NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY

ENVIRONMENTAL IMPACT ASSESSMENT GUIDELINES

FOR

THE ENERGY SECTOR

June 2004

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Acronyms

AFDB	African Development Bank
BP	
CAO	Chief Administrative Officer
CBA	Cost Benefit Analysis
COD	Chemical Oxygen Demand
EIA	Environmental Impact Assessment
EIR	Environmental Impact Review
EIS	Environmental Impact Statement
EIStudy	Environmental Impact Study
ERA	Electricity Regulatory Authority
GoU	Government of Uganda
GTZ	German Technical Cooperation
IDA	International Development Association
IFC	International Finance Cooperation
IPP	Independent Power Producer
IRN	International Rivers Network
kVA	Kilo Volts Ampere
kW	Kilo Watts
LC	Local Council
MEMD	Ministry of Energy and Mineral Development
NEMA	National Environment Management Authority
NGO	Non Governmental Organization
NORAD	Norwegian Agency for Development Cooperation

OD	Operational Directive
OP	Operational Polices
PoE	Pannel of Experts
PPM	Parts Per Million
RDC	Resident District Commissioner
REA	Rural Electrification Agency
ROW	Right of Way
SIDA	Swedish International Development Agency
ToR	Terms of Reference
UN	United Nations
WCD	World Commission on Dams
WHO	World Health Organization

Glossary

The following definitions are adopted from the National Environment Statute, of 1995, with additional definitions of terms used in the EIA Guidelines but not included in the Statute.

Developer: Means a person, group of persons or agency developing a new project or proposing to extend an existing project which is subject to an EIA process.

Cumulative Impacts: Those impacts that result from incremental impacts of the proposed action added to the impacts of other past, present and foreseeable future action.

Direct Impacts: Those impacts that are caused by the action and which generally occur at the same time and place as the action.

EIA: A systematic examination conducted to determine whether or not a project will have any adverse impacts on the environment.

EIS: The written report that presents the results of an EIStudy.

EIStudy: the study conducted to determine the possible environmental impacts of a proposed policy, project, plans or activity, and measures to mitigate any such impacts.

Environment: The physical factors of the surroundings of abiotic and biotic including land, water, atmosphere, climate, sound, odour, taste, the biological factors of animals and plants and the social factor of aesthetics and includes both the natural and the disturbed environment.

Environmental Economic Analysis: An analysis of the expected environmental impacts of projects from an economic perspective.

Environmental Monitoring: Observation of effects of developing projects on environmental resources and values; including sampling, analysis, temporal monitoring during the project construction stage and continued periodic monitoring following commencement of project operation

Guidelines: the description of the methodology for conducting EIAs for energy projects, and the responsibilities for the different stakeholders within the EIA process.

Impact: Is the effect of any action that affects one or more elements of the natural, Social, political or economic environment, either adversely or beneficially.

Indirect Impact: Those impacts that include changes in the natural environment, population, economic growth, and land use, as a result of actions not directly linked to the project in question.

Lead Agency: Any ministry, department, parastatal agency, local government system or public officer in which or in whom any law vests function of control or management of any segment of the environment.

Mitigation measures: Actions which reduce, avoid or offset the potential adverse environmental consequences of a project, and include engineering works, technological improvements, management measures and ways and means of ameliorating effects to the environment and losses suffered by individuals and/or communities, including compensation and resettlement.

Participation: A process through which stakeholders influence and share control over development initiatives and decisions on resources that affect them.

Pollution: Any direct or indirect alteration of the physical, thermal, chemical, biological, or radioactive properties of any part of the environment by discharging, emitting or disposing waste so as to affect any beneficial use dversely, to cause a condition which is hazardous or potentially hazardous to public health, safety, or welfare or to to animals, plants or aquatic life to cause a concentration of any condition, limitations or restriction to a healthy environment.

Practitioner: an expert in conducting the EIStudy and preparation of the EIS.

Project: A set of planned activities designed to achieve specific objectives within a given area and time frame.

Project brief: A summary statement of the nature of the project, its proposed environmental setting and the likely environmental impacts and mitigation measures thereto.

Review: Critical examination and assessment of an EIA/EIS and its conclusions and recommendation.

Scoping: Early, open identification of potentially significant environmental impacts and de-emphasis or elimination of insignificant impacts or impacts which have already been covered by other EIAs.

Screening: Determination of which level of EIA is required.

Significance: An expert evaluation/judgment of the magnitude of impact(s) or the degree to which a proposed activity or project may (potentially) impact on the environment if implemented.

Significant effect: A substantial, or potentially substantial, adverse change in any of the physical factors of the surroundings of the human beings including land, water, atmosphere, climate, sound, odour, taste, the biological factors of animals and plants and the social factor of aesthetics includeing both the natural and the disturbed environment.

Stakeholder: Those affected by the outcome of a project or can affect the outcome of a proposed project either negatively or positively.

HOW TO READ AND USE THESE GUIDELINES

This report is structured into 10 chapters. After the Introduction in chapter 1, chapter 2 provides the legal and policy framework for energy projects. Chapter 3 considers the NEMA EIA guidelines and how they can be applied to the energy sector, giving an overview of the EIA process in Uganda. In chapter 4, impacts commonly associated with energy projects and measures to mitigate them are presented. Chapter 5 presents EIA guidelines as they apply to MEMD in its function as the lead agency. Chapter 6 provides guidelines for developers, and chapter 7 for practitioners or consulting engineers. Chapter 8 provides guidelines for the mitigation of social-economic impacts, and chapter 9 for public consultation, while chapter 10 deals with resettlement and compensation issues.

It might not be necessary to read this document in consecutive order, nor to study all its chapters. The document is arranged in such a way, that the different players in the EIA process can greatly benefit by referring to the chapter that is relevant to them. For example, a **developer** needs not to bother about chapter 5 describing the roles and tasks of MEMD. They could start with the introduction (chapter 1), skip to the general EIA process description (chapter 3), and then concentrate on the part describing their tasks (chapter 6) using the project-specific impact- and mitigation lists (chapter 4) in order to improve their project design. On the other hand, an experienced **practitioner** can directly start on the part describing his tasks (chapter 7), while falling back on the relevant sections, and text references that are given throughout the guidelines as his assignment proceeds.

CHAPTER ONE

1.0 BACKGROUND AND INTRODUCTION TO THE GUIDELINES

1.1 Uganda's Energy Sector

In Uganda, like any other Country, the energy sector plays a central role in the economy. Energy is the engine for economic growth and development, and a vital input into all the productive and social sectors of the economy.

Uganda's energy sector like most other sectors of the economy, is largely informal and underdeveloped. It is characterized by a very low level of consumption of modern energy estimated at 0.02 toe per capita, one of the lowest in the world. There is over dependence on low-grade forms of energy especially biomass-based fuels which account for more than 92% of the total energy consumption. The level of electrification is very low and only about 5% of the population are connected to the national grid. In rural areas, only about 1% of the households are connected to grid power, while the remainder comes from household diesel generators, batteries and solar phovoltaics (PVs).

In terms of natural resource endowment, the country is blessed with a variety of energy resources. These include biomass and water resources, ideal solar conditions, peat, geothermal, wind and large quantities of non-woody biomass. However, with the exception of biomass whose contribution is already enormous, the remaining energy potential remains largely untapped. The government's major role in this sector is to remove barriers and constraints that have hampered the widespread exploitation and use of these resources so that they can contribute more significantly to the country's energy sector and the economy as a whole.

Uganda's past decade has been characterized by the successful revitalization and record growth of her economy. This has created new and additional demands for various forms of energy. In order to cope with these demands, and further develop and expand the sector, Government has adopted a number of appropriate intervention policies and strategies. These interventions are in line with the overall energy policy goal of ensuring adequate, modern and sustainable energy supplies so as to overcome the inherent adverse impacts of over dependence on biomass fuels. Further, the policy seeks to evolve an energy supply system that is cost effective, sustainable and environmentally friendly so as to meet the current and future demands of the country's economy.

1.2 Energy and the Environment

The quest for providing energy needs raises many environmental concerns. Depending on their nature, scale and location, energy development projects are commonly associated with a variety of adverse impacts on the environment. The production, conversion, transportation and final utilization of many forms of energy are harmful to the environment. At the global level, energy activities give rise to undesirable phenomena such as global warming, climate change, and pollution of water and air while at the local and national level, energy is strongly linked with

deforestation, destruction of ecosystems, micro-climate change and displacement of people and communities.

It is, therefore, very important that the intimate relationship between energy and the environment is duly recognized as Uganda embarks on the implementation of her set policy objectives in the energy sector. The environmental and socio-economic concerns relating to new or planned energy development projects ought to be systematically integrated into the country's overall development process.

1.3 EIA as a Tool for Environmental Management

The critical need to integrate environmental and socio economic concerns into the development process has been fully realized at both national and international levels. Efforts in this direction can be traced from several international declarations, notably the The RIO Declaration, Earth Summit (1992). In Uganda, The National Environment Statute (1995) provided the legal basis for sound environmental management in the country. This statute emphasized the usefulness of Environmental Impact Assessment (EIA) as a tool for ensuring sound environmental management, and also spelt out the responsibilities and mandates of different institutions in managing the country's environmental resources.

The donor community especially, both the bi-lateral and multi-lateral agencies stress the need to harmonize development actions with environmental concerns in development cooperation. One of the fundamental objectives of donor assistance where they are involved is to promote sustainable use of natural resources and protection of the environment. Following the development and adoption of 'The Guidelines on Environment and Aid', most donor agencies have developed guidelines for EIA process, and these apply to all forms of development assistance where they are involved.

The EIA is a universally accepted concept that can allow the effective integration of the key project concerns into the policy and project planning process at the earliest possible planning and design stages. But it is also a proactive planning tool, an aid to the decision-making process and an instrument for attaining sustainable development. It is against this background that the National Environment Management Authority (NEMA) developed EIA Guidelines (1997), for the purpose of guiding development actions that are likely to impact on the Uganda's environment.

Annexe 3 of the NEMA guidelines lists energy projects/activities among those that should be subjected to an EIA before they can be granted approval for implementation. These guidelines, however, are not specific to energy development projects but target all development actions that are likely to have significant adverse impacts on the environment. In view of this, EIA sectoral guidelines have been developed specifically for energy development projects and for the energy sector in general.

In developing the sectoral guidelines, a holistic interpretation of the energy sector has been adopted, and the guidelines apply to the projects listed in Annex A. These can be new development projects or major modifications to existing infrastructure or facilities.

The EIA sectoral guidelines have been purposely developed to facilitate the easy implementation of new or planned developments in the energy sector by providing practical guidance to all the key players involved in managing different aspects of the EIA process. The key players in the sector include the Ministry of Energy and Mineral Development (MEMD) which is also the lead agency. Others are NEMA, developers, EIA practitioners, statutory and other consultees, and the general public. A reasonable degree of flexibility has been allowed so that the guidelines can be updated as and when new environmental conditions and realities demand so.

CHAPTER TWO

2.0 LEGAL AND POLICY FRAMEWORK

2.1 Introduction

There are several state policies, laws, regulations and standards that are specifically relevant to energy development activities. The developer should first carefully study such policies and laws so that they provide the policy and legal background against which the acceptability of a proposed project shall be determined by a competent authority. Further, there are several international treaties and agreements of which Uganda is a signatory that might also apply to a proposed project.

This chapter summarizes the most relevant policies and laws, and international treaties and agreements that apply to energy development projects. It is a requirement that all aspects of an energy development project complies with such policies, laws, treaties and agreements.

2.2 Environment Management

Under the National Environment Statute, 1995, NEMA is the principal agency for the management of the environment and shall coordinate, monitor and supervise all activities in the field of the environment .

The National Environment Statute, 1995 provides tools for environmental management including EIAs. The Statute imposes a mandatory duty on a project developer to have an EIA conducted and approved before embarking on a project.

The EIA Regulations, 1998 specifies the types of projects to be subject to EIAs.

2.3 The National Energy Policy, 2002

The policy goal in the energy sector is to meet the energy needs of the Ugandan population for social and economic development in an environmentally sustainable manner.

Specifically, the energy policy seeks to meet the following broad objectives:

- To establish the availability, potential and demand of the various energy resources in the country
- To increase access to modern, affordable and reliable energy services
- To improve energy governance and administration
- To stimulate economic development
- To manage energy-related environmental impacts

In pursuit of these objectives, the government will ensure that environmental considerations are given priority by energy suppliers and users to protect the

environment and will put in place a monitoring mechanism to evaluate compliance with established environmental protection guidelines.

2.4 Water Resources Management

The Water Statute, 1995 provides for the use, protection and management of water resources and supply.

The management framework for water resources in Uganda is spelt out in the Water Statute, 1995 and the National Water Policy (1997).

The National Environment Statute, 1995 requires a developer to obtain a permit from the Department of Water Development (DWD) before the developer can undertake any construction on water resources and that an EIA be carried out before the DWD will issue a permit to construct a hydropower project.

2.5 Wildlife Management

The Uganda Wildlife Policy formed the basis for the enactment of the Uganda Wildlife Statute, 1996 and the establishment of the Uganda Wildlife Authority (UWA).

The purpose of the Statute is to promote the conservation and sustainable utilization of wildlife throughout Uganda so that the abundance and diversity of their species are maintained at optimum levels commensurate with other forms of land use. The Statute also emphasizes the importance of public participation in wildlife management.

The Statute requires an EIA to be carried out for any project that has got potential for causing a significant impact on any wildlife species or community.

2.6 Electricity Regulation

The Electricity Act, 1999 provides for the establishment of the Electricity Regulatory Authority (ERA) whose functions include: issuing licenses for the generation, transmission, distribution or sale of electricity; controlling activities in the electricity sector; liberalizing and bringing competition in the electricity sector; replacing the Electricity Act, 1964 and providing for a successor Company to the Uganda Electricity Board.

Section 30 of the Electricity Act requires that before a license is issued, the developer shall provide NEMA the description of the impact of the project on electricity supply, socio-economics, cultural heritage, the environment, natural resources and wildlife.

The Electricity Act, 1999 authorizes the ERA to delegate some of its licensing functions to local governments and to be paid royalties by the developers.

2.7 Land Act, 1998

The Land Act, 1998 provides for the ownership and management of land. It provides for four different types of land tenures (Customary, Leasehold, Mailo and Freehold) and the procedure for applying for grant of any of the tenures. The Act states that non-citizens of Uganda may only be granted leases not exceeding 99 years.

The Act inter alia provides that the construction of electricity transmission and distribution lines, construction of dams and hydropower plants are public works and any person authorized to execute public works on any land may enter into mutual agreement with an occupier or owner of the land in accordance with the Act.

The developer of an energy project should seek to enter into mutual agreement with the occupier or owner of the land. The Act creates a series of land administration institutions consisting of Uganda Land Commission (ULC), District Land Boards (DLB), Parish Land Committees (PLC) and land tribunals. Section 78 of the Act gives valuation principles for compensation. Section 40 requires the written consent from the spouse(s) and children before the household head transfers, sells or enters into contract of land where the household derives its livelihood. The District Land Tribunals have power to determine any disputes arising out of compensation for land.

Under the Land Fund, there is a provision for resettling persons who have been rendered land-less by Government action. For energy development projects in general, the developer will have to source funds for resettlement or compensation.

2.8 Land Acquisition Act, 1965

This Act provides for the procedure and method of compulsory acquisition of land for public purposes whether for temporary or permanent use. The minister responsible for land may authorise any person(s) to enter upon the land and survey it, dig or bore the subsoil or any other thing necessary for ascertaining whether the land is suitable for a public purpose. The government is expected to compensate any person who suffers damage as a result of any action. Any dispute as to the compensation payable can be referred by the Attorney General to court for decision.

2.9 Local Government Act, 1997

The Local Government Act, 1997 provides for decentralization and devolution of government functions, powers and services from the central to local governments and sets up the political and administrative functions of local governments. The local governments are responsible for the protection of the environment at the district level. This therefore, implies that local governments shall be consulted on projects to be located within their jurisdiction and on matters that affect their environment. The Electricity Act, 1999 further authorizes the ERA to delegate some of its licensing functions to local governments and to be paid royalties by the developers.

2.10 The Mineral Policy for Uganda

Among the main objectives of the Mineral Policy for Uganda, 2001 is the minimization of the adverse social and environmental impacts of mineral exploitation. This policy commits Government to ensure that there is compliance with the existing laws governing the environment and protection of human health and safety.

2.11 Privatization and Investment

The Investment Code Statute, 1991 sets out the procedure for obtaining an investment license. The code provides that investment in the energy industry is priority and requires the investor to conduct an EIA for approval by NEMA before the project can be implemented.

2.12 Regulation in dealing with Petroleum Products

The Petroleum Act, 1957 mandates the Department of Petroleum Supplies in the MEMD to: monitor the importation and exploration of petroleum products, receive and process applications for petroleum operating companies, and obtain information on petroleum products within the country. In addition, the government issued comprehensive guidelines to companies intending to deal in petroleum products. Construction permits are issued by MEMD to Oil Companies after they have conducted an EIA and obtained an approval from NEMA.

2.13 Petroleum (Conduct of Exploration Operations) Regulations, 1993

Regulation Number 51 (1) provides pollution prevention obligations. It states that in carrying out exploration, development and production operations and transportation of oil and gas, the licence holder shall operate in a manner that ensures the prevention of pollution of the environment. Regulation 53 (1) states that before drilling operations are commenced in any licensed area, the person in charge shall submit for approval by the commissioner, a description of procedures, personnel, equipment and materials that will be used in monitoring, cleaning, and prevention of the spread of any pollution arising from exploration or development activities.

2.14 The Town and Country Planning Act Cap. 30

This act provides for the orderly and progressive development of land in towns and other rural areas of the Country. It defines building operations to include the making accessible of electrical installations and development in relation to any land. Any placing of new poles for transmission and distribution of electricity and construction of substations must comply with the provisions of this Act.

2.15 The Uganda Constitution, 1995

The Uganda Constitution of 1995 (Articles 39 and 41), provide that everyone has a duty to maintain a sound environment. Every person in Uganda has a right to a healthy and clean environment and as such can bring legal action for any pollution or disposal of wastes. Chapter three, section 245 stipulates that Parliament shall by law provide measures intended to protect and preserve the environment from abuse, pollution and degradation.

For acquisition of land for development and other purposes, Article 237(1) of the Constitution vests all land in Uganda in her citizens. However, under Article 237(1) (a), the Government or Local Government may acquire land in the public interest. Such acquisition is subject to the provisions of Article 26 of the same Constitution, which gives every person in Uganda a right to own property. It provides procedures to follow during the acquisition of land for public interest and provides for the "prompt payment of fair and adequate compensation" prior to taking possession of land. The Constitution, however, does not make resettlement a right.

2.16 The Roads Act, 1964

The Roads Act of 1964 is a critical piece of legislation with respect to the construction of access roads to energy provision facilities. It defines a road reserve as that area bounded by imaginary lines parallel to and not more than fifty feet distant from the centreline of any road. The Act is silent on whether such land is "taken" for the state, but states that no person shall erect any building or plant trees or grow permanent crops within a road reserve. However, it allows the roads authorities to dig and take materials from the road reserve for the construction and maintenance of roads.

The road authority is required to give written notice to the illegal occupier of the land on which prohibited activities have been carried out.

2.17 The Public Health Act (1964)

The main objective of the Public Health Act is to safeguard and promote the public health. Section 7 of the Act provides local authorities with administrative powers to take all lawful, necessary and reasonable measures for preventing the occurrence of, or for dealing with any outbreak or prevalence of any infectious communicable or preventable diseases. Local Authorities are mandated to exercise powers and perform the duties in respect of public health conferred or imposed by this act or any other law.

Section 105 of the Act imposes a duty on the Local Authority to take measures to prevent any pollution dangerous to the health of any water supply that the public has a right to use for drinking or domestic purposes. The Act also details the siting of waste disposal facilities such as solid waste skips in relation to settlements and food points.

2.18 The Factories Act (1964)

This act provides for the health, safety and welfare of persons employed in factories and other places. Areas of concern under the Act include overcrowding, ventilation and lighting, housekeeping, and general safety aspects pertaining to work in confined spaces and fire safety. Workers must have adequate training for their specific jobs and also in the proper use of protective equipment.

2.19 International Treaties and Agreements.

River Nile

There are several international treaties and agreements concerning the River Nile. As a trans-boundary resource, the Nile has been subject to various international agreements in order to regulate and control its water use, and ensure that its resources are shared in a fair and equitable manner between the ten countries of the Nile Basin.

The Nile River Basin Action Plan and Panel of Experts (POE), 1959. The Agreement provides for the full utilization of the Nile waters between Egypt and Sudan which, among other things, established a Permanent Joint Technical Committee to resolve disputes and jointly review claims by other riparian countries.

Lake Victoria

There are several agreements relating to the management of Lake Victoria resources signed between Kenya, Uganda and Tanzania. The most important being, 'The 1994 Agreement on the preparation of the tripartite Environmental Management Program for Lake Victoria'.

International Agreements and Conventions

Uganda has signed and /or ratified several international agreements relating to the environment, both global and regional. Agreements of potential importance are briefly outlined in the box on page 18.

International Agreements to which Uganda is Party.

- Uganda has ratified the Convention concerning the Protection of the World Cultural and Natural Heritage (World Heritage Convention). Two sites in Uganda feature on the World Heritage List: Bwindi Impenetrable National Park and Rwenzori Mountains National Park. The Murchison Falls have been proposed to be included on the World Heritage List .

- Uganda has ratified 'The Convention on Biological Diversity (CBD)'. This Convention's main objective is to ensure the conservation of biological diversity and the sustainable use of its components.

- Uganda has signed but not ratified the Convention on the Conservation of Migratory Species of Wild Animals (CMS). The objective of the Convention is to conserve those species of wild animals that migrate across or outside national boundaries.

- Uganda has ratified the Convention on Wetlands of International Importance (Ramsar Convention).

- Uganda has ratified the African Convention on the Conservation of Nature and Natural Resources (1968), signed the Protocol Agreement on the Conservation of Common Natural Resources (1982).

- Uganda is a party to the Treaty on the Non-Proliferation of Nuclear Weapons that entered into force on 5 March 1970.

The co-operative efforts described above imply that the developer is expected to conform to these international requirements.

2.17 Donors and Financing Institutions

The World Bank Group has developed safeguard policies for environmental and social issues that project sponsors/developers ought to review before conducting their assessments. During the Bank's appraisal process, policies that apply to a specific project are identified.

Projects seeking support from the World Bank will, therefore, have to adhere to the guidelines in *The Environment Assessment Sourcebook (1991)* and the *Environmental Sourcebook Updates issued periodically since 1993.*

The World Bank Group has a range of relevant requirements and guidelines that apply to energy projects outlined in box on page 19.

Relevant Requirements and Guidelines by World Bank for Energy Projects

- OP 4.01 Environmental Assessment
  Outlines the general requirements regarding environmental assessment, and defines the possible instruments which include EIA.
- OP 4.04 Natural Habitats
  The Bank is committed to protecting natural habitats and provides for compensatory measures when lending results in adverse impacts. The Bank promotes conservation and management of wetlands (e.g. estuaries, lakes, mangroves, marshes, and swamps).
- OP 4.07, Water Resources Management
  Bank policy promotes the protection and management of watersheds, as an element of lending operations for dams, reservoirs, and irrigation systems.
- OP 4.11 Cultural property
  Confirms the Bank's commitment to protect archaeological sites, historic monuments, and historic settlements.
- OP/BP/GP 4.12 Involuntary Resettlement
  Provides guidance on projects involving involuntary resettlement.
- OD 4.20 Indigenous People (to be reissued as OP/BP 4.10)
  Provides specific guidance on addressing the rights of indigenous peoples, including traditional land and water rights.
- OP 4.36 Forestry
  Guidance on tropical forests is also provided by the Bank's July 1991 paper Forest Policy and OP/BP 4.04 Natural Habitats.
- OP 4.37 Safety of Dams
- OP/BP 7.50 International waterways
  Provides guidance for projects on international waterways.
- OP 7.60 Projects in Disputed Areas
- Induced development and other socio-cultural aspects. Secondary growth of settlements and infrastructure, often referred to as "induced development" or "boomtown" effects, can have major indirect environmental impacts, which local governments may have difficulty to address.
- International treaties and agreements on the environment, natural resources, and cultural property. The EA should review the status and application of such current and pending treaties and agreements, including their notification requirements.
- Land settlement. Land settlement should generally be carefully reviewed because it can have complex physical, biological, socio-economic, and cultural impacts.
- Natural hazards. The EA should review whether the project may be affected by natural hazards (e.g., earthquakes, floods, volcanic activity) and, if so, should propose specific measures to these concerns (see OP/BP 8.50 Emergency Recovery Assistance).
- Occupational health and safety. All industry and energy projects should include formal plans to promote occupational health and safety (see World Bank's Occupational Health and Safety Guidelines).

Other donor agencies, notably AfDB, SIDA, DfID and NORAD have also developed their own EIA guidelines. The guidelines apply to all forms of development assistance initiated and supported by these agencies. It is a standard requirement that developers seeking any form of support from such agencies must comply with the EIA guidelines of the relevant agency.

For large development projects, especially hydropower, some international organisations including NGOs can provide valuable information on the acceptability of the proposed project. These include the International River Network (IRN) and the World Commission on Dams (WCD), now working under Dams and Development. It is strongly recommended that the concerns of such organisations are taken into account during project development and the entire EIA process.

3.0 THE EIA PROCESS IN UGANDA AS APPLICABLE TO THE ENERGY SECTOR

The National Environmental Statute, 1995 gives NEMA the responsibility for preparing and adopting guidelines for the EIA process in Uganda. The Statute also mandates NEMA to administer and oversee the entire EIA process in the country.

In accordance with the EIA Regulations, 1998, the actual implementation of the EIA process remains a function of the relevant line ministries and departments, the private sector, and the public. The implementation of the EIA sectoral guidelines for development projects in the energy sector is, therefore, a responsibility of MEMD.

The EIA Guidelines, (NEMA,1997), do recognize three interconnected phases of the EIA process in Uganda, namely; Screening, Environmental Impact Study (EIStudy) and decision-making. These phases equally apply to energy development projects before they can be granted approval for implementation.

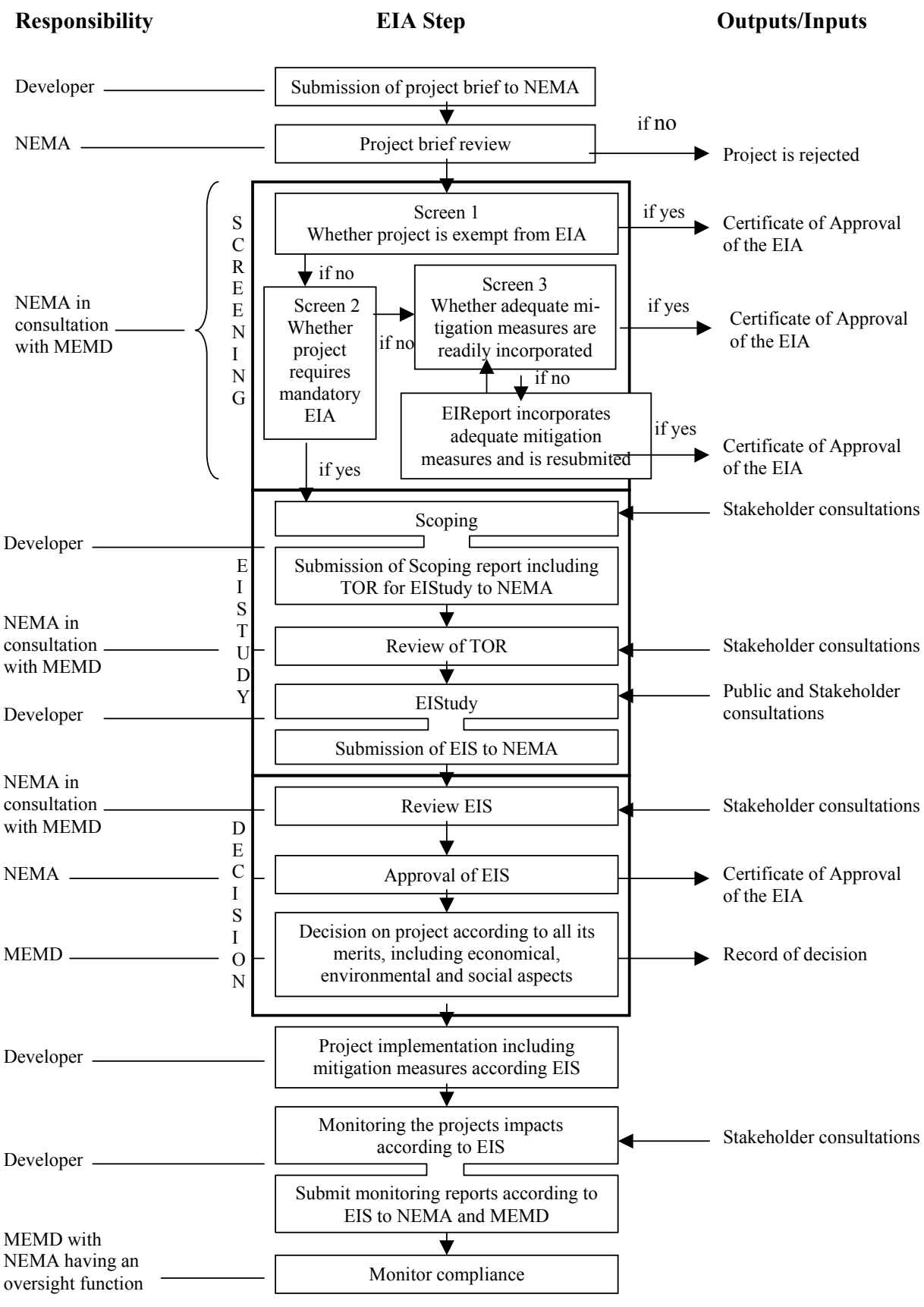
3.1 The EIA Process in Uganda

EIA Guidelines (NEMA,1997) and EIA Regulations (NEMA,1998) recognize the following stages of EIA in Uganda:

- Project brief formulation
- Screening
- EIStudy
- Decision making
- Environmental monitoring and auditing

Figure 3.1 gives an overview of the EIA process, responsibilities and necessary inputs and outputs for a typical energy project.

Figure 3.1: EIA process flow for energy



Source: Adapted from *Guidelines for EIA in Uganda*, NEMA, 1997.

3.2 Preparation of the Project Brief

The project brief provides essential background information on the project inputs and outputs to guide a competent authority on the screening criteria to which the proposed project should be subjected. Project briefs are usually prepared by developers. A Developer may be private, or public like in the case where MEMD is undertaking the project itself.

The commencement of the EIA process is marked by the submission of ten (10) copies of the project brief to NEMA by the developer. If NEMA deems the brief to be complete, a copy is forwarded to MEMD for further review. Upon receipt of the brief, NEMA is allowed a maximum of fourteen working days within which to make her comments on it. At this stage, NEMA starts preliminary consultations with MEMD on the proposed project. Screening of the project then follows.

The content of a well-written project brief is given in Annex B1.

3.3 Environmental Screening

The objective of screening is to determine the extent to which a project is likely to affect the environment and therefore, be able to determine the level of assessment required. If it is determined not to have potential to cause significant adverse impacts, it can be exempted from further environmental assessment right away.

Screening is generally guided by the following criteria:

- Size or location of project
- Type of project
- Potential impacts compared against set thresholds and standards

Not all energy projects may necessarily cause significant adverse effects on the environment. This is due to differences in energy source, scale of operation, nature and complexity of the project and location. Different energy projects, therefore, undergo different levels of environmental assessment.

Screening stages

Screen I: The first screening decides on the projects that do not require an EIA; these belong to the exempt category. A list of projects falling under this category, also known as category i is given in Table 5.1 on page 58.

Screen II: Energy projects that require mandatory EIA are directly subjected to a detailed EIStudy. Projects in this category, also known as Screening Category iii include small and large hydro projects, geothermal energy projects, industrial charcoal production, electric transmission and distribution lines, wind farms, thermal power stations, petroleum extraction and production, and petroleum storage facilities. A full list of such projects is also given in Table 5.1.

Screen III: Projects that do not fall under any of the above two categories do not require a mandatory EIA though they are associated with some adverse impacts. Such projects belong to Screening Category II, also presented in Table 5.1. If adequate mitigation measures are already prescribed for a project, it can be approved directly, and if not, then an EIR is required. Depending on the results of the EIR, the project can be approved or subjected to a detailed EIStudy.

If a decision is made at the screening stage to exempt a project, or to approve its environmental aspects on the basis of identified adequate mitigation measures, such a decision shall be contained in a Certificate of Approval of the EIA issued by NEMA.

3.4 Environmental Impact Review

During the screening process, there may be uncertainty on the nature and magnitude of impacts some energy projects can cause. This mainly applies to projects belonging to category iii. These projects therefore, require an EIR to determine if mitigation measures can be identified, or whether a more detailed EIStudy would be required.

NEMA and MEMD can use their expertise in addition to the checklist provided in Annex D3 to assess the nature and level of likely environmental impacts. Depending on the results of their assessment, the project can be approved or it may be decided that a detailed EIStudy is necessary.

When a Developer completes preparation of the EIR report, it is submitted to NEMA, which in turn consults with MEMD for the purpose of reviewing the report and making a decision on the project.

The review of EIR should not exceed 30 days. Upon approval, NEMA shall issue a certificate of approval of the EIR.

3.5 Environmental Impact Study

According to the EIA Regulations, 1998, EIStudy refers to the detailed study conducted to determine the possible environmental impacts of a proposed project and measures to mitigate their effects.

Scoping and ToR

Scoping is the initial step in the EIStudy. Its purpose is to determine the scope of work to be undertaken in assessing the environmental impacts of the proposed project. It identifies the critical environmental impacts of the project for which in-depth studies are required, and elimination of the insignificant ones. The scoping exercise should involve all the project stakeholders so that consensus is reached on what to include or exclude from the scope of work. It is also at this stage that project alternatives are identified and taken into consideration.

The Developer takes the responsibility for scoping and prepares the scoping report after consultation with NEMA, MEMD and other stakeholders. The developer with assistance from technical consultants draws the ToR for the EIStudy and submits a copy to NEMA that shall in turn forward them to MEMD for comments. In case MEMD is the developer, it submits the ToR to NEMA for review and approval, and thereafter the EIStudy commences.

The relevant information for scoping is listed in Annex C1 while a scoping checklist is provided in Annex C2. The ToR for an EIStudy of a typical energy project are given in Annex D1.

Conducting EIStudy

The conducting of the EIStudy usually includes but not limited to the following:

- Commissioning of expert study team.
- Identifying key actors and decision makers.
- Researching of policies, laws, regulations and other requirements that will affect the recommendations.
- Making contacts with each of the various decision makers.
- Determining how and when to communicate the EIA's findings.

Main Steps in the EIStudy

- Identification – what will happen as a result of the project?
- Prediction – what will be the extent of the changes?
- Evaluation - do the changes matter?
- Mitigation – what can be done about them?
- Monitoring - how can critical impacts and the compliance of mitigation measures be monitored?
- Documentation - how can the decision makers be informed of what needs to be done?

Preparation of the EIS

In preparing an EIS, relevant information is collected on issues of real significance and sensitivity. These are then analyzed, mitigation measures developed for the adverse impacts, and compensatory measures recommended for unmitigated environmental impacts. Measures aimed at enhancing beneficial or positive impacts are also given. An EIS documents the findings of the EIStudy, and is submitted to NEMA by the developer. The detailed content of the EIS is outlined in Annex D2.

3.6 Review of EIS and Decision on Project

The Developer is required to submit ten (10) copies of the EIS to NEMA for review and approval. NEMA then forwards a copy to the MEMD for comments, and this should be done within thirty working days upon receipt of the EIS. On the other hand, if the MEMD is the developer, it will be required to submit the EIS to NEMA for review and approval.

NEMA in consultation with MEMD shall review the contents of the EIS, paying particular attention to the identified environmental impacts and their mitigation measures, as well as the level of consultation and involvement of the affected stakeholders in the EIStudy process. In this review, the level to which the ToR set out for the study is addressed shall be considered. In making a decision about the adequacy of the EIS, NEMA shall take into account the comments and observations made by MEMD, other stakeholders and the general public.

NEMA may grant permission for the project with or without conditions, or refuse permission. If the project is approved, the Developer will be issued a Certificate of Approval.

After approval or disapproval of the EIS by NEMA, MEMD and other licensing authorities will then take appropriate action to approve or disapprove the project based on all its merits (environmental, social, economic, or other factors), and a Record of Decision shall be prepared.

After reaching a decision on the proposed action, if it is approved, the developer will be licensed or permitted to implement the project in accordance with the mitigation measures stipulated in the EIS and any other terms and conditions attached to the approval. If it is denied, the developer may, if such denial is based on environmental considerations that can further be improved, be urged to revise the proposed action to eliminate adverse impacts.

3.7 Environmental Monitoring

Monitoring is the continuous and systematic collection of data in order to assess whether the environmental objectives of the project have been achieved. Good practice demands that procedures for monitoring the environmental performance of proposed projects are incorporated in the EIS.

The purpose of monitoring is to:

- Provide information that the predicted impacts from a project are within the engineering and environmental acceptable limits.
- Provide an early warning information for unacceptable environmental conditions.
- Ensure that the mitigation measures proposed in the environmental management plans are implemented satisfactorily.
- Assist in identifying additional mitigation efforts needed or where alteration to the adopted management approach may be required.

Monitoring plan

To assist in the implementation of identified mitigation and monitoring strategies, an environmental and monitoring plan will be developed. It will describe the various environmental management strategies and procedures and will identify the management roles and responsibilities for ensuring that monitoring is undertaken and that the results are analysed and any necessary amendments to practices are identified and implemented in a timely manner.

The monitoring plan shall provide for monitoring of both project implementation and environmental quality. It shall contain a schedule for inspecting and reporting upon the implementation of the project and associated mitigation measures identified in the EIS. The monitoring plan shall also identify the key indicators of environmental impact. Further, the plan shall provide a schedule for monitoring each indicator and for reporting the monitoring results to MEMD and NEMA.

Details of monitoring requirements are given in Annex E.

Key Factors for Environmentally Sound Project Implementation, Monitoring and Evaluation.

- The EIS must contain relevant background data against which results can be monitored and evaluated.
- Measures to eliminate or minimise effects on the environment must have specific objectives and indicators, and must be included in project documents and in agreements.
- Indicators for objectives of the project's positive contribution to sustainable development must be clearly defined.
- Funds should be allocated by the developer to ensure monitoring of the environmental impacts of the project.
- The responsibility for implementing requisite measures and the responsibility for monitoring these measures should be defined.
- In case training is essential to ensure effective implementation and monitoring, funds for capacity building should be allocated in the project budget.

3.8 Environmental Evaluation

The evaluation of the positive and negative impacts of a project should be carried out by MEMD and the developer, both during the implementation stage and after the decommissioning of the project. This exercise makes it possible for all stakeholders to learn from the experience gained.

The data collected during monitoring is analyzed with the aim of:

- Assessing any changes in baseline conditions
- Assessing whether recommended mitigation measure have been successfully implemented
- Determining reasons for unsuccessful mitigation
- Developing and recommending alternative mitigation measures or plans to replace unsatisfactory ones
- Identifying and explaining trends in environment improvement or degradation.

4.0 POTENTIAL IMPACTS AND POSSIBLE MITIGATION MEASURES FOR ENERGY PROJECTS

This chapter describes some of the major environmental impacts and issues associated with selected development projects in the energy sector. The impacts can be adverse or beneficial. For adverse impacts, the possible mitigation measures are proposed at each stage of the different energy projects in the subsequent sections.

The beneficial impacts of energy projects can be local or go beyond the project area. Depending on the type of the project, these are mainly of a socio-economic nature, and include: provision of energy, employment, entertainment, improved social services, fishing and water supply. During the EIA process, measures aimed at enhancing such benefits should be proposed where they occur and enhanced.

4.1 Environmental Impacts of Hydropower Projects

The dams and reservoirs required to generate hydropower can provide additional benefits in terms of water supply, irrigation, reservoir fishery and recreation. These positive impacts should be enhanced. However, by modifying the hydrological regime, dams inevitably affect both natural and man-made environments both in the vicinity of the project and downstream. The likely impacts of hydropower projects are given in Table 4.1.

Table 4.1: The Environmental Impacts of Hydropower Projects

Project stage	Impact source	Impact	Mitigation measures
Construction	Land take	Loss of habitats (agricultural land, forest, range, wetlands, scenic beauty)	• Siting of dam to decrease losses • Decrease of dam and reservoir size • Protection of equal areas in region to offset losses, establishment of parks or reserved areas
		Loss of biodiversity and change in species composition, causing - loss of fish catch - loss of wildlife	• Avoid areas with aquatic resources of high biodiversity value • Avoid areas with sensitive habitats or containing highly valued ecological resources • Provide alternative habitat of at least equal value • Physically rescue and relocate species where possible
		Dislocation of people	• Relocation of people to nearby suitable area • Provision of compensation for resources lost • Provision of adequate health services, infrastructure and employment opportunities • See chapter 10 on Resettlement and Compensation for details
		Loss of historic, cultural or aesthetic features	• Salvage or protection of cultural properties

Project stage	Impact source	Impact	Mitigation measures
	Construction activities	Air and water pollution, noise, waste disposal	• Air and water pollution control, controlled waste disposal Reduce or protect against noise levels
Construction	Construction activities	Soil erosion	• Careful location of camps, buildings, borrow pits, quarries, spoil and disposal sites • Precautions to minimize erosion • Minimize dust levels • Install sewerage treatment plants • Regular environmental, health and safety monitoring • Control fuel wood extraction • Prevention of hunting of wild animals • Use approved waste disposal methods • Provide latrines
		Destruction of vegetation	
		Safety	
		Sanitary and health problems from construction camps, influx of new diseases	
		Fuel leakages or spillages	• Good practice of waste oil management • Suitable protective measures to effectively prevent any fuel leakages, spent lubricants or spillages
		Traffic / Access roads	• Design access roads to minimise land take and the exposure of remote areas to exploitation and development • Minimise noise and physical disturbance through adequate traffic management
		Downstream floods	• Flood control
		Labour migration to area, disruption of local communities	• Prefer employment of local labour
Inundation	Flooding of mineral resources	Loss of resources	• Exploit resources before inundation
		Dissolving minerals effect water quality	• Seal mines before inundation
	Biomass and waste in reservoir area	Loss of biomass	• Exploit biomass resources before inundation • Cut woody vegetation before inundation • Clean reservoir before inundation
		Water quality deteriorates through eutrophication	
	Reservoir creation	Seismic impacts like reservoir induced earthquakes and land slides	• Installation of monitoring systems of say 3 to 10 short period stations to accurately determine the locations of micro earthquakes of local origin
Operation: Flow Management	Reservoir sedimentation	Loss of storage capacity	• Minimizing sediment inflow to reservoir from watershed by control of land use (especially prevention of conversion of forests to agriculture), and reforestation and/or soil conservation activities • Operation of reservoir to minimise sedimentation • Physcal removal of sediments (flushing, sluicing, release of density currents)
		Damage to or impairment of hydro equipment	
		Loss of bed load downstream, affecting the structure of the river-bed	
		Bank erosion and instabilities	
		Effects on water quality	
		Effects on eutrophication	

Project stage	Impact source	Impact	Mitigation measures
Operation: Flow Management	Downstream flow and water quality	Disruption of riverine fisheries	• Maintenance of necessary minimum flow for fisheries • Ensure adequate oxygen level in outlet water
		Scouring of riverbed below dam	• Design of trap efficiency and sediment release to increase salt content of released water
		Changes on ground water level	• Flood control • Replicate pre-project flows as far as possible • Maintain an aquatic minimum flow • Maintain water quality
		Decreased inundation of wetlands causing loss of habitat	
Operation	Inflows from watershed	Deterioration of water quality in reservoir	• Control of land uses, wastewater discharges and agricultural chemical use in watershed
	Thermal stratification		• Changes in inlet structure configuration
	Blocking of fish migration	Effects on migrating fish species	• Provide fish ladders and other means of passage adapted to occurring fish species • Provide fish screen installations
Operation	Reservoir management	Effects on reservoir fisheries	• Maintain an aquatic minimum flow • Provide fish screen installations
		Eutrophication	• Management of agricultural, industrial and urban activities to limit inflowing nutrients • Regulation of water discharge and manipulation of water levels in the reservoir to discourage weed growth • Harvesting of weeds and algae for compost, fodder or biomass
	Increase of water-related diseases	Health impacts	• Design and operation of dam to decrease habitat for vector which includes: o Clearing of future shoreline prior to inundation and subsequent control of algae growth and riparian vegetation o Elimination of pool or shallow areas o Fluctuation of water level • Disease vector and disease monitoring, prophylaxis and treatment • Establishment of a health advisory body and support of health services • Awareness programme for local population
Secondary impacts	Diverse	Environmental problems arising from development made possible by dam (irrigated agriculture, industries, municipal growth)	• Basic wide integrated planning to avoid over use or misuse of water and land resources.

4.2 Environmental Impacts of Thermoelectric projects

Thermal power projects produce electrical energy by burning fossil fuels or other combustible materials to raise steam. The major environmental impacts are related to air quality and effects on water bodies. The likely impacts and their possible mitigation measures are given in Table 4.2.

Table 4.2: The Environmental Impacts of Thermoelectric Projects

Project stage	Impact source	Impact	Mitigation measures
Construction	Vegetation removal Dredging and filling of wetlands	Habitat loss	• Select alternative sites and layout to avoid loss of ecological resources and wetlands • Restore or create similar vegetation, habitats or wetlands
	Land take	Human population displacement	• Select alternative site or site layout to avoid displacement • If unavoidable follow the Resettlement and Compensation guidelines
	Increased traffic	Disruption of traffic	• Develop traffic plan that includes phasing road use by workers • Upgrade roads and intersections
	Land take	Modification of historically or archaeologically significant structures or lands (e.g. churches, temples, mosques, cemeteries)	• Select alternative site or site layout • Develop and implement "chance find" procedures to recover, relocate or restore structures • Fence or construct other barriers to protect structures or lands
	Structures	Visual impact on historical, archaeological and cultural resources and on landscapes	• Select alternative site or site layout • Construct visual buffers (e.g. plant trees)

Operation	Air emissions	Effects to human health, agriculture, native wildlife and vegetation	• Locate facility away from sensitive air quality receptors
			• Design higher stacks to reduce ground level concentrations
			• Use cleaner fuels (e.g. low sulphur coal)
			• Install air pollution control equipment
			• Properly inspect and monitor
			  • Quench flue gases
			  • Alkaline scrubbers
			  • Fibre filter collectors
			• Comply with Uganda National Standards for emissions to ambient air

		Worker exposure to dust from ash	• Provide dust collector equipment • Maintain dust levels < 10mg/m^3 • Monitor for free silica content • Provide dust masks when levels are exceeded
	Green house gas emissions (CO_2 , CH_4 and others)	Climate change	• Improve power plant efficiency • Use cleaner fuels (e.g. gas instead of coal)

Project stage	Impact source	Impact	Mitigation measures
Operation	Operation	Noise and vibration	• Use lower rated equipment • Control the timing of noise and vibrations to least disruptive periods • Install noise barriers
		Worker exposure to excessive noise	• Maintain noise levels below 90 dBA, or provide ear protection
	Discharges	Change in surface water and groundwater quality	• Treat discharges chemically or mechanically on-site • Prevent groundwater contamination through use of liners • Use deep well injection below potable zones • Construct liners for ponds and solid waste disposal areas • Dilute effluent at point of discharge
		Toxic effects of chemical discharges and spills	• Develop spill prevention plans • Develop traps and containment systems and chemically treat discharges on-site
	Heat dissipation	Thermal shock to aquatic organisms	• Use alternative heat dissipation design (e.g. closed cycle cooling) • Dilute thermal condition by discharging water into larger receiving water body • Install mechanical diffusers • Cool water on-site in holding pond prior to discharge • Explore opportunities to use waste heat
	Water intake	Entrainment and impingement of aquatic organisms	• Select water intake in area that avoids significant impact • Install screens to eliminate entrainment and impingement
		Change in surface water and groundwater quantity	• Develop water recycling plan
		Change in surface water flow and discharge	• Construct drainage ways and holding ponds in-site
	Stacks, towers and transmission lines	Avian hazards	• Site stacks and tower away from flyways • Install deflectors, lights and other visible features
	Leaks	Worker exposure to toxic gases leaking from boilers	• Maintain boilers properly • Monitor concentrations with levels not to exceed levels qualified by NEMA •

4.3 Environmental Impacts of Using Generators

Generation of electricity through use of small diesel generators is inefficient and has impacts related to air quality and noise. If located in residential areas, these impacts become even more significant. The likely impacts associated with diesel generators and their mitigation measures are given in Table 4.3.

Table 4.3: Environmental Impacts of Diesel Generators

Project stage	Impact source	Impact	Mitigation measures
Operation	Noise	Effects to human health and well-being	• Use lower rated equipment • Install noise barriers
	Fuel leakages	Soil and groundwater contamination	• Install secondary containment • Tank integrity testing • Good maintenance practice
	Air emissions	Effects to human health, agriculture, native wildlife and vegetation	• Locate facility away from sensitive air quality receptors • Use cleaner fuels • Comply with Uganda National Standards for emissions to ambient air
	Green house gas emissions (CO_2 , CH_4 and others)	Climate change	• Improve efficiency • Use cleaner fuels (e.g. biodiesel instead of diesel)
	Spent Oil	Soil and water contamination	• Good practices of waste oil management

4.4 Environmental Impacts of Geothermal Energy Projects

Geothermal energy is usually based on the extraction of steam or hot water from underground natural reservoirs. Some of the key effects of geothermal energy development on the environment and how they can be mitigated are given in Table 4.4.

Table: Environmental Impacts of Geothermal Energy Projects

Project stage	Impact source	Impact	Mitigation measures
Exploration & Construction	Drilling	Noise	• Careful site selection • Restrict operations to certain times
		Vibrations	
Operation	Emissions of hydrogen sulphide	Air pollution	• Widely used processes available for removal of gas • No emissions if binary plant is used
	Emission of vapor-borne salts		
	Water intake or discharges	Changing stream flows	• Maintain stream flow within adequate limits
	Release of high temperature well products	Changing quality of surface water	• Use high temperature waste water • Cool waste water before releasing it into water bodies
		Changing quality, level and temperature of groundwater	
	Destruction of geyser activity	Existing activities (e.g. recreational) are disturbed	• Careful planning and site selection
	Withdrawal of geothermal fluids	Noise	• Careful site selection, good working practices
		Vibration	
		Increase of seismic activity	• Fluid re-injection into wells to maintain well pressure

4.5 Environmental Impacts of Biomass Projects

A number of biomass energy sources can be utilised for e.g. methane generation from agricultural / domestic wastes and ethanol production from sugar or wood. Other biomass-based projects include gasifiers, briquette production and energy farming. The possible impacts of these projects are given in Table 4.5.

Table 4.5: The Environmental Impacts of Biomass Energy Projects

Project	Impact source	Impact	Mitigation measures
Energy farming	Land take	Competition for land with food production	• Select site to avoid disturbance of local food production • Prefer multiple land use
	Intensive farming	Single species plantation easily attached by diseases	• Apply disease control
		Soil erosion	• Apply soil protection measures
		Soil exhaustion	• Apply land management practices
		Soil nutrient loss	• Add organic fertilizers
Gasification	Cutting down trees	Loss of natural resources	• Planting of trees for the project
	Process operation	Waste disposal	• Adequate ventilation
		Air emissions	• Installation of a scrubber to clean emissions
Land fill gas extraction	Gas leakage	Air emissions / increased safety risks	• Appropriate design of gas pipe
	Leachate	Leachate infiltration to ground water	• Install leachate collection pipes • Leachate treatment
	Increased traffic	Noise and air emissions	• Minimize traffic • Traffic movements during day time
		Accidents / safety	• Organize public education on safety
Peat production	Harvesting Dry recovery	Effect on hydrology	• Wet mining and recovery
		Lowering of water table	
		Water contamination	
		Situation of rivers downstream	
		Air quality (huge clouds of dust)	
		Destruction of aquatic habitats	• Restoration of land (forestry and agriculture)
	Peat Storage	Self ignition hazard	• Locate stores some distance from plant and equipment • Install fire detection system/sprinklers • Use of non-metallic metals to avoid possibility of sparking
Peat combustion	Emissions	So_2 , No_x emissions	• Selection of peat bags with low conclusion
		Emissions of heavy metals (esp. nickel and vanadium)	• Appropriate disposal method
		Ash accumulation	• Appropriate disposal method
			• Comply with Uganda National Standards for emissions to ambient air

4.6 Environmental Impacts of Solar Energy Projects

The production of electricity or heat using solar energy is one of the cleanest techniques available. However, with large-scale photovoltaic, solar tower and solar farm projects, land-take may be a negative aspect. Other impacts and their possible mitigation measures are given in Table 4.6.

Table 4.6: Environmental Impacts of Solar Energy Projects

Project stage	Impact source	Impact	Mitigation measures
Operation	Structures	Land take	• Make structures integral part of existing buildings • Prefer fallow land • Allow multiple use (e.g. grazing)
		Visual intrusion	• Careful planning (e.g. concerning reflection)
	Heat transfer fluids	Leakages can be harmful to the environment	• Careful planning and maintenance
Decommissioning	Batteries	Toxic waste	Design of a waste disposal plan with strategies to minimize impacts in line with NEMA standards

4.7 Environmental Impacts of Wind Energy Projects

The utilization of wind energy for electricity production is associated with few environmental impacts. Noise and shadow effects can be a big concern especially in residential areas, while obstruction of the movement of birds can be significant in ecologically sensitive areas. Table 4.7 gives a summary of impacts associated with wind energy projects.

Table 4.7: Environmental Impacts of Wind Energy Projects

Project stage	Impact source	Impact	Mitigation measures
Operation	Rotor Movement	Noise	• Select site to avoid impact on human settlements • Modeling of zone of visual intrusion, choice of colour, structure type and layout to minimize impacts • If impacts are unavoidable develop mitigation programme (e.g. shut down during certain directions of wind or certain sun positions)
		Shadow effects	
		Disco effect (light reflections)	
		Obstruction of bird movements	• Select site to avoid sensitive bird areas • Provide a route for birds along the stretch of wind turbines
	Tower and Rotor	Visual intrusion	• Select site to avoid sensitive (touristic) areas • Careful planning to minimize the problem

4.8 Environmental Impacts of Electricity Transmission

Electricity transmission systems include the transmission line, its right-of-way (ROW), switchyards, substations, and access or maintenance roads. The principal structures of the transmission line include the line itself, conductors, towers, and supports (e.g. guy wires).

The erection and establishment of a transmission system is associated with several adverse impacts. Impacts relating to a transmission system are presented in Table 4.8.

Table 4.8: Environmental Impacts of a Power Transmission System

Project stage	Impact source	Impact	Mitigation measures
Construction	Construction of transmission line and substations	Vegetation damage, habitat loss, invasion by exotic species along the ROW and access roads and around substation sites	• Utilize appropriate techniques (e.g. hand clearing versus mechanized clearing) • Maintain native ground cover beneath lines • Replant disturbed sites • Manage ROWs to maximize wildlife benefits
		Habitat fragmentation or disturbance	• Select ROW to avoid important natural areas such as wildlands and sensitive habitats
		Increased access to wildlands	• Select ROW to avoid sensitive wildlands • Develop protection and management plans for these areas • Use discontinuous maintenance roads
		Runoff and sedimentation from grading for access roads, tower pads and substation facilities, and alteration of hydrological patterns due to maintenance roads	• Select ROW to avoid impacts on water bodies, floodplains and wetlands • Install sediment traps or screens to control runoff and sedimentation • Minimize use of fill dirt • Use ample culverts • Design drainage ditches to avoid affecting nearby lands
		Loss of land use and population relocation due to placement of towers and substations	• Select ROW to avoid important social, agricultural and cultural resources • Utilize alternative tower designs to reduce ROW width requirements and minimise land use impacts • Adjust the length of the span to avoid site-specific tower pad impacts • Manage resettlement in accordance with Guidelines recommendations
Operation	Maintenance	Chemical contamination from chemical maintenance techniques	• Utilize mechanical clearing techniques, grazing and/or selective chemical applications • Select herbicides with minimal undesired effects • Do not apply herbicides with broadcast aerial spraying • Maintain naturally low-growing vegetation along ROW

Project stage	Impact source	Impact	Mitigation measures
Operation	Transmission lines and towers	Aviation hazards	• Select ROW to avoid important bird habitats and flight routes • Install towers and lines to minimize risk for avian hazards • Install deflectors on lines in areas with potential for bird collisions
		Aircraft hazards	• Select ROW to avoid airport flight paths • Install markers to minimize risk of low-flying aircraft
		Impaired cultural or aesthetic resources because of visual aspects	• Select ROW to avoid sensitive areas, including tourist sites and vistas • Construct visual buffers • Select appropriate support structure design, materials and finishes • Use lower voltage, DC system, or underground cable to reduce or eliminate visual impacts of lines, structures and ROWs
	Power transmission	Induced effects from electromagnetic fields on human health	• Select ROW to avoid areas of human activity
	Transformer Oil	Soil and water contamination	• Secure the transformers

4.9 Environmental Impacts of Oil and Gas Production

Exploration for and production of oil and gas on- and off-shore can have a number of impacts on the environment. These are given in Table 4.9.

Table 4.9: Environmental Impacts of Oil and Gas Production

Project stage	Impact source	Impact	Mitigation measures
Aerial survey	Aircraft	• Noise	• Avoid protected areas / sensitivities. • Schedule operation during least sensitive periods.
Seismic operations (onshore)	Seismic equipment	• Noise • Vegetation / Habitat loss	• Shot-hole method should be considered instead of vibroseis. • Mobilize clean-up crew after operations.
	Base camps and access	• Oil Spillage • Noise • Land take • Vegetation / Habitat loss • Waste • Pressure on natural resources	• Use adequate noise attenuation on engines. • Carry spill clean-up material in case of fuel and hydraulic fluid leaks. • Ensure proper storage of fuels. • Select site in consultation with local authorities and other stakeholders to minimize effects on environment and local communities. • Avoid or minimize road construction/minimize clearing and disturbance/minimize footprint, use existing infrastructure. • Where possible avoid use of heavy machinery. • Take account of topography, natural drainage and site runoff. Ensure adequate and proper drainage. • Ensure proper handling and storage of fuels and hazardous materials (e.g. explosives) • Use helicopters within safety limits where minimization of ground transport is required (e.g. access, clearing etc) • Follow operational health and safety requirements. • Block and control access. • Control workforce activities e.g. hunting, interaction with local population • Minimize waste, control waste disposal (solids, sewerage) • Prepare contingency plans for spillages, fire risk • Minimize extraneous noise and light sources.
	Line cutting	• Vegetation / Habitat loss • Ecological disturbance	• Hand-cut lines to minimize disturbance • Minimize width compatible with operational, health and safety requirements. • Do not cut trees of a diameter greater than local regulations permit (or, in the absence of regulations, greater than 20 cm).

Project stage	Impact source	Impact	Mitigation measures
Seismic operations (onshore)	Decommissioning and restoration	• Non-native materials • Soil erosion • Ecological disturbance	• Consult with local authorities and other stakeholders, particularly if any infrastructure is to remain. • Render access routes, campsites, seismic lines inaccessible. • Break-up compacted surfaces/replace topsoil, brash seed source, leaf litter etc. • Remove non-native materials. • Stabilize all slopes. If necessary revegetate to avoid erosion. • Keep photographic record. • Review success of restoration at a later date.
Seismic operations (offshore)	Vessel operations	• Waste materials • Oil spills • Marine disturbance • Noise	• Consider using guard boat in busy areas. • Report all unplanned interactions with other resource users or marine life to the authorities. • Use local expertise to support operations e.g. spotting marine mammals, wildlife etc. • Sensitise other stakeholders well in advance. • Consult local authorities and other stakeholders regarding survey programme, permits and notifications. • Remain on planned survey track to avoid unwanted interaction • Dispose all waste materials and oily water properly to meet local, national and international regulations. • Apply proper procedures for handling and maintenance of cable equipment particularly cable oil. • All towed equipment must be visible enough. • Make adequate allowance for deviation of towed equipment when turning. • Prepare contingency plans for lost equipment and oil spillage. • Attach active acoustic location devices to auxiliary equipment to aid location and recovery. • Label all towed equipment.
Exploration and appraisal drilling (onshore)	Drill site location	• Visual intrusion • Accidents • Ecological disturbance • Flooding	• Identify protected areas / sensitivities. Schedule operations during least sensitive periods. • Select least sensitive location within confines of bottom target / drilling envelope. Consider directional drilling to access targets beneath sensitive areas. • Select site in consultation with local authorities and other stakeholders to minimize effects on environment and local communities. • Consult local authorities and other stakeholders regarding preferred location for drilling sites, camps and access/ maximize use of existing infrastructure. • Select location to be as unobtrusive as possible, with minimal visual intrusion • Take account of topography, natural drainage and site run-off. Avoid areas prone to flooding. • Plan subsequent restoration requirements. • Follow operational health and safety requirements. • Consider cluster drilling to minimize footprint.

Project stage	Impact source	Impact	Mitigation measures
Exploration and appraisal drilling (onshore)	Access	• Vegetation loss • Soil erosion • Accidents • Noise • Increased traffic • Disturbance	• Consult with local authorities regarding preferred routings. • Where possible use existing road/water infrastructure • Plan routing to minimize subsequent disturbance to natural resources and people. • Limit road width and footprint consistent with operational, health and safety requirements. • Minimise vegetation loss and disturbance • Limit erosion potential/avoid steep slope and drainage courses/avoid cut and fill techniques/incorporate proper drainage, culverting and bridging techniques. • Road construction should use local material, but minimize cutting of timber. • Block and control access/prevent unauthorized use.
	Site preparation	• Vegetation loss • Dust • Accidents • Noise • Soil erosion • Waste	• Minimize cleared area and size of site/maximize perimeter to area ratio to aid natural revegetation. • Use hand cutting to clear vegetation initially – where necessary be selective in using machinery. • Conserve root stock and topsoil, store for later rehabilitation • Limit levelling activity • Do not burn brush and uprooted materials • Where vegetation and soil are removed ensure proper separation and storage/collect seed, rootstock, brush for subsequent revegetation. • Incorporate drainage and minimize disturbance to natural drainage patterns. • Use perimeter drainage ditches. • Seal bund and ensure proper drainage of machinery areas, fuel and chemical storage and mud mixing areas. • Provide base material compatible with local ground conditions. Hard core should be laid on geotextile membrane. Avoid concreting sites. • Protect watercourses from contamination and siltation. • Protect groundwater from drill stem penetration and shallow aquifers from possible contamination. • Where water courses and aquifers are deemed sensitive, consider a fully sealed site, avoid use of mud pits, preferentially use steel tanks. • Mud pits, if used, must have adequate contingency capacity especially in areas of high rainfall, and must be fully lined and bundled.

Project stage	Impact source	Impact	Mitigation measures
Exploration and appraisal drilling (onshore) continued	Camp and operations Camp and operations (continued)	• Pressure on natural resources • Water / soil contamination • Crime • Diseases • Noise • Air pollution	• Carefully select water supply sources and maintain water quality. • Plan effluent treatment systems. • Utilize local sewerage, disposal facilities where available. For small, isolated sites, soak away / septic field system can be utilized, biodegradable solids may be buried, liquid discharges should be controlled to ensure that local water resources, both surface and ground water, are not contaminated. • Containerise used oils and lubricants for proper disposal or recycling. • Any waste water from well test operations must be properly disposed of. • Where approved disposal sites are available and suitable these should be used for all offsite waste disposal. On-site disposal may be considered for inert materials. • In isolated/remote areas, with no local disposal facilities, non-toxic dry and liquid wastes may be burnt, giving due consideration to atmospheric effects. Portable incinerators may be used to provide a cleaner burn. • Containerise contaminated soils which cannot be treated in situ and remove offsite for treatment. • Consider bulk supply of materials to minimize packaging wastes. • Minimize atmospheric emission/noise/light. • Hazardous materials usage, storage and disposal requirements must meet planning requirements. • Light sources be properly shaded and directed onto site. • Initiate consultation and liaison with local authorities. Use local expertise. • Workforce should keep within defined boundary and to the agreed access routes. • Protect workers against risk of injury and chronic disease from exposure to chemicals such as cadmium, arsenic, cyanide, PAHs and lead. • Discharge water, drill cuttings and mud adequately to protect benthic marine communities, mammals, birds and humans against chronic effects.

Project stage	Impact source	Impact	Mitigation measures
Exploration and appraisal drilling (onshore) continued	Decommissioning and restoration	• Non-native materials • Soil erosion • Ecological disturbance	• Restoration plan must be followed and site restored to its original condition. • Remove all debris and contaminated soils. • Reform contours to natural surroundings. • Break-up base materials, re-spread topsoil and brash, vegetation, leaf litter and organic material. Use specialized techniques where sensitivities dictate, e.g. brushwood barriers, seeding, turf etc. • Mud pits, where used, should be de-watered and filled in to 1m cover, Infill burn and waste pits to 1m. • Block access routes, if required, hand over to local authorities. • Document and monitor site recovery.
Exploration and appraisal drilling (offshore)	Site location	• Visual intrusion • Noise • Disturbance • Waste materials	• Schedule operations during least sensitive periods. • Consult with local authorities regarding site selection and support infrastructure – ports, vessel and air traffic. • Select least sensitive location within confines of bottom target/drilling envelope. Consider cluster well drilling. • Local conditions must be fully assessed – wave, wind and currents. • In coastal areas, select site and equipment to minimize disturbance, noise, light and visual intrusion.
	Operations		• In coastal areas where sensitivities dictate use vessels in preference to helicopters. • Exercise strict control on access and all vessel and rig activity. • Consult with local authorities regarding emissions, discharges and solid waste disposal/notifications in regard to other resource users. • Oily water from deck washing drainage systems, bilges etc. should be treated prior to discharge to meet local, national and international consents. • Sewerage must be properly treated prior to discharge to meet local and international standards. • Biodegradable kitchen wastes require grinding prior to discharge, if permitted under local regulations. • Ensure adequate preventive measures are taken and that spill contingency plan requirements are in place. • Store oils and chemicals properly in contained, drained areas. Limit quantities stored to a minimum level required for operational purposes. Do not dispose of waste chemicals overboard. • Produced water from well tests must meet local regulations or company specified standards prior to discharge. • Preferentially separate and store oil from well test operations. If burnt, ensure burner efficiency is adequate to prevent oil fallout onto sea surface.

Project stage	Impact source	Impact	Mitigation measures
Exploration and appraisal drilling (offshore)	Operations (continued)		• Collect all domestic waste and compact for onshore disposal. • Consider waste segregation at source for different waste types – organic, inorganic industrial wastes etc. • No debris or waste to be discarded overboard from rig or supply vessel. • Waste containers must be closed to prevent loss overboard. • Spent oils and lubes should be containerised and returned to shore. • Consider bulk supply of materials to minimize packaging wastes. • Preferably use low toxicity water based drilling muds. Minimize use of oil-based muds (OBM). • Consider down hole disposal of OBM wastes. • Well test burners must be efficient, maintained and effectively burn gas and oil. • H_2S emissions must be effectively controlled.
	Decommissioning and restoration	• Pollution	• All debris must be removed from seabed. • Decommissioning of onshore support facilities must meet planning requirements
Development and production (onshore)	Access	• Accidents • Noise • Increased traffic • Pollution • Disturbance	• Appropriate design and engineering considerations are required. • Consultation with local authorities is required. • Site selection procedures must avoid long-term disturbance and impact on local environment and infrastructure. • Consider locating all facilities at single site to minimize footprint. • Consider maximizing use of satellite/cluster drilling sites, horizontal wells, extended reach drilling in sensitive areas. • Use consolidated, impermeable base to all facilities with permanent inbuilt drainage systems. • Segregate drainage systems for offsite and non-contaminated/clean site areas and oily drainage system for process areas.

Project stage	Impact source	Impact	Mitigation measures
Development and production (onshore)	Site preparation	• Vegetation / Habitat loss • Accidents • Waste material • Noise • Air pollution	• Flow lines and pipelines will require consideration in terms of disturbance and effects (bury/surface) • Site selection and preparation planning should include consideration of eventual decommissioning and restoration. • Ensure proper storage, power generation and other support and accommodation facilities in terms of long-term disturbance and impact. • Minimize exerting additional pressure on local infrastructure in particular water supply, power supply, waste disposal, housing, education, welfare, medical, employment. economy etc. • Install proper waste treatment facilities, particularly if local infrastructure cannot support requirements. In particular, treatment of waste waters – wash water, process water, drainage, sewage, produced water. • Treat waste gases and observe emission limits, particularly where gas flaring is necessary. Avoid gas venting. • Ensure optimal waste treatment and disposal. • Prepare a detailed waste management plan. • Install oil sumps, interceptors and oily water treatment system. • Provide contained storage areas for produced oil, chemicals and hazardous materials, including treatment of tank sludge's. • Prepare detailed contingency plans, personnel training and regular exercise of response. • Establish consultation and local liaison activities. • Monitor waste streams in order to meet compliance requirements.
	Decommissioning and aftercare	• Non-native materials • Waste materials • Accidents	• Develop full decommissioning, restoration and aftercare plan in consultation with local authorities. • Hand over any facilities and infrastructure to local authorities with proper instructions for use, maintenance and include proper training procedures. • Remove, if appropriate, all permanent structures, foundations and bases, roads etc. • Restore the site to its original condition. • Select indigenous species compatible with the surrounding habitat for replanting. • Record and monitor site recovery.

Project stage	Impact source	Impact	Mitigation measures
Development and production (offshore)	Site location and access	• Oil spillage • Accidents • Pollution • Marine disturbance	• Minimize resource use conflicts, especially on commercially important species. • All aspects identified for exploration drilling should be applied to permanent sites. • Consult with local authorities • Consider site and route selection for flow lines and pipelines
	Operations	• Oil spillage • Accidents • Pollution • Waste materials • Emissions	• Maximize use of central processing facility and use of satellite and cluster wells to minimize footprint. • All aspects identified for exploration drilling should be applied to permanent sites. • Consult with local authorities. • Provide adequate infrastructure, related to onshore service functions such as harbours. • Minimize resource use conflicts and ensure proper waste treatment and disposal. • Incorporate oily water treatment system for both waste water and contaminated water treatment to meet local, national and international discharge limits. • Include sewerage treatment system. • Ensure proper treatment of waste gases and observe emission limits, particularly where gas is flared. Avoid gas venting. • Treatment and disposal of solid, toxic and hazardous wastes onshore will require proper planning particularly if local infrastructure is limited in capacity and capability. A detailed waste management plan will be required. • Prepare detailed contingency plans, personnel training and regular exercises of response, taking into consideration storage and export systems. • Monitor waste streams in order to meet compliance requirements.
	Decommissioning and rehabilitation	• Non-native materials • Marine disturbance • Waste materials • Pollution	• Develop a full decommissioning and rehabilitation plan in consultation with local authorities. • Decommissioning of offshore structures is subject to international and national laws, and should be dealt with on a case-by-case basis with local authorities. • Record and monitor site as required after appropriate decommissioning activities.

4.10 Environmental Impacts of Petroleum Refining

Petroleum refining is a complex series of interrelated operations concerned with the separation of the crude molecular constituents of oil, and molecular cracking and rebuilding. Some of the major environmental impacts resulting from refining are given in Table 4.10.

Table 4.10: Environmental Impacts of Petroleum Refining

Project stage	Impact source	Impact	Mitigation measures
Operation	Atmospheric emissions of sulphur and nitrogen oxide, hydrocarbons, carbon monoxide and odour	Health and environment will be affected	
	Accidental exposure of workers to petroleum and its by-products (e.g. benzene)	Direct health effects and chronic illnesses, e.g. Leukaemia	• Provide adequate safety measures • Maintain properly
	Waste water effluents	Water pollution and possibly human health affected	• Treat effluents adequately before entering water bodies
	Solid wastes	Slurry damaging water and land resources	• Treat waste correctly before deposing
	Operation	Noise	
		Visual impacts by smoke emissions and fog	
	Structures	Landscape degradation	

4.11 Environmental Impacts of Oil and Gas Pipelines

Pipelines can be used to transport both crude oil and gas products, and finished petroleum products on land and at sea. Pipelines have the best safety record of all methods of crude oil transportation and can reduce the need for more damaging transport by truck. However, various aspects of pipeline transportation have negative impacts. Impacts of pipeline transportation are summarized in Table 4.11.

Table 4.11: Environmental Impacts of Oil and Gas Pipelines

Project stage	Impact source	Impact	Mitigation measures
Construction	Construction of pipeline and intermediate 'pigging' stations	Vegetation damage, habitat loss, invasion by exotic species along the ROW and access roads and around intermediate 'pigging' stations	• Utilize appropriate techniques (e.g. hand clearing versus mechanized clearing) • Maintain native ground cover beneath pipelines • Replant disturbed sites • Manage ROWs to maximize wildlife benefits
		Habitat fragmentation or disturbance	• Select ROW to avoid important natural areas such as wildlands and sensitive habitats • Maintain habitat around/beneath pipeline • Make provisions to avoid interfering with natural fire regimes
		Increased access to wildlands	• Select ROW to avoid sensitive wildlands • Develop protection and management plans for these areas • Use discontinuous maintenance roads
		Runoff and sedimentation from grading for access roads, pipeline and intermediate 'pigging' stations, and alteration of hydrological patterns due to maintenance roads	• Select ROW to avoid impacts on water bodies, floodplains and wetlands • Install sediment traps or screens to control runoff and sedimentation • Minimize use of fill dirt • Use ample culverts • Design drainage ditches to avoid affecting nearby lands
		Loss of land use and population relocation due to placement of pipeline and intermediate 'pigging' stations	• Select ROW to avoid important social, agricultural and cultural resources • Manage resettlement in accordance with Guidelines recommendations

Project stage	Impact source	Impact	Mitigation measures
Operation	Leakages	Environmental damage	• Apply modern methods giving protection against corrosion and allowing for detection of weak points • Careful maintenance • Construct facilities for pollution prevention and fire safety at pipeline terminals and intermediate 'pigging' stations
	Maintenance	Chemical contamination from chemical maintenance techniques	• Utilize mechanical clearing techniques, grazing and/or selective chemical applications • Select herbicides with minimal undesired effects • Do not apply herbicides with broadcast aerial spraying • Maintain naturally low-growing vegetation along ROW
	Structures	Impaired cultural or aesthetic resources because of visual aspects	• Select ROW to avoid sensitive areas, including tourist sites and vistas • Construct visual buffers • Select appropriate structure design, materials and finishes

4.12 Environmental Impacts of Petroleum Storage / Trading of Petroleum Products

Gasoline and many of its additives can lead to acute and chronic toxicity, and is associated with some types of cancer. Groups at high risk for exposure to gasoline and its additives include: employees in the distribution, storage and pumping of gasoline; people living near transfer and storage facilities, and service stations; automobile drivers who pump their own gas; people who live in houses with attached garages; and those whose drinking water has been contaminated with gasoline e.g. by leakages into ground water.

Table 4.12 lists impacts of and mitigation measures for petroleum bulk storage depots, retail dispensing sites (petrol stations) and other trading and use of petroleum products.

Table 4.12: Environmental Impacts of Petroleum Storage

Potential pollutant	Main negative impacts	Mitigation measures
Petroleum bulk storage depots	Leaking underground tanks	• Use protective coatings for the storage tank to defend against corrosion • Use either double walled tanks or a secondary containment method, e.g. concrete pits, or high-density polyethylene liner to line the excavation
	Effluents	
	Fires, spills, releases	• Prepare detailed emergency and response procedures
(Pressure) Piping	Leakages	• Apply adequate design, paying particular attention to pipe-work joints, connections, coating and cathodic protection • Install a line leak detector on all pressure systems
	Spills at fill points during tank truck deliveries	• Install spill containment devices • Manage adequately, e.g. locking fill point seal caps at all times
Retail dispensing sites	Effect on water table	
	Drainage into public drains and waterways	
	Quality of effluents	
	Waste oil disposal	
	Vapour venting	

Potential pollutant	Main negative impacts	Mitigation measures
Retail dispensing sites (continued)	Leakages / Safety at Pumps / Dispensers	• Compliance with Hazardous Classification wiring regulations to ensure the pump electrical supply does not create a source of ignition • The ability to electrically isolate the pump / dispenser from a point some distance from the unit, in cases of emergency • Correct installation of the shear valve and connection of the trip wire on pressure systems, to ensure the product flow is stopped should the dispenser be knocked over • The fitting of hose breakway couplings to limit the amount of fuel spilled when a customer drives off while still connected
Construction debris	-Decreased aesthetics -Increased suspended solids -Blockage of drainage -Reduced safety of workers	• Dispose in environmentally sound manner in authorized sites
Plastics	-Non-biodegradable -Decreased aesthetics -Increased suspended solids -Blockage of drainage	• Separate from other wastes and dispose in special and authorized dump sites or recycle
Batteries	-Corrosive and hazardous -Pollution and contamination from lead and sulphuric acid -Plastic covers not easily biodegradable -Decreased aesthetics	• Safe temporary storage pending sell and recycle
Silt	-Blockage of drainage and filling of manholes -Increased total suspended solids	• Regular clearing and unblocking of drainage channels
Used oil filters	-Cause oil pollution -Decreased aesthetics -Hazardous	• Safe temporary storage, dry and crush to reduce volume for disposal in gazetted areas
Oil-contaminated sawdust	-Cause oil pollution -Self-ignition during storage -Decreased aesthetics -Hazardous	• Use drain mobiles in service pits for used oil
Used rags and gloves	-Can lead to oil contamination -Decreased aesthetics -Plastic gloves not easily biodegradable	• Dry and dispose in gazetted areas
Old tyres	-Non-biodegradable -Decreased aesthetics -Burning leads to poor air quality	• Avoid burning of tyres and reuse for soil erosion control, sandals or recycle whenever possible
COD	-Reduces dissolved oxygen contents -Decreased aquatic biodiversity -Ground water contamination	• Construct oil interceptors for separation oil

Potential pollutant	Main negative impacts	Mitigation measures
Oil and grease	-Increased COD -Suffocation of biota -Cause surface films on water surfaces -Interference with aerobic and anaerobic processes -Decreased aesthetics -Increased odour	• Construct oil interceptors for separating oil
Suspended solids	-Suffocates aquatic life -Increased siltation -Blockage of drainage -Possible flooding -Decreased aesthetics	• Control soil erosion during construction • Pave the parking lot

5.0 GUIDELINES FOR USE BY MEMD IN ITS FUNCTION AS LEAD AGENCY

The MEMD is the lead agency for the energy sector in Uganda. It is mandated to promote the development, strategically manage and safeguard the national and sustainable exploitation and utilization of energy resources for social-economic development in the country. MEMD is also charged with the role of inspecting, regulating, monitoring and evaluating activities of private companies engaged in the energy sector so that the resources are developed, exploited and used in a rational and sustainable manner. Further, MEMD provides policy guidance on all issues relating to the development, exploitation and management of energy resources.

5.1 The Role of MEMD in the EIA Process

This chapter describes the role of MEMD in case a private developer has to carry out an EIA for an energy project. On the other hand, if MEMD is the developer, the Guidelines for Developers in chapter 6 apply for MEMD, and NEMA will not consult the ministry for review purposes.

5.2 Environmental Screening of Projects

The developer prepares the project brief and provides ten (10) copies to the Executive Director, NEMA. If NEMA deems the project brief to be complete, one copy is forwarded to MEMD. The content of a well-written project brief is given in Annex B1.

Screening of energy projects is conducted following the steps described in chapter 3.3. The detailed checklist used for screening can be found in Annex B2 while screening categories for different types of energy projects are given in Table 5.1.

Project developers are, however, advised that in addition to the screening procedures given above, all projects will be assessed according to their specific design and environmental components that are likely to be affected.

Table 5.1: Screening categories for different energy projects

Screening category	Definition	Types of energy projects or activities
I	Projects normally exempt from EIA	• Solar energy (PV) < 10 kW • Stand alone wind turbine < 100 kW • Household biogas unit • Household generator < 5 kW • Power substations < 100 kVA • Single phase power distribution lines • Triple phase power distribution lines < 1 km
II	Energy projects for which adequate mitigation measures have to be determined either directly or through EIR	• Hydropower < 500 kW • Stand alone wind turbine > 100 kW • Wind farm < 15 machines • Stand alone gasifier < 50 kW • Stand alone generator < 500 kW • Cogeneration < 500 kW_{el} • Power substations < 1000 kVA • Triple phase power distribution lines < 10 km • Commercial energy farming < 50 ha (crops only for energy purpose) • Industrial charcoal production < 3,000 tonnes/annum
III	Energy projects requiring full EIA	• Wind farm >15 machines • Hydropower > 500 kW • Gasifiers > 50 kW • Thermal power generation • Cogeneration projects >500 kW_{el} • Electric power transmission lines • Triple phase power distribution lines >10 km • Power substations > 1000 kVA • Geothermal power projects (starting with appraisal drilling) • Petroleum exploration & production (starting with appraisal drilling) • Petroleum storage facilities (storage tanks) • Petroleum refinery • Petroleum pipeline • Commercial petroleum transportation • Petrol station construction • Commercial energy farming > 50 ha (crops only for energy purpose) • Industrial bio-diesel / ethanol production • Land fill gas extraction • Natural gas extraction • Natural gas transportation • Large scale natural gas storage

		• Peat extraction • Industrial charcoal production > 3,000 tonnes/annum • Industrial briquetting of peat/agro-residues/ charcoal > 3,000 tonnes/annum • Nuclear energy projects

The energy projects falling in Categories I and II may be shifted from category to category depending on a specific project site. For example, a project located in or near a fragile or sensitive ecological system will have potential for significant environmental impacts due to location rather than scale. Depending on the uniqueness of location of a project, NEMA in consultation with MEMD may decide to move a project from category I to II or from category I and II to III.

Any medium- to large-scale projects not classified in Table 5.1, will be assessed on a case-by-case basis.

Timeframe for screening

NEMA in consultation with MEMD shall decide on the project within two weeks after submission of the project brief by the developer irrespective of whether:

- A conditional or unconditional approval for the project shall be granted.
- A further assessment of environmental impact shall be required.

The developer and other interested/concerned parties shall be notified of the decision taken, and such a decision shall be contained in a Certificate of Approval of the EIA issued by NEMA. If further assessment is required, ToR will be developed for the purpose of conducting the EIStudy.

5.3 Environmental Impact Review

If an EIR is required as in the case of category ii projects, the Developer prepares an EIR report which is submitted to NEMA.

NEMA and MEMD can rely on their expertise and the checklists provided in chapter 4 to assess the nature and level of likely environmental impacts. Depending on their assessment, the project can be approved or it may be decided that a detailed EIA is necessary.

If the screening exercise determines that the project has significant environmental impacts and identifies appropriate mitigation measures, NEMA shall recommend that the developer make necessary changes to eliminate the potential significant impacts. If the developer makes a commitment to fulfil the NEMA conditions to eliminate or reduce the effects of potential significant impacts, the project shall be approved and NEMA issues a Certificate of Approval of EIA. On the other hand, if potential significant impacts cannot be eliminated easily the project shall not be approved, and

the screening decision will require that the project be subjected to a detailed EIStudy.

5.4 Scoping Report & ToR for the EIStudy

The developer in consultation with NEMA, MEMD and other key stakeholders shall undertake to prepare the ToR for EIStudy. For this purpose, all relevant documents should be made available to the stakeholders. Details of the content of the ToR are presented in Annex D1.

The scoping report including the ToR shall be reviewed by MEMD with the aid of the scoping checklist given in Annex C2.

5.5 Review of Environmental Impact Statements

The developer submits ten (10) copies of the EIS to NEMA. NEMA in consultation with MEMD reviews the EIS to determine if it is complete and whether it addresses the potential significant environmental impacts as identified during scoping and as stipulated in the ToR for the study.

NEMA shall circulate the EIS to other stakeholders and interested parties for review and comments. NEMA in close consultation with MEMD shall hold a public hearing to review the EIS.

Review parameters

The main objective of the review exercise is to critically examine whether the EIS adequately addresses the significant environmental issues identified during scoping and in the ToR for the EIStudy; whether the results and findings presented are scientifically and technically sound and coherent enough to be understood by decision makers and the public in general, and whether reasonable alternatives have been suggested to the proposed action.

Procedure for Review

- Does the work done comply with the ToR?
- Is the presentation consistent? Are there no contradictions of facts and issues in the document?
- Does the project location conform with the existing laws and policies?
- Did the study team adequately involve the local communities and the general public during the study period?
- Did the study team follow the energy sector EIA guidelines, and other EIA guidelines and regulations?

Impacts Assessment and Evaluation

- The EIS addresses the potential significant impacts identified during scoping.
- Categorizing the different impacts into direct or indirect impacts.
- Determining the impacts that are more sensitive.
- Identifying impacts that need a compensation plan.
- Identify long and short-term impacts.
- Comparing the proposed project impacts with best alternative option projects.
- Risk analysis adequately done.

Mitigation Measures

- Existence of a list of mitigation measures.
- Validity and adequacy of the proposed mitigation measures.
- Impacts that can not be avoided have been identified and accordingly addressed.
- A compensation plan has been drawn for unavoidable impacts that cannot be mitigated.
- Mitigation and support measures are technically and scientifically sound.
- Mitigation measures were drawn in close consultation with the public and local communities.

Implementation and Monitoring of Projects

- A good analysis of the institutional, financial and personnel resources to operationalise the mitigation plan.
- The schedule of the mitigation plan is achievable.
- Are the standards set in the mitigation plan achievable and meaningful.
- A study specified the institution(s) responsible for the monitoring and evaluation of this phase.

For a detailed review checklist, refer to Annex D3.

The MEMD shall finally conduct an independent assessment of the EIS to determine its adequacy in informing a correct decision to be taken on the environmental aspects of the project. MEMD shall in turn forward the comments on the EIS to NEMA so as to guide the latter in taking a final decision on the project.

5.6 MEMD's Role in Monitoring

MEMD shall monitor compliance and implementation of activities to ensure that the design criteria, mitigation measures and monitoring requirements are implemented.

6.0 GUIDELINES FOR USE BY PROJECT DEVELOPERS IN THE ENERGY SECTOR

Developers of energy projects can be private investors, NGOs or MEMD. If MEMD is the developer, its responsibilities as a lead agency described in chapter 5 are taken over by NEMA.

Developers ought to understand their EIA obligations right from the planning and design stages, and the associated screening activities by the time they submit a project brief or the EIS to NEMA. The EIA should be part and parcel of the project owner's planning cycle. Figure 6.1 presents the ideal linkage between the project cycle and the EIA process.

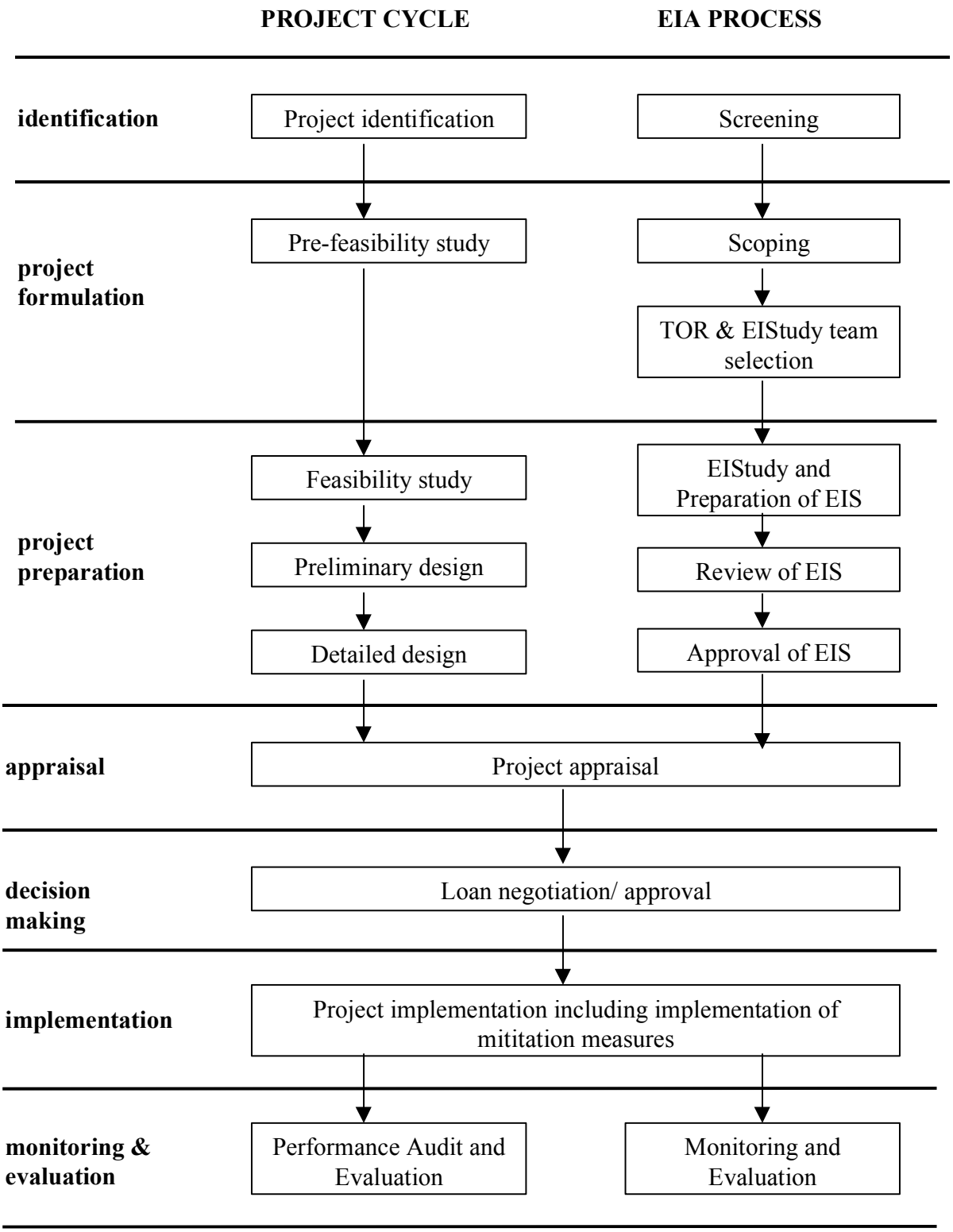
6.1 Application of the EIA as part of the Project Cycle

The EIA shall be conducted as an integral part of the overall project cycle from project identification to pre-feasibility study, feasibility study, project design and other phases, and shall therefore form the basis for environmentally sound project implementation and monitoring.

The EIA conducted at the early planning stage will serve as a tool that assists and guides developers through providing environmental information and raising environmental concerns at key stages in the project cycle leading to projects designed with in-built mitigation measures.

Design proposals with potentially adverse environmental impacts can therefore be mitigated while those found to be incapable of mitigation could be changed appropriately. The EIA applied at this critical stage permits early indication of practical design changes aimed at either avoiding or minimizing identified negative environmental impacts or enhanced environmental benefits.

Figure 6.1: EIA and the typical energy project cycle



Source: Adapted from *Seminar on Environmental Assessment Procedures between the Republic of Uganda and the World Bank,* Final Report, 1998.

6.2 The Role of the Developer in the EIA Process

The Developer is responsible for undertaking an EIA, and shall meet all the costs associated with it. Such costs shall include, among others, cost for conducting the EIStudy, preparation, production and distribution of EIS for comment and review by agencies, interested parties and other stakeholders.

The developer must ensure that the EIA is carried out before projects can be licensed or approved by the responsible Agencies. All financing institutions such as World Bank and other donors also demand this requirement.

6.3 Steps a Developer takes to conduct EIA

The developer is expected to go through the following steps from the design stage to the time their project is issued a Certificate of Approval:

Step 1: Initial Screening

Developers need to undertake their own screening to identify environmental issues of major concern at an early stage of the project.

For screening energy projects, the following questions can offer guidance to the developer:

Nature of project:

- Will the project cause significant environmental impact?
- Will the project lead to increased or decreased discharge of fossil carbon dioxide, methane or other greenhouse gases?

Siting of the project:

- Is the project located within or near environmentally sensitive areas such as sources of public water supply, areas of unique historic, cultural, archaeological, scientific or geological interest and ecologically fragile ecosystems such as wetlands?

Natural resources affected:

- Will the proposed project result in direct or indirect negative or positive impacts to the natural resources in the surroundings?
- Will the project develop systems, which permit sludge nutritive salts, building waste, excavated materials or other waste products to be taken care of or brought back into ecocycles?
- Will the project improve or impair the living conditions of the settled population or nomadic groups?

The detailed screening checklist given in Annex B2 could also be useful for initial screening of projects by developers.

Step 2: Assessment of project alternatives

At this early project stage, a thorough assessment of all the possible project alternatives should be conducted with a view to determining the most optimal in terms of environmental and social considerations. This assessment should begin early in the planning process before the siting, type and scale of an energy project is decided upon.

For an energy project, the following alternatives should be considered:

- Site / location alternatives
- Project scale or size alternatives
- Source of energy alternatives
- Construction, operation, decommissioning design alternatives
- 'No-project' alternative

Step 3: Project planning and designing

Once the developer has identified the potentially environmental impacts; he will identify appropriate mitigation measures which will be incorporated into the project design. This will minimize time and costs associated with conducting EIAs, and in any case EIA must be considered as part and parcel of the planning and design for all energy projects. Good practice demands that costs for mitigation are incorporated in the total project budget.

Step 4: Preparation and submission of the project brief

The developer prepares a project brief which he submits to NEMA. The purpose of the brief is to provide sufficient and relevant information on the proposed project that can allow NEMA and MEMD to establish whether or not the project is likely to have significant impact on the environment and determine the level of EIA required. If adequate mitigation measures are identified in the project brief, this may eliminate the need for further assessment and the project may be approved, subject to any other conditions that may be set to ensure implementation of the proposed mitigation plan. The detailed content of the project brief is given in Annex B1.

The developer is required to submit ten copies of the project brief to NEMA, which in turn sends a copy to MEMD.

Step 5: Screening of projects

After submitting a project brief to NEMA, it is screened by NEMA in consultation with MEMD. The screening process is aimed at the following:

- Identification of major environmental issues at a very early stage.

- Better utilization of financial and human resources by focusing on major environmental issues of the project.

After screening, NEMA is in position to determine whether a detailed EIStudy is required (go to Step 7), or an EIR is necessary (go to Step 6) or the project is exempted.

Step 6: Environmental Impact Review

The objective of an EIR is to determine the environmental impacts an energy project may have, and to define adequate mitigation measures for the significant impacts. The findings of the EIR are presented in the EIR report. This report should be brief and precise i.e between 5-30 pages.

The EIR report should contain the following but not limited to:

- Background and objectives of the project proposal
- Description of the project and the project components
- Description of the affected environment
- A list of the potential significant environment impacts of the project
- Identification of adequate mitigation measures to address the environmental impacts
- A list of agencies, organizations and individuals consulted.
- A list of the technical team that conducted the EIR

Depending on the decision taken on the EIR by NEMA, the project will be subjected to an EIStudy or a Certificate of Approval will be issued.

Step 7: Scoping

Scoping is then conducted to determine the most critical issues that need to be addressed during the EIStudy. The developer in consultation with NEMA, MEMD and other interested parties undertakes scoping. Good practice demands that there should be full participation of the public during scoping. A checklist and basic information needed for scoping are given in Annex C1 and C2 respectively.

Step 8: Preparation of the TOR and Conducting an EIStudy.

The ToR for the EIStudy are developed basing on the scoping results. The developer in close consultation with NEMA, MEMD and other key stakeholders shall prepare the ToR for the study. The scoping results including the ToR shall be submitted to NEMA in order for it to determine their completeness and adequacy. A general outline for the ToR is given in Annex D1.

At this point, the developer needs to source and hire experienced experts to undertake the different tasks specified in the ToR. Most likely this support is already acquired during earlier stages of the EIA process.

Step 9: Hold meeting with Practitioner

Step 10: Submission of the EIS to NEMA

The outcome of the EIStudy is an EIS. Upon completion of the study, the developer shall submit ten (10) copies of the EIS to NEMA. NEMA will in turn send copies to MEMD and other key stakeholders for review and comments. The EIS shall be a public document, which will be made available to any person requesting for it. The details of the content of an EIS are presented in Annex D2.

Any comments made shall be forwarded to NEMA so that these shall be taken into consideration in approving or disapproving the contents of the EIS.

A Certificate of Approval of the EIS shall be issued by NEMA to the developer and shall indicate whether or not the environmental aspects of the EIS have been approved. The developer shall then present this certificate to MEMD, REA, ERA or any other licensing authorities that shall take appropriate decision on the project.

6.4 Developer's Role in Monitoring

The developer of an energy project, that has obtained its Certificate of Approval on the basis of proposed mitigation measures, shall ensure that the mitigation measures and actions proposed to protect the environment are adopted and implemented.

The developer shall conduct self-monitoring, self record-keeping and self reporting. The information gathered through monitoring shall be stored and made available during inspection. The developer shall also undertake all reasonable measures to mitigate undesirable environmental impacts not contemplated in the EIS and shall accordingly report on these measures to MEMD and NEMA.

Annex E gives a list of monitoring requirements.

7.0 EIA GUIDELINES FOR PRACTITIONERS

In these guidelines, an EIA practitioner refers either to a team of individual consultants assembled for the purpose of conducting an EIA or a firm of consulting specialists contracted to carry out the feasibility study and detailed engineering designs for a proposed project, and to also plan and conduct the EIA for the project.

EIA practitioners play a key role in the EIA process.

Roles and responsibilities of Practitioners include:

- Conducting an EIR
- Conducting and managing an EIA for a proposed project
- Conducting the EIStudy
- Communicating and reporting on the findings of the EIStudy, also known as preparation of the EIS

This section is aimed at guiding practitioners on procedures and steps for conducting EIA, the EIStudy and preparing EIS for energy projects.

After screening an energy project, NEMA in consultation with MEMD might decide that the project will lead to significant impacts on the environment. The developer will then be required to conduct an EIStudy.

An EIStudy comprises of the following steps:

- Scoping
- Preparation of ToR for EIStudy
- EIStudy
- Preparation of EIS

7.1 Scoping of projects

Collection of baseline data for Scoping

The project brief contains a good deal of baseline data about a given energy project. However, more often than not, it does not provide all the required information.

The information gaps should be identified and more information collected to facilitate the identification of impacts. A checklist of information required for scoping is given in Annex C1.

Scoping of projects

The scoping exercise is aimed at identifying all the key and significant impacts and issues pertaining to a development project. It is vital for defining the focus and scope of the EIStudy.

Scoping is undertaken in order to:

- Specify which issues and impacts the EIStudy shall focus on and the methodologies to be used.
- Formulate project alternatives to be assessed during the study.
- Identify stakeholders and the methodology for their participation in the EIA process.
- Determine the type and quality of information and data required for the study.
- Determine the type of specialists to constitute the study team.

Scoping of energy projects must involve the local community, independent experts, NGOs, Government Departments and International partners in development. Extensive consultations have to be made especially for big hydro projects so that they are accepted both locally and internationally.

The scoping team should visit the project site to acquaint themselves with, and obtain first hand information on the local environment at the location of the project. Reference should also be made to the chapters on Potential Impacts and Mitigation Measures for Energy Projects (chapter 4), Guidelines for Mitigation of Social Impacts (chapter 8), Public Consultation (chapter 9) and Resettlement and Compensation (chapter 10) as these chapters tackle various aspects of scoping.

The main output of the scoping exercise is to define the ToR of the EIStudy.

7.2 Preparation of the ToR for the EIStudy

The ToR for the EIStudy is developed basing on the scoping results. This should be done in consultation with NEMA, MEMD and other key stakeholders. The scoping results including the ToR shall be submitted to NEMA which will review the scoping report and ToR with a view to ensuring their completeness and adequacy.

The technical team to undertake the EIStudy is identified and their names and qualifications forwarded to NEMA for approval.

7.3 Environmental Impact Study

The detailed content of the EIS and the procedures in conducting the EIStudy and preparing the EIS will vary from project to project. The major tasks of the EIStudy are

described below, while a list of basic contents of an EIS is given in Annex D2. For self-reviewing of the EIS, the review checklist in Annex D3 is recommended.

Environmental Baseline Study

This involves the collection of relevant data and information on physical, ecological, economic, socio-cultural and demographic conditions in the project area. These data form the basis for determining the existing environment and the expected changes on the environment by implementing the project.

The project brief and the baseline data for scoping might contain useful baseline data about a given energy project. However, most energy projects are relatively complex and the information available from the project brief and the scoping exercise might not be adequate. The practitioner should be able to identify any information gaps, and plan to collect more relevant data. Some of the required data might already be available in the research, academic and government departments respectively. In Uganda, a wealth of information do exist in District Environment profile reports, the census and other reports, and in several government departments such as Meteorology, Forestry, Water Development and others.

The collected data should be comprehensive enough to address the specific issues identified in the EIStudy.

Description and quantification of impacts

The identification of most of the significant impacts, both positive and negative is usually accomplished during the scoping exercise. More in-depth studies may be required to identify other impacts.

After the identification of all the possible significant impacts, an attempt should be made to describe the precise nature of the impact on its receiving environment.

Impacts can be described as follows:

- Direct or indirect impacts
- Temporary or permanent impacts
- Reversible or irreversible impacts
- Short term or long term impacts
- Simple or complex impacts
- Primary or secondary impacts
- Local or regional or global impacts
- Cumulative or non-cumulative impacts
- Continuous or intermittent impacts

The significance of impacts has to be judged upon its magnitude, extent, severity, duration and likelihood. Quantitative assessment methods may be useful in comparing different impacts.

The quantification of significant impacts can be based on the use of various indicators and weighing the impacts against threshold values, where these exist. Such threshold values may be in form of standards for various environmental parameters to be assessed during the study.

Where environmental standards do exist, the environmental parameters under investigation should be compared with the national standards to determine their acceptability and conformity with the regulations.

It is worth noting that environmental standards are not well developed in Uganda, and very few environmental parameters have such standards. It is, therefore, desirable that the importance or significance of such impacts is based on sound and scientific principles i.e. Bye-laws, World Bank standards, WHO and UN standards.

Environmental economic analysis

Whenever possible, environmental economic analyses should be made as part of EIAs. This is important for several reasons. An economic analysis and a valuation in monetary terms of the environmental impacts and of the proposals for necessary measures make it possible to integrate the conclusions of the EIA into the economic and financial analysis of the project assessment. It is then possible to weigh up the project's costs and benefits and the advantages and disadvantages of different possible alternatives and scenarios. Environmental economic analysis can also be used to find the most effective instruments to solve environmental problems that may arise as a result of the project.

An environmental economic analysis should be included in the EIA if the cost of making this analysis is reasonable, and if it is not too difficult or time-consuming. If a socio-economic analysis is made of the project proposal, the environmental impact should always be included in it.

Project alternatives

The EIStudy must include a thorough assessment of all the possible project alternatives with a view to determining the most optimal in terms of environmental and social considerations. This assessment should begin early in the planning process before the siting, type and scale of an energy project is decided upon.

For an energy project, the following alternatives should be considered:

- Site / location alternatives
- Project scale or size alternatives
- Source of energy alternatives
- Construction, operation, decommissioning design alternatives
- 'No-project' alternative

Impact mitigation

One of the main objectives of EIA is to predict and prevent unacceptable adverse environmental effects through recommending the implementation of appropriate project modifications or actions that reduce, avoid or offset the potential adverse consequences of a project.

Impact mitigation can only be possible when the full extent of the anticipated environmental and social problems is understood. Impact mitigation therefore has to affect the sources of impacts. Common sources include location: construction practices; operation and implementation of projects; maintenance; and cumulative impacts.

Mitigation should not be treated as an isolated activity but rather as being inherent in all aspects of the EIA process right from the project design stage.

The prescribed mitigation measures should be discussed preferably in each topic section of the EIS (e.g. soil, air quality, hydrology, cultural heritage, etc.).

The successful implementation of the prescribed mitigation measures is a good indication of the success of the project as a whole. This demands that mitigation costs are integrated in the contract dossier and bills of quantities as distinctive cost items so that both the contractor and the developer cannot overlook them.

Monitoring programme

Identifying impacts and related mitigation measures without ensuring their compliance makes little sense. Therefore a detailed monitoring and evaluation programme has to be part of the EIS. It shall contain a schedule for inspecting and reporting upon the implementation of the project and associated mitigation measures. The monitoring programme shall also identify the key indicators of environmental and social impact and their respective threshold level above which the impact is significant. The programme shall provide a schedule for monitoring each indicator and for reporting the monitoring results to MEMD and NEMA.

A list of monitoring requirements is given in Annex E.

7.4 Preparation of EIS

After conducting the EIStudy, the findings have to be presented in an EIS. The necessary content of an EIS is given in Annex D2.

The EIS shall provide a description of the following as required by the EIA regulations, 1998:

- The project and of the activities it is likely to generate.
- The proposed site and reasons for rejecting alternative sites.
- A description of the potentially affected environment including specific information necessary for identifying and assessing the environmental effects of the project.
- The material inputs into the project and their potential environmental effects.
- An economic analysis of the project.
- The products and by-products of the project.
- The environmental effects of the project including the direct, indirect, cumulative, short-term and long-term effects and possible alternatives.
- The measures proposed for eliminating, minimising or mitigating adverse impacts.
- An identification of gaps in knowledge and uncertainties, which were encountered in compiling the required information.
- An indication of whether the environment of any other state is likely to be affected and available alternatives and mitigating measures

8.0. GUIDELINES FOR MITIGATION OF SOCIAL IMPACTS

An EIA must also address the human or social environment, which include the social and socio-economic impacts due to the implementation of an energy project. One of the main objectives of social-EIAs is to predict and prevent or moderate unacceptable adverse social effects on the proposed actions or projects.

This is done through involving the community and all other stakeholders so that changes can be recommended at the planning, design and implementation stages. This is in accordance with Part III of the EIA regulations, 1998 (Statutory Instruments Supplement No.8). Social impact analysis should be carried out at every stage of the project cycle.

8.1 Project Planning

At the planning and design stage of all energy projects, it must be ensured in the design that people are integral part of the environment and are going to be active participants in the overall project environment. The following guidelines will apply:

⇒ the developer will identify the social impacts;
⇒ the developer will focus on preventing social impact;
⇒ during the design, the consulting engineer/EIStudy team must describe the main phases of the project; vis-à-vis the project cycle to ensure that the stakeholders fully understand what the project is all about.
⇒ the consulting engineer/EIStudy team should take note of the significant social-cultural issues in the project area.
⇒ the consulting engineer/EIStudy team should formulate a plan to prevent undesirable social-impacts if possible at the design/planning stage.

8.2 The Project Brief

For the purpose of addressing socio-economic impacts in the project brief, the developer will ensure the following:

⇒ Key social-economic activities and cultural issues within the project area are highlighted in the brief.
⇒ The methodology for addressing gender concerns during recruitment of personnel and distribution of socio-economic benefits to the local community is clearly detailed and where possible the requirements of the Local Government Statute, 1995 are fulfilled (Affirmative Action on Women).
⇒ The EIA expert who prepares the project brief should consult a competent sociologist/anthropologist.

8.3 Assessment and Mitigation of Social Impacts during the EIStudy

Although every project is unique, in most cases there is a series of more or less standard steps through which the analysis must proceed in order to achieve good results.

Step 1: Develop an effective public involvement plan, so that all affected interests will be involved.

The level of public participation needed varies with the nature of the action under review. For a complex project, like a large-scale hydropower project, a social assessment may be useful at the outset to establish the general character of the community, define the potentially affected groups, and determine best mechanisms for their involvement. In a simpler case, like a wind farm, merely consulting with local leaders and experts may be sufficient to obtain the critical data on which to build a public involvement program.

Step 2: Identify and characterize alternatives.

Alternatives are developed based on the purpose and need for the action, but the analyst needs to consider what they are and obtain sufficient data on each to frame the analysis.

As basic information about each alternative, the following is needed:

- Locations
- Land requirements
- Needs for ancillary facilities (roads, transmission lines, utilities, etc.)
- Construction or implementation schedule
- Size of the work force (construction and operation, by year or month)
- Facility size and shape (if a facility is involved)
- Need for a local work force
- Institutional resources

Step 3: Define baseline conditions.

Having established a means of working with the public, and obtained basic data on each alternative, the analyst now tries to define the pertinent existing conditions in each potentially affected area i.e the affected social environment. The analyst seeks answers to questions like:

- What populations may be affected? Are they concentrated or dispersed?
- How does each population relate to the natural or built environment?
- What is the historical background of each population?
- What are the political and social resources, power structure, and networks of relationship in each group?
- Are there low-income or minority populations or other disadvantaged groups involved? Do they have special needs?

- What kind of cultural and attitudinal attributes characterize each group? How do they feel about political and social institutions? How do they relate to the environment? To change?
- What are the relevant demographic and economic characteristics? Is there significant unemployment or underemployment? Is housing available? Access to utilities? Education? Transportation? Are there seasonal or other patterns of in-migration and out-migration?

At a minimum, this kind of information should be developed based on existing literature, government documents, and consultation with experts and the community. For a more complicated project, formal studies may be needed.

Indicators should be used to describe the social structure. These indicators should facilitate the identification especially of disadvantaged groups, and to describe and measure the social impacts analysed in the sequel. These indicators could include:

- **Social indicators like**
  - ❖ Registered crimes/disputes (per 1,000 pop.)
  - ❖ Crimes/disputes involving women (per 1,000 pop.)
  - ❖ Crimes/disputes involving vulnerable groups (per 1,000 pop.)
  - ❖ Primary school attendance Male
  - ❖ Primary school attendance Female
  - ❖ Number of households
  - ❖ Number of female-headed households
  - ❖ Number of community -based organizations

- **Economic indicators like**
  - ❖ Average land holding per household (hectares)
  - ❖ Percentage households owning land
  - ❖ Percentage households owning domicile
  - ❖ Percentage households renting land
  - ❖ Percentage households renting domicile
  - ❖ Agricultural Production
    - ▪ Maize (tons per ha. per annum)
    - ▪ Rice (tons per ha. per annum)
    - ▪ Millet (tons per ha. per annum)
    - ▪ Cassava (tons per ha. per annum)
    - ▪ Fish catch (tons per household/per annum)
    - ▪ Banana (tons per ha/ annum
  - Employment
    - Number of male wage earners
    - Number of female wage earners
  - Average household income (per annum)
  - Average household expenditure (per annum)
  - Energy consumption (average per household)
    - fuel wood (tons per annum)
    - kerosene (litres per annum)
    - electricity (kWh per annum)

- **Health indicators like**
    - Birth rate
    - Death rate
    - Infant mortality rate (per 1000 live births)
    - Average weight of children ages 5 - 12 (kg.)
    - Incidence of disease (per 1,000 pop./per month)
        - Diarrhoea
        - Upper Respiratory Infection
        - Tuberculosis
        - Hepatitis
        - Malaria or other endemic diseases
    - Number of Health Post cases registered (average per month)

Step 4: Define the scope of the effort.
The assessment of social impacts must be scoped to make sure it is focussed on the right things, and that the right methods are employed. The scope has to be included in the TOR for the EIS. Scoping must be carried out in consultation with the affected groups and through the public participation process.
Factors to consider in establishing the scope include:

- Probability that an event will occur
- Number of people potentially affected
- Duration of potential impacts
- Values of benefits and costs to affected groups
- Potential for reversibility or mitigation
- Likelihood of subsequent impacts
- Relevance to decisions
- Uncertainties over probable effects
- Controversy

Step 5: Project probable impacts.
Analysis of potential social impacts involves the study of data provided by the agencies involved, records of previous experience with similar actions or similar populations, census data and other vital statistics, documents and secondary sources, and field research involving interviews, meetings, surveys, and observation.

Social impacts are generally manifested in one or more of the following changes:
- People's way of life - how they live, work, play and interact with one another on a day-to-day basis;
- Their culture - shared beliefs, customs and values;
- Their community - its cohesion, stability, character, services and facilities;
- Their environment - the quality of the air and water people use, the availability and quality of the food they eat, the level of dust and noise to which they are exposed, the adequacy of sanitation, their safety and fears about their security, and most importantly, their access to and control over resources.

The EIA expert should endeavour to analyze all these broad areas of impacts so that no major types of social impacts are overlooked.

Methods of Impact Projection

There are a number of methods of projecting impacts. These methods depend on factors like the scope of the action, the area where it occurs, and the availability of pertinent data. Projection methods include:

- Comparative: comparing with similar actions and their effects
- Straight-line trend projection: taking an existing trend and projecting it into the future
- Population multiplier: for actions involving increase or decrease in given populations; each unit of change in a given population implies change in other variables such as housing and use of natural resources
- Scenarios: generate logical or data-based models and play them out
- Expert advice: obtain the thoughts of experts about likely scenarios or changes
- Calculation of "futures foregone": for example, the future of small minority-owned businesses in a community if the proposed action does NOT take place
- Computer modelling: very suitable for quantatitive impacts

Step 6: Predict responses to impacts.

The following questions are important in predicting responses to impacts:

- Will a group be highly influenced by what its leaders think, and will the leaders be positive or negative about the project?
- Are there ways for the population to adapt with the project, or is it likely to relocate?
- Can a group continue to carry out its valued ways of life, or will they be irrevocably lost?

Step 7: Consider indirect and cumulative impacts.
This is an important aspect that must be considered because most social impacts are not direct; they may occur well after the action is taken, and possibly in areas distant from the project. Many populations, especially local communities, are severely at risk of cultural extinction due to a variety of pressures, and a given project may lead to their extinction.

Step 8: Recommend new alternatives as needed and feasible.
As serious impacts are identified, consider what alternatives might alleviate the problems, and work with the project managers and affected groups to determine whether these are feasible and implementable.

Step 9: Develop a mitigation plan.
Work with project managers and affected groups to establish ways to mitigate social effects, and put this plan forward in the EIS. Establish monitoring programs to make sure that mitigation actually occurs.

9.0 GUIDELINES FOR PUBLIC CONSULTATIONS

Energy developments usually have different impacts or effects in areas where they are located. Such impacts may directly or indirectly affect different categories of social groups, agencies, communities and individuals. These are collectively referred to as project stakeholders or the 'public'. It is, therefore, very crucial that during the EIA process, appropriate mechanisms for ensuring the fullest participation and involvement of the public are taken by MEMD or/and the developer in order to minimise social and environmental impacts and enhance stakeholder acceptance.

This chapter highlights the need for public participation and involvement during the EIA process for energy projects, and the methodology for systematic involvement of the public. The terms 'public' and project stakeholders are interchangeably used throughout the chapter.

NEMA prepared EIA Public Hearing Guidelines (1999) providing methodological guidelines on public consultation. Developers are also encouraged to read and internalise these guidelines.

9.1 Energy Projects for which the Public must be consulted

The consultation and involvement of the public is very desirable throughout the EIA process. However, it is very critical at the following stages:

- Project design
- Scoping
- EIS review

It should also be noted that the need and degree of public consultation and involvement will vary according to the nature and characteristics of the project. For example, very intensive and extensive consultations will be required for a large hydropower project. This will also generally apply to any other energy project characterized by the following:

- Substantial land-take
- Displacement of families or communities
- Disruption of the means of livelihood of families and communities
- Destruction of communal assets and property
- Need for resettlement and compensation
- Inundation of land and property

9.2 Methodology for Involvement of the Public

Selection of stakeholders

An energy project has got a wide range of stakeholders. These generally include individuals, organized groups, local and international NGOs or institutions with specific interest in a project including MEMD. Sometimes, it might be useful to involve individuals such as academics and research scientists who may have special local knowledge about the project environment.

It should be recognized that different stakeholders have different interests in a project, thus the need to carefully identify and appropriately categorize them. This should preferably be initiated as early as possible in the project cycle preferably at the project planning stage. Special care should be taken to ensure that the concerns and views of the directly affected, the poor, minority and other highly vulnerable groups are not overshadowed by the more influential groups. The interests of women as a special group should also be captured.

Consultations with Stakeholders

Once the stakeholders have been identified and properly categorized, the process of involving them in the EIA process should begin. For an energy project, consultations involve an exchange of vital information or facts and key issues between the developer or MEMD on one hand, and the stakeholder community on the other. The consultation process should accord the stakeholder community every opportunity to comment on the merits, demerits and any other aspect of the proposed project. The process must be well planned and coordinated so that participation is convenient and cost-effective to all the parties involved.

An effective consultation process should generally ensure that:

- The public have got a clear understanding of the proposed project;
- Feedback mechanisms are clearly laid out and known by parties involved.

Consultation Methodology

There are numerous techniques and approaches that can be used for seeking the views of the public and consulting various project stakeholders. The following are recommended for energy projects:

- **Public Meetings**
  These may be specially convened meetings for people living in or near the project area. In Uganda, these may target LC officials and residents of villages adjacent to the project area. They may also apply to larger urbanised communities. The meetings are generally open and anybody is free to attend and participate in the proceedings.
  Public meetings are an ideal technique for a project developer to inform or educate the public about what the proposed development is about in general terms. To a good extent, they also enable the public to express their views and

feelings about the project. Though the meetings are not formal, detailed notes of the important points and issues raised during the session should be minuted by the developer. These should be kept on file for reference purposes.

- **Interviews**
  These may be structured or semi-structured. Interviews should be undertaken with key individuals representing the range of publics likely to be interested or affected by the project. For energy projects, these may include LC officials, elders and civic leaders adjacent to the project area. They should also target individuals considered to represent the views of distinct social groups such as women and the poor.
  Interviews are very effective in assessing public sentiments about the project.

- **Surveys**
  Surveys are an effective technique for determining public attitudes, values, and perceptives on various issues regarding the proposed project. Surveys can be conducted by individual interviews, or in small group interviews. The respondents should be carefully selected for this technique to achieve its objective.

- **Operating Field Offices**
  The establishment and operation of special field offices serve as a liaison with the developer and the public. This is quite applicable to projects necessitating close local contact and coordination, an example being a hydropower project where compensation and resettlement for displaced people must be undertaken. For this approach to be effective, the offices must be well publicised so that they are known to the public.

- **Open Houses**
  These are publicised accessible locations where the information on the proposed project and the EIA can be found. A member of the EIA team should be present to explain and discuss issues, and record the viewpoints and concerns of visitors. An open house is open and accessible to any person and the times of opening should be well publicised.

- **Advising Stakeholder Panels**
  Good experiences have been made with the establishment of official advising panels, which consist of representatives of the different stakeholder groups. These panels are especially useful for negotiations concerning resettlement plans.

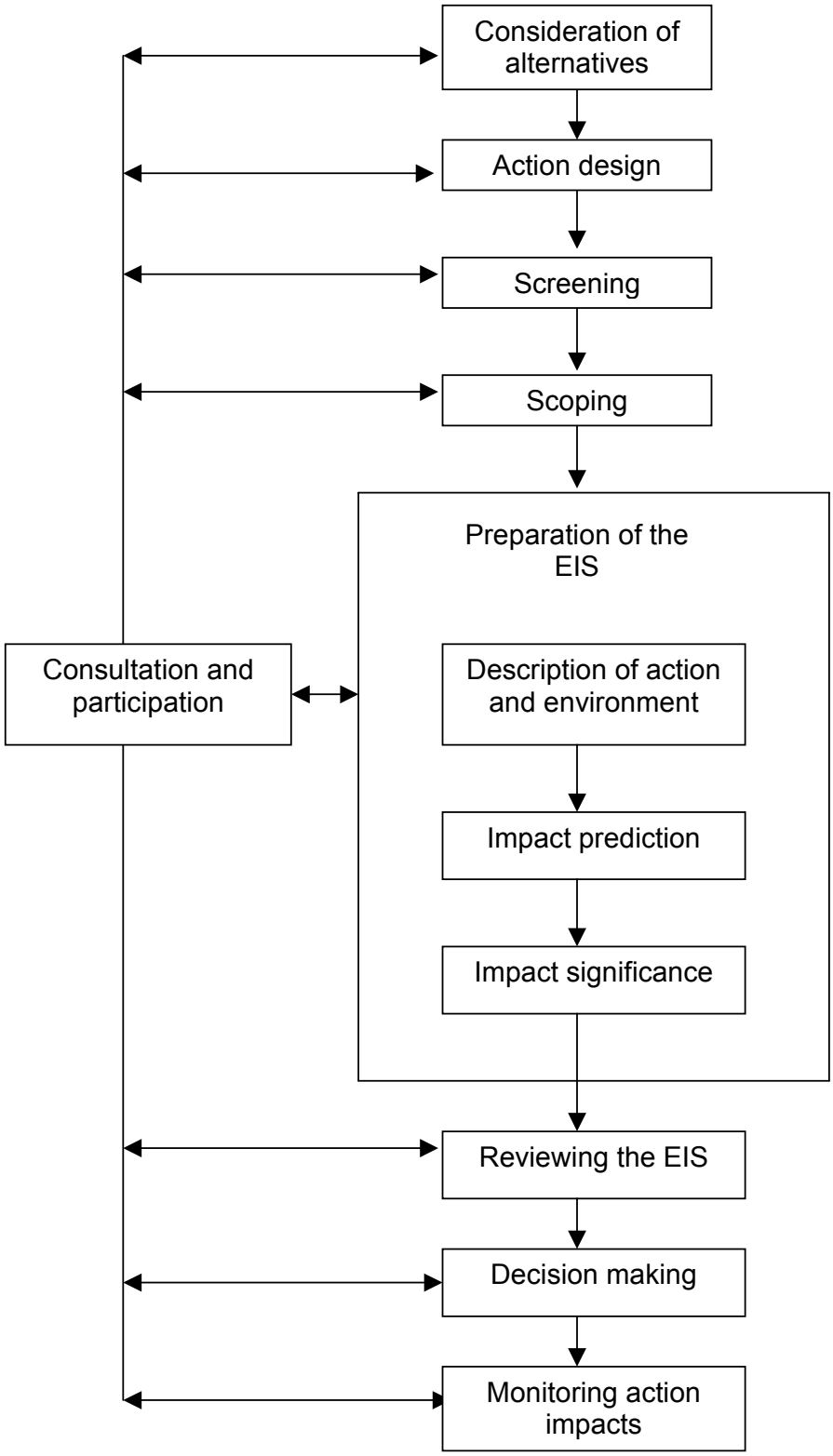
9.3 Responsibility for Ensuring Public Participation

- MEMD takes lead in ensuring that the public fully participates in the EIA process. As a matter of good practice, developers should also ensure an optimal level of public involvement at different stages of the EIA process;

- Where MEMD is the developer, the responsibility for ensuring public participation is taken over by NEMA.

9.4 Public Consultation within the EIA Process

In practice, public consultation is not a linear but an iterative as well as an on-going process. Figure 9.1 illustrates the critical points at which consultations must be conducted.



Different stages of the EIA process do require different levels of public consultation and involvement. However, public involvement becomes very critical at the following stages:

- Public consultation before the commissioning of the EIStudy
- Public consultation during the EIStudy
- Public consultation during EIS review

Public Consultation before Commissioning of the EIStudy

On submission of the project brief to MEMD and NEMA, it might be decided that the views and comments of the public on the project shall be sought. NEMA is obliged to publish the developer's notification and other relevant documents in a public notice within 4 weeks from the date of submission of the project brief and/or notice of intent to develop.

For the purpose of publishing the developer's notification in the public notice, the project brief should be appropriately summarized out, including the following:

- Nature, size, location of the project
- Site characteristics

The notification should also clearly specify where the developer's documents can be found.

The public and other stakeholders should submit their objections, views and comments to NEMA and MEMD within 21 days from the date of publication of the notice.

Preparation of Public Consultation Plan

It is important that a plan for stakeholder involvement is prepared before the EIStudy begins. This should be done with input from an anthropologist or rural sociologist with knowledge of the local cultures and different approaches or techniques available for implementing stakeholder involvement. Such a plan should consider:

- The stakeholders to be involved
- Matching of stakeholders with approaches and techniques of involvement
- Traditional authority structures and political decision-making processes
- Programming of the implementation, in time and space, of the different approaches and techniques for stakeholder involvement
- Mechanisms to collect, synthesise, analyse and, most importantly, present the results to the EIStudy team and key decision-makers
- Measures to ensure timely and adequate feedback to the stakeholders
- Budgetary / time opportunities and constraints

Public Consultations during the EIStudy

During the EIStudy, the study team should endeavour to consult the public on environmental concerns and any other issues pertaining to the project. Though

consultations are very critical at the scoping stage, ideally, it should be an on-going activity throughout the study.

Public Consultation during the EIS Review

During the EIS review, the public is given additional opportunity for ensuring that their views and concerns have been adequately addressed in the EIS. Any earlier omissions on, or oversight about the project effects can be raised at this stage. To achieve this objective, the EIS and related documents become public documents after submitting them to NEMA.

Upon receipt of EIS for an energy project, NEMA shall publicize its contents and go further to identify the relevant stakeholders and the concerned area or region; and also the location of places for inspection of the EIS. Further, NEMA shall make copies or appropriate summaries of the statement available for public inspection. This should be accomplished within two weeks from the receipt of the EIS. NEMA in close consultation with MEMD will decide on the most suitable locations or places where the EIS content can be accessed conveniently by the public.

The public notice should include a concise summary of assessment data indicating the following:

- Size and nature of the project
- Location
- Site characteristics
- Key results of the EIStudy

The notice should also specify the locations or places where the EIS may be consulted or viewed in addition to a notification to send or copy any comments to NEMA.

An official review appointment will be announced, where the reviewing authority has to answer questions and remarks from the public. These questions have to be handed in written form before-hand.

10.0 GUIDELINES FOR RESETTLEMENT AND COMPENSATION

The energy projects for which these guidelines apply are likely to fall into two categories: the old projects, that may need rehabilitation or expansion, and thus require additional pieces of land and the new projects that may require new land altogether. In both cases, the relocation of populations and disruption of the peoples' livelihoods might occur. This is most likely especially in the development of hydropower, exploration of petroleum resources, and large renewable energy projects. When relocation of people or communities is inevitable, there is a need to resettle them and ensure that their new places offer similar or better facilities compared to the old environmental and socio-economic set-up.

Resettlement in Uganda is covered under the Land Act (1998) while compensation is covered under the Uganda Constitution (1995). Currently, a resettlement policy is being prepared by the Commissioner for Resettlement in the Office of the Prime Minister, which should be referred to as soon as it is available. However, in all types of energy projects, every effort must be made to avoid relocation of communities.

Involuntary displacement is generally known as an agent for disrupting and impoverishing communities. It should, therefore, be avoided, or at least minimized. Where it is unavoidable, the displaced persons should not only be adequately compensated for their losses at replacement cost, but also be given opportunity to share in energy development project benefits. Further, they should be assisted in all ways possible in order to improve their livelihood.

Compensation is considered as an appropriate mitigation measure for unavoidable impacts when actions to minimize such impacts on people are not possible or insufficient. Provisions for compensation are supposed to avail enough resources for the affected communities to purchase replacement properties. The compensation scheme should also ensure that displaced people are not worse off, economically and socially, than they were before their displacement.

For energy projects, compensation would have to be paid for land, property and crops, where land is acquired for the purpose of enabling the development project to take place. However, no compensation need to be paid for any buildings, property or crops that were erected or grown after the cut-off period or in areas designated for energy projects such as the right of way for transmission lines in a road reserve.

10.1 Policy Framework

The objectives of the policy framework includes the following key elements:

- Involuntary resettlement should be avoided or minimised through design efforts.
- Where involuntary resettlement is inevitable, resettlement activities should be conceived and executed as sustainable development programs, providing sufficient investment resources to give the persons displaced by the project the opportunity to share in project benefits.

- Displaced persons should be assisted in their efforts to improve their livelihoods and standard of living or at least to restore them, in real terms, to pre-displacement levels.

According to the Uganda Government Policy as well as the policies of the development partners, the term - affected people/communities refers to people who are directly affected socially and economically by the energy development projects. This will usually be caused by the involuntary land-take or use of other assets that may result in:

- Relocation or loss of shelter.
- Loss of assets or access to assets.
- Loss of income sources or means of livelihood, whether or not the affected persons must move to another location.
- The involuntary restriction of access to legally designated parks and protected areas that could result into adverse impacts on the livelihood of the displaced persons.

The resettlement policy applies to all development projects and activities in the energy sector irrespective of the developer or financier of the project. This policy also covers resettlement and compensation resulting from complementary activities that are not directly part of the immediate energy investment project, but are necessary to achieve its objectives as set forth in the energy investment project documents. The policy applies to all displaced persons regardless of the total number affected or the severity of impact. Particular attention should be paid to the needs of vulnerable groups among those displaced: especially those below the poverty line, the elderly, women and children, the disabled local communities and ethnic minorities.

10.2 Legal Framework

The EIStudy team should determine the legal requirements for compensation including the existence of local bye-laws, if any. In addition, it should work out a framework for co-ordination between the different players in compensation.

The position of the government of Uganda in relation to resettlement and compensation to be paid if damage is caused to land is clear under the constitution and other Ugandan laws as well as for most of the development partner policies and guidelines. The relevant laws, that provide a framework for resettlement and / or land acquisition exercise for energy projects, are: The Uganda Constitution, The Land Act, 1998, The Land Acquisition Act, 1965, and The Roads Act, 1964. These pieces of legislation are already discussed in chapter 2 – the legal and policy framework for energy projects, to which reference should be made.

Development Partners Safeguard Policies and Guidelines

Each development partner has its own guidelines. The World Bank, for example has the Draft OP 4.12 “Involuntary Resettlement” which requires that displaced persons be compensated at full replacement cost, assisted with relocation/ resettlement and during the transition period. The developer should be encouraged to offer replacement land rather than cash compensation when the residual land holdings are not economically viable.

10.3 Institutional Framework

Overall, there are four main actors involved in carrying out resettlement if required for an energy project. These are the Ministry of Water, Lands and Environment (Compensation), the Prime Minister’s office (Resettlement), MEMD and the Local Governments.

Although the Prime Minister’s office is mandated to handle resettlement, it tends to limit itself to disaster situations. For the purpose of energy projects, MEMD will take responsibility for resettlement, identifying and coordinating all the players in the resettlement programme.

In general, the developer will liaise with the Ministry of Water, Lands and Environment to harmonise the compensation rates in consultation with the Chief Government Valuer. In addition, the LC officials, the contractor or developer and the affected local communities will work closely to ensure a fair resettlement exercise.

All districts in Uganda operate under a five-tier system of local government. The highest level is the Local Council Five (LCV) headed by a district chairman, followed by the LC IV, LC III, LC II, and LC I all headed by the respective local council chairperson. This hierarchy is the political wing of the district administration, while the district Chief Administrative Officer (CAO) heads the technical wing. Within the district, the Central Government is represented by the Resident District Commissioner (RDC). The district officials who will facilitate the resettlement exercise are the RDC and the LC V Chairman.

The technical personnel at the district level are headed by the CAO and will usually include the Community Development Officer(CDO), The District Land Officer, and the District Surveyor. At the energy project development level, the parish chiefs of Counties as well as Local Council (LC) officials at LC1, should form part of the resettlement committees. The Parish chief together with the community development officer at the district level should be involved in the resettlement programme as they should have been involved in the census exercise.

10.4 Stakeholder Analysis and Census of the Affected Persons

Prior to any compensation or relocation of person/communities, it is imperative to identify the stakeholders and carry out a census of the affected persons and communities. The census will take into account of all the people affected together with their means of livelihood. The census will in particular identify the vulnerable

groups, which should be protected. These include women, the disabled, the orphans, widows and other minorities.

During the census exercise of the affected persons, the local leaders, CDO as well as the Parish Chiefs from the project area should work together with the developer to ensure a smooth exercise. Both immovable and movable properties will be counted and eventually valued. The major stakeholders in the energy projects will include the following:

- Local Governments (District Administration, and the Parish chiefs)
- The District Resident Commissioners
- LC V, III & II Executives and Councillors as well as the Office of the LC IIIs in town council respectively
- LCI Chairmen in all the affected settlements
- Representatives of the MEMD
- Development partners if relevant

10.5 Compensation in Energy Projects

Compensation is considered when steps to minimise impacts on people are not possible or insufficient. Compensation provisions are supposed to avail enough resources for the affected communities to purchase replacement assets. They should also ensure that displaced people are not worse off, economically and socially, than before the displacement.

Constraints to Monetary Compensation

Monetary compensation as a means of compensating those directly affected by a development project has not been very effective in Uganda. There have been a significant number of cases where compensation provisions and property acquisition practices did not provide sufficient resources to enable the affected communities to purchase replacement assets. There are several reasons for this, and these include the following:

- Under-valuation of assets by government valuers
- Changes in price of the alternative properties
- Delayed payments leading to loss of value (e.g. because of inflation)
- Unsuitable manner of payment whereby it is not clear whether people should be paid a lump sum or instalments
- Misappropriation of funds earmarked for compensation

In view of the foregoing, monetary compensation may not be the best mode of compensating local communities. Thus there is a need to put in place a community-driven development plan to implement compensation. Furthermore, compensation or resettlement for large energy development projects is complicated by the fact that these responsibilities are handled by different institutions altogether. Energy projects for which compensation and resettlement are vital, fall under the aegis of the MEMD, while compensation issues are handled by the Ministry of Water, Lands and

Environment. On the other hand, resettlement is under the jurisdiction of the Office of the Prime Minister. This creates co-ordination problems since the different budgets and other forms of logistical support may not be easily synchronized and may lead to unnecessary delays in project implementation.

Compensation Guidelines

Past experience in Uganda highlights the need for legislated compensation. The legislation requires that only owners of properties that have to make way for the development project should receive compensation. It makes no mention of employees, tenants and squatters who may be affected. This has been unfortunate because the majority of the affected people do not receive any form of compensation particularly in urban areas.

In order for compensation to be effective, it is essential that a comprehensive baseline survey is conducted followed by the development of rehabilitation packages.

Objectives of Compensations

Article 26 of the Constitution of Uganda, 1995, states that compulsory deprivation of one's property is prohibited except when taking possession or acquisition is necessary for public use. If this is proved to be the case, as for an energy project, then acquisition is subject to prompt payment of fair and adequate compensation.

Compensation should aim to minimise social disruption and assist those who have lost assets as a result of an energy project to maintain their livelihoods through income restoration.

Responsibilities

Compensation is paid by the GoU through the Ministry of Water, Lands and Environment.

Inventory of Affected Assets

The EIStudy team must undertake a detailed survey of all losses that will result for each household, enterprise, or community affected by the project. The survey should account for land acquisition and loss of physical assets as well as loss of income—either temporary or permanent—resulting from displacement of household members from employment or income-generating resources (for instance, potters from clay deposits, fishers from fishing grounds, small-scale suppliers or vendors from customers). Assets held collectively, such as water sources, livestock grazing areas, irrigation systems, and community structures should be recorded separately.

It is essential for resettlement planners to consult with the affected people during this stage to develop a reasonable consensus on the methods and formulae for assigning value to lost assets and income forgone during resettlement. In some jurisdictions, it may be necessary for local authorities to validate claims to assets. However inventories of assets are compiled, heads of households should be

required to countersign them to minimize the possibility of subsequent claims or disputes regarding claims. The following are important inventory categories:

- **Land use/land capability**
  All land acquired or otherwise affected by the project, whether on a permanent or a temporary basis, must be surveyed, classified by type, and recorded. Civil authorities typically classify and assess the value of land by use (for instance, irrigated agriculture, nonirrigated agriculture, pasture, forest, housing, commercial). However, such classification may overlook the difference between present and potential land use requirements of affected people. For example, shifting cultivators practice crop rotation over wide areas and long periods of time. In such a case, land that appears unused may in fact be in a fallow cycle awaiting cultivation some years hence. Such a differentiation typically requires detailed soils maps and an assessment of land capability and carrying capacity. In addition, even in cases where cadastral survey maps demarcating land ownership and classification are available from the local land revenue office, these maps may be dated and no longer accurate. For this reason, the EIStudy team should be prepared to undertake independent surveys of land use and assessments of capacity to ensure the accuracy and equitable payment of compensation claims. Additional follow-up studies are usually required to support estimates of the annual revenue derived from different land uses or land types such as irrigated land, rain-fed land, fish-farming ponds, and woodlots. Resettlement planners must establish the difference between present and potential land use to ensure that replacement land provided to affected people is of value equivalent to the land acquired from them.

- **Houses and associated structures**
  Dwellings, separate kitchens, toilets, storerooms, barns, stables, livestock pens, granaries, and workshops for cottage industry should be classified by construction materials (timber, wattle, bamboo, reed, brick and mortar, concrete, earth). All structures should be included in the inventory regardless of whether they are permanently inhabited or occupied intermittently by transient populations.

- **Other private physical assets**
  Such assets include non-moveable assets such as standing crops, fruit and fodder trees, firewood and timber woodlots, plantations (rubber, oil palm), fencing, wells, irrigation structures, and graves or tombs.

- **Private enterprises**
  Shops, workshops, stalls, factories, and other business establishments should be surveyed and recorded. These should be classified according to ownership (private business, public enterprise, joint venture, etc.). Individuals losing their enterprises, employees losing jobs, or vendors losing customers should be enumerated, and the value of these losses incurred during the resettlement period should be estimated.

At the community level, the assets survey should provide an inventory and an assessment of the losses of public resources including:

- **Common property resources**
  Such resources include forest and woodlands (sources of building and craft materials, biomass for domestic energy) and pasture.

- **Public structures**
  These inlude schools, clinics, meeting halls, places of worship, wells/communal water points, livestock watering points, bathing and washing platforms, bus shelters, and monuments.

- **Cultural property**
  Cultural property includes archaeological sites, burial grounds, monuments, shrines, places of worship, artefacts, and sites of religious or historical significance.

- **Infrastructure**
  All infrastructure that will be destroyed or disrupted by the construction of the project should be enumerated, including roads and bridges; irrigation and drainage channels; water and sewage lines; power lines; and communication lines.

The inventory of assets should be cross-referenced with the census and linked with the census in a single database. It is advisable for resettlement planners to photograph, document, and register all assets described above by household, enterprise, or community organization. Digitised photographs can be used to record assets for storage in computerized census and socio-economic databases.

Valuation for Lost Assets

The EIStudy team should establish transparent methods for the valuation of all assets affected by the project. These methods should include consultation with representatives of the affected communities to assess the adequacy and acceptability of the proposed compensation. Such consultation is especially important where market values for assets are not well established or are intangible (social or cultural values that are not readily monetized). The study should also take note of changes in price and values of assets between evaluation and compensation.

After acceptable compensation rates are established, they are applied to the inventory of losses for all households and enterprises affected by the project. A simple software application can be used to create a database that combines census data, inventory of losses data, and compensation formulae. This database can then be used to budget compensation payments and to track progress in settling compensation claims.

Payments

The EIStudy team should draw up a payment plan, which will streamline procedures so as to avoid delayed payments.

The team should establish the best criteria for effective payments. The latter may include instalments, pre-season or lump sum, depending on the socio-economic characteristics of the society in question. Payments should be made at the peoples place of residence or other places that are easily accessible.

Peasant communities are often unable to properly manage large sums of money following compensation. Special attention should be paid to this point in order to guarantee that compensated people are economically not worse off than before the displacement.

10.6 Resettlement in Energy Projects

Resettlement Policy Framework

In Uganda, the resettlement policy is currently under development by the Commissioner for Resettlement in the Office of the Prime Minister. A white paper is currently being prepared. It would appear that the resettlement policy is designed to meet the needs of people who have been affected by disasters that are man-made (e.g. wars) or natural (floods). In this case, resettlees are given basic tools and necessities to start a new life. In many cases, resettlement has been on a case-by-case policy and often donor dependent. This has often resulted in serious negative effects on the displaced people. Nevertheless, examples of projects that have necessitated resettlement in Uganda include national parks, housing projects, refugees and the Owen Falls Dam Construction.

On the other hand, the GoU's fundamental policy goal is to improve living standards and earning capacities of displaced persons. In this way involuntary resettlement of people is transformed into an opportunity for development and self-improvement as they are enabled to share the benefits of development projects that cause their displacement. The concern is that displaced group are further economically disadvantaged. There is the possibility that they will engage in appropriate income generation activities that will result in environmental degradation. The GoU's policy is to avoid involuntary resettlement of indigenous or ethnic minority groups.

Objectives in Resettlement

The main objective in resettlement is to ensure that the displaced population receives benefits from the displacing project. Involuntary resettlement, therefore, should be an integral part of the energy development project and should be handled at the onset of the project, i.e. at the planning and feasibility stages. When communities or individuals are forcibly moved, it is likely that production systems are dismantled, kinship groups may be scattered, jobs may be lost and social networks may collapse leading to a host of other socio-economic ills. This is why involuntary resettlement should take into account all the socio-economic characteristics of the affected people.

Basic Requirements for Resettlement Plans

There are at least four basic requirements for energy development projects where resettlement will occur. These are as follows:

Resettlement Timetables

It is essential that a resettlement timetable, which is well co-ordinated with proposed energy development activities, is put in place so that the resettlement exercise is not left to be implemented towards the end of the energy project. Resettlement timetables should provide for phased resettlement to allow construction/improvement works and resettlement to take place at minimal cost.

Restoration of Lost Incomes

Resettlement plans should target restoration of lost incomes due to energy development projects. The desirable plan to restore lost incomes should include compensation costs, resettlement costs, administrative costs, rehabilitation costs and costs of lost local government or Central Government public assets. To minimise loses to the community, it is essential that compensation is paid upfront and a compensation timetable/programme is put in place.

Resettlement Budget

Inadequate financial resources for a resettlement programme may lead to its failure. Therefore it is necessary to prepare an adequate budget to meet the costs of resettlement. There are two aspects to preparing the resettlement budget. These are as follows:

- if the budget is too low, then the funds will be inadequate and this will lead to delays in implementing the energy project; and
- if the budget is excessive, it may discourage the Developer/Development partners from investing in that particular project.

10.7 Contents of a Compensation and Resettlement Plan

Where the energy project will displace people involuntarily, severe socio-economic problems are likely to arise. It is necessary therefore that the Developer ensures that the displaced population receives benefits from the project. This can only be possible if a people-oriented resettlement plan is evolved and implemented. Resettlement plans should include the following key components:

- **Objective**

  The objective of the plan should be well considered to the effect that the displaced people should benefit from the proposed energy project through compensation assistance in moving, and assistance to improve their former living standards and any other considerations relevant to the development area.

- **Policy**

The current government policy on resettlement should be stated, as well as other regulations particularly with respect to land tenure, local governance and environment. The project development partners' policy on resettlement should also be included.

- **Community Participation**

  All the identified key stakeholders should be actively involved in community participation

- **Baseline Survey**

  This will cover the community and their socio – economic situational analysis.

- **Legal Framework**

  This is outlined in chapter 2 and in some sections above.

- **Alternative Sites**

  With regard to alternatives for resettlement sites, the EIStudy team needs to:

  - Identify possible alternative sites together with the host and resettlees.
  - Identify the productive potential of alternative sites as well as availability of other sources of income.
  - Identify the comparable employment opportunities, infrastructure, services and production opportunities.
  - Identify and prepare relocation sites and drawing up timetables and budgets for resettlement.

  MWLE will put in place legal arrangements for land title ownership and for guarding against land speculation.

- **Valuation of and Compensation for loss of assets**

  Resettlement plans must target restoration of lost incomes as a result of implementing the project. To ensure this, the plan should:

  - Pay special attention to the legal arrangement for land title registration and site occupation.
  - Sensitise the affected communities on the laws and regulations on valuation and compensation.
  - Establish eligibility criteria for affected households.
  - Establish access to communal facilities.

- **Land Tenure, Acquisition and Transfer**

  The Developer should review the land tenure system both in the host community and the affected community. MEMD and the Ministry for Water, Lands and

Environment should together work out the compensation eligibility for land dependent populations. Evaluation and grievance procedures should be explained to the community making sure that both customary and titled resettlees are equally treated.

The plan should take into consideration the time required to process land titles.

- **Access to Training and Credit**

  If the baseline survey indicates that the resettlees cannot get the same employment opportunities as before then the plan must include alternative employment strategies for the displaced people. It may be necessary to institute vocational training, employment counselling, extension of credit and any other as may be identified.

- **Shelter, Infrastructure and Social Services**

  The plan should provide for infrastructure at the new sites. It is preferable that the GoU (through the Ministry of Water, Lands and Environment and the Office of the Prime Minister) provides suitable building materials while settlers construct their own dwellings according to their culture and tastes. The developer should facilitate this.

- **Implementation Schedule**

  It is essential that a sound schedule for executing the resettlement operation evenly over the duration of energy development projects requiring resettlement is put in place so as to avoid "end-bunching". The resettlement plan should include an implementation schedule for each activity covering the initial baseline and preparation, actual relocation and post relocation economic and social activities.

10.8 Impacts of Energy Projects

Energy projects particularly hydropower projects are known for leading to severe dislocation of persons and communities. This can happen at the stage of dam construction, construction of transmission facilities including upgrade sub stations, as well as during the construction of other related infrastructure.

Potential Scope of Resettlement/ Compensation in Energy Projects

Examples of different activities relating to energy development projects may lead to resettlement / compensation are summarized in Table 10.1

Table 10.1: Activities relating to energy development projects, and their potential resettlement / compensation impacts

TYPES OF PROJECTS	POTENTIAL RESETTLEMENT / COMPENSATION IMPACTS
Hydropower Dam construction	• Extensive permanent land-take leading to relocation and need for compensation to communities and individuals

	• Temporary land take near construction sites leading to temporary relocation and compensation • Downstream impacts like reduced fish catch, or loss of land and infrastructure due to increased erosion of the riverbed (less sediments) could require relocation and compensation
Construction of Substations and related infrastructures	• Permanent land-take for substation and access roads leading to relocation and need for compensation to communities and individuals • Temporary land-take near construction sites leading temporary relocation and compensation
Construction of High Voltage Transmission lines	• Permanent Right of Way Corridor land-take leading to relocation and need for compensation to communities and individuals • Temporary land-take near construction sites leading temporary relocation and compensation. Possible temporary impacts during construction

10.9 Consultations with, and Participation of Displaced Persons in Planning and Implementation

It is important that the affected persons/community, MEMD or Developer and the EIA study team start interacting right from the time it is first realized that compensation / resettlement may be necessary, i.e. during project planning or at the latest, during the feasibility stage.

Various members of the community should also be involved in negotiations, including:

- Informal leaders and representatives
- LC Officials
- Other formal leaders
- Local NGOs and CBOs
- Local Environment Committees

10.10 Grievance Redress Mechanism

The affected community should be given an opportunity to review the survey results. In case any complaints arise from the affected communities, a grievance committee must be put in place to quicken the process of conflict resolution. This is to avoid the tedious process of courts of law, which are often not appreciated and out of reach by local communities.
The grievance committee should be formed at the lowest level of activity (e.g. Village level) and should include some of the following:

- Village Elder
- Woman leader

- A person from the Land Committee
- Representative of MEMD or developer

The procedure should be such that if the complainant still does not agree with the decision of the grievance committee, she or he should be encouraged to appeal to the Probation Officer of the Local Government based at every district. If he still does not agree to the decision, he may be encouraged to go to the court as a last option. It is important that the grievance committee is acceptable to all the stakeholders. This can be achieved by circulating its membership to community for acceptance.

10.11 Resettlement Monitoring and Evaluation Arrangement

It is important that a resettlement implementation plan is formulated so that it can serve as a basis for the resettlement monitoring and evaluation. The plan will ensure that the contractor is aware of his responsibilities. The plan needs to define criteria and indicators against which to measure the success of the resettlement. To implement this plan it is imperative that a social monitoring team is instituted. This will be responsible for monitoring the resettlement/compensation activities and implementing the social mitigation measures proposed in the resettlement/ compensation plan. The monitoring team should closely liaise with local implementation committee which would have been put in place for that purpose. The monitor should report to the MEMD / Developer and his/her reports should be availed to the district authorities who may wish to make comments or adjustments in accordance with emerging local bye-laws or concerns.

Depending on the project specific situation, the monitoring team should include:
- Sociologists
- Urban physical planners
- Psychologists
- Doctors
- Public health specialists
- Anthropologists
- Economists
- Agricultural experts

The Resettlement monitoring team's main activities should include the following:

1. Overview and review compensation and/or lease agreements for land-take (both temporary for the use of the Contractor and permanent for the energy development works),
2. Check that no land has been taken unnecessarily, no crops destroyed unnecessarily and no buildings nor trees destroyed unnecessarily,
3. Review reinstatement and/or future management plans of construction facilities such as camps.

ANNEX A: LIST OF PROJECTS FOR WHICH THESE GUIDELINES APPLY.

Petroleum/Natural gas projects
- Exploration
- Extraction
- Refinery
- Storage (Surface/underground)
- Transmission of oil/gas via pipeline installation
- Transport of oil/gas by other means
- Retail

Hydropower projects
- Dams
- Reservoirs
- Generation

Thermoelectric projects
- Diesel
- Oil
- Bagasse
- Gas
- Biomass

Renewable Energy Projects
- Energy crop farming / fuel wood plantations
- Industrial production of charcoal
- Land fill gas for energy production
- Wind farms
- Large solar thermal projects
- Bio-fuels (ethanol, bio diesel, etc)

Geothermal
- Drilling
- Steam extraction
- Power production

Power transmission
- Electrical energy
- Steam
- Hot water

Industrial briquetting
- Wood residues
- Charcoal
- Peat
- Agro-residues

Other energy projects

- Gasification
- Peat extraction

ANNEX B1: CONTENT OF PROJECT BRIEF

Project briefs are concise documents (20 pages) that should contain the following information:

1. Contact details of the Developer

- Name of the developer
- Main postal address, telephone, fax and e-mail details for the developer
- Name of the main contact person and direct postal address, telephone, fax and e-mail details

2. Characteristics of the project

- Brief description of the proposed project including type of project, the form of energy source, size of the project in terms of capacity installed, transmitted or distributed, length of transmission, distribution lines, number of people to benefit from the project, raw materials needed as well as product by product or emissions
- Reasons for proposing the project (justification of the project, project objectives)
- Background of the project: How was the project conceived; Findings from previous studies such as energy supply and demand analysis that contributed to the conception of the project; Relationship with other existing/planned projects
- Project site: Maps and photographs showing the location of the project relative to surrounding physical, natural and man-made features; Existing land-uses on and adjacent to the site and any future planned land uses; Protected and sensitive areas like national parks, forests, wetlands, sites of cultural interest; Alternative project sites; Reasons for choosing the particular site
- Baseline data: The baseline data should include information relevant to the proposed project that will depend on the source of energy of a particular project. It will include data on some of the following: Geology and soils, Climate and rainfall conditions, Settlement areas, Drainage patterns, Total river basin, Long-term average flow of a river, Water level of reservoir, Design flood level, Reservoir area during normal storage, Minimum and Maximum Water level in downstream, Submerged land, Land requirement for construction, Land use and tenure, Sites of cultural or historic value, Human population and demographic trends, Local government set up, Major economic activities, Public health status Key social-economic activities and cultural issues
- Physical form of the development: Layout, buildings, other structures, construction materials, etc. including details such as: Energy source (hydro, petroleum, solar, biomass, wood, etc.); Energy generated, transmitted or

distributed; Power House (generating capacity of plant); Size of Dam; Spillways; Size of pen stoke, pipeline or storage capacity; Transmission lines, voltage, number, length; Distribution lines – voltage, number, length; Reservoir areas and height; Energy demand and supply in the project area; Raw material consumption rate; Access roads; Project land within project boundary; Site preparation activities such as clearing of land, forests, drilling, blasting, excavation of land, etc.; Time needed for project development

- Construction practices: Specific construction techniques to be used with emphasis on any potential impacts of construction e.g. noise, dust. Needed housing, transportation, etc. for the workers

- Operations: Operations with particular emphasis on number of workers to be employed, working hours, housing and transportation needs, occupational health and safety hazards. Any expected air, water or waste discharge from proposed action

- Preliminary analysis of alternatives: The brief should indicate reasonable alternatives to meet project objectives. This may lead to alternatives that are more sound from an environmental, social cultural and economic point of view from the originally proposed project. Alternatives can be other energy sources, construction of smaller energy facilities, alternative sites, different technologies, etc.

- Other large development projects ongoing or planned for within the area of influence of the energy project

3. Characteristics of the potential impacts

A brief description of the likely impacts of the project considering the following factors:

- Impacts on people, human health, gender distribution of socio-economic benefits, fauna and flora, soils, land use, material assets, water quality and hydrology, air quality, climate, noise and vibration, the landscape and visual environment, historic and cultural heritage resources, and the interactions between them

- Nature of the impacts (i.e. direct, indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative)

- Extent of the impacts (geographical area, size of the affected population/habitat/species)

- Magnitude and complexity of the impacts

- Probability of the impacts

- Duration, frequency and reversibility of the impacts

- Mitigation incorporated into the project design to reduce, avoid or offset significant adverse impacts

- Transboundary nature of the impact

It is important to remember that only such information can be requested, that the developer reasonably can be expected to have at the stage in the development the project has reached. If screening is being carried out early in the project's life only some information will be available.

ANNEX B2: SCREENING CHECKLIST

Questions to be Considered	Yes / No / ? . Briefly describe	Is this likely to result in a significant effect? Yes/No/? – Why?
Brief Project Description:		
1. Will construction, operation or decommissioning of the Project involve actions which will cause physical changes in the locality (topography, land use, changes in water bodies, etc)?		
2. Will construction or operation of the Project use natural resources such as land, water, materials or energy, especially any resources which are non-renewable or in short supply?		
3. Will the Project involve use, storage, transport, handling or production of substances or materials which could be harmful to human health or the environment or raise concerns about actual or perceived risks to human health?		
4. Will the Project produce solid wastes during construction or operation or decommissioning?		
5. Will the Project release pollutants or any hazardous, toxic or noxious substances to air?		
6. Will the Project cause noise and vibration or release of light, heat energy or electromagnetic radiation?		
7. Will the Project lead to risks of contamination of land or water from releases of pollutants onto the ground or into surface waters, groundwater, coastal wasters or the sea?		
8. Will there be any risk of accidents during construction or operation of the Project which could affect human health or the environment?		
9. Will the Project result in social changes, for example, in demography, traditional lifestyles, employment?		
10. Are there any other factors which should be considered such as consequential development which could lead to environmental effects or the potential for cumulative impacts with other existing or planned activities in the locality?		
11. Are there any areas on or around the location which are protected under international or national or local legislation for their ecological, landscape, cultural or other value, which could be affected by the project?		
12. Are there any other areas on or around the location which are important or sensitive for reasons of their ecology e.g. wetlands, watercourses or other water bodies, mountains, forests or woodlands, which could be affected by the project?		

Questions to be Considered	Yes / No / ? . Briefly describe	Is this likely to result in a significant effect? Yes/No/? – Why?
13. Are there any areas on or around the location which are used by protected, important or sensitive species of fauna or flora e.g. for breeding, nesting, foraging, resting, overwintering, migration, which could be affected by the project?		
14. Are there any inland, coastal, marine or underground waters on or around the location which could be affected by the project?		
15. Are there any areas or features of high landscape or scenic value on or around the location which could be affected by the project?		
16. Are there any routes or facilities on or around the location which are used by the public for access to recreation or other facilities, which could be affected by the project?		
17. Are there any transport routes on or around the location which are susceptible to congestion or which cause environmental problems, which could be affected by the project?		
18. Is the project in a location where it is likely to be highly visible to many people?		
19. Are there any areas or features of historic or cultural importance on or around the location which could be affected by the project?		
20. Is the project located in a previously undeveloped area where there will be loss of greenfield land?		
21. Are there existing land uses on or around the location e.g. homes, gardens, other private property, industry, commerce, recreation, public open space, community facilities, agriculture, forestry, tourism, mining or quarrying which could be affected by the project?		
22. Are there any plans for future land uses on or around the location which could be affected by the project?		
23. Are there any areas on or around the location which are densely populated or built-up, which could be affected by the project?		
24. Are there any areas on or around the location which are occupied by sensitive land uses e.g. hospitals, schools, places of worship, community facilities, which could be affected by the project?		
25. Are there any areas on or around the location which contain important, high quality or scarce resources e.g. groundwater, surface waters, forestry, agriculture, fisheries, tourism, minerals, which could be affected by the project?		
26. Are there any areas on or around the location which are already subject to pollution or environmental damage e.g. where existing legal environmental standards are exceeded, which could be affected by the project?		

Questions to be Considered	Yes / No / ? . Briefly describe	Is this likely to result in a significant effect? Yes/No/? – Why?
27. Is the project location susceptible to earthquakes, subsidence, landslides, erosion, flooding or extreme or adverse climatic conditions e.g. temperature inversions, fogs, severe winds, which could cause the project to present environmental problems?		

Summary of features of project and of its location indicating the need for EIA

ANNEX C1: BASIC INFORMATION NEEDED FOR SCOPING

This list is the same as Annex B1: Content of project brief, except that at the scoping stage more detail is likely to be needed. This may involve some preliminary data collection and field-work.

1. Contact details of the Developer

- Name of the developer
- Main postal address, telephone, fax and e-mail details for the developer
- Name of the main contact person and direct postal address, telephone, fax and e-mail details

2. Characteristics of the project

- Brief description of the proposed project including type of project, the form of energy source, size of the project in terms of capacity installed, transmitted or distributed, length of transmission, distribution lines, number of people to benefit from the project, raw materials needed as well as product by product or emissions
- Reasons for proposing the project (justification of the project, project objectives)
- Background of the project: How was the project conceived; Findings from previous studies such as energy supply and demand analysis that contributed to the conception of the project; Relationship with other existing/planned projects
- Project site: Maps and photographs showing the location of the project relative to surrounding physical, natural and man-made features; Existing land-uses on and adjacent to the site and any future planned land uses; Protected and sensitive areas like national parks, forests, wetlands, sites of cultural interest; Alternative project sites; Reasons for choosing the particular site
- Baseline data: The baseline data should include information relevant to the proposed project that will depend on the source of energy of a particular project. It will include data on some of the following: Geology and soils, Climate and rainfall conditions, Settlement areas, Drainage patterns, Total river basin, Long-term average flow of a river, Water level of reservoir, Design flood level, Reservoir area during normal storage, Minimum and Maximum Water level in downstream, Submerged land, Land requirement for construction, Land use and tenure, Sites of cultural or historic value, Human population and demographic trends, Local government set up, Major economic activities, Public health status
- Physical form of the development: Layout, buildings, other structures, construction materials, etc. including details such as: Energy source (hydro,

petroleum, solar, biomass, wood, etc.); Energy generated, transmitted or distributed; Power House (generating capacity of plant); Size of Dam; Spillways; Size of pen stoke, pipeline or storage capacity; Transmission lines, voltage, number, length; Distribution lines – voltage, number, length; Reservoir areas and height; Energy demand and supply in the project area; Raw material consumption rate; Access roads; Project land within project boundary; Site preparation activities such as clearing of land, forests, drilling, blasting, excavation of land, etc.; Time needed for project development

- Construction practices: Specific construction techniques to be used with focus on any potential impacts of construction e.g. noise, dust. Needed housing, transportation, etc. for the workers

- Operations: Operations with particular emphasis on number of workers to be employed, working hours, housing and transportation needs, occupational health and safety hazards. Any expected air, water or waste discharge from proposed action

- Preliminary analysis of alternatives: The brief should indicate reasonable alternatives to meet project objectives. This may lead to alternatives which are more sound from an environmental, social cultural and economic point of view from the originally proposed project. Alternatives can be other energy sources, construction of smaller energy facilities, alternative sites, different technologies, etc.

- Other large development projects ongoing or planned for within the area of influence of the energy project

3. Characteristics of the potential impacts

A brief description of the likely impacts of the project considering the following factors:

- Impacts on people, human health, fauna and flora, soils, land use, material assets, water quality and hydrology, air quality, climate, noise and vibration, the landscape and visual environment, historic and cultural heritage resources, and the interactions between them

- Nature of the impacts (i.e. direct, indirect, secondary, cumulative, short, medium and long-term, permanent and temporary, positive and negative)

- Extent of the impacts (geographical area, size of the affected population/habitat/species)

- Magnitude and complexity of the impacts

- Probability of the impacts

- Duration, frequency and reversibility of the impacts

- Mitigation incorporated into the project design to reduce, avoid or offset significant adverse impacts

- Transboundary nature of the impact

ANNEX C2: SCOPING CHECKLIST

No.	Questions to be considered in Scoping	Yes/No/?	Which characteristics of the project environment could be affected and how?	Is the effect likely to be significant? Why?
1. Will construction, operation or decommissioning of the project involve actions which will cause physical changes in the locality (topography, land use, changes in waterbodies, etc) ?				
1.1	Permanent or temporary change in land use, landcover or topography including increases in intensity of land use?			
1.2	Clearance of existing land, vegetation and buildings?			
1.3	Creation of new land uses?			
1.4	Pre-construction investigations e.g. boreholes, soil testing?			
1.5	Construction works?			
1.6	Demolition works?			
1.7	Temporary sites used for construction works or housing of construction workers?			
1.8	Above ground buildings, structures or earthworks including linear structures, cut and fill or excavations?			
1.9	Underground works including mining or tunnelling?			
1.10	Reclamation works?			
1.11	Dredging?			
1.12	Production and manufacturing processes?			
1.13	Facilities for storage of goods or materials?			
1.14	Facilities for treatment or disposal of solid wastes or liquid effluents?			
1.15	Facilities for long term housing of operational workers?			
1.16	New traffic during construction or operation?			
1.17	New transport infrastructure?			
1.18	Closure or diversion of existing transport routes or infrastructure leading to changes in traffic movements?			
1.19	New or diverted transmission lines or pipelines?			
1.20	Impoundment, damming, culverting, realignment or other changes to the hydrology of watercourses or aquifers?			
1.21	Stream crossings?			
1.22	Abstraction or transfers of water from ground or surface waters?			
1.23	Changes in waterbodies or the land surface affecting drainage or run-off?			
No.	**Questions to be considered in Scoping**	**Yes/No/?**	**Which characteristics of the project environment could be affected and how?**	**Is the effect likely to be significant? Why?**

1.24	Transport of personnel or materials for construction, operation or decommissioning?			
1.25	Long term dismantling or decommissioning or restoration works?			
1.26	Ongoing activity during decommissioning which could have an impact on the environment?			
1.27	Influx of people to an area in either temporarily or permanently?			
1.28	Introduction of alien species?			
1.29	Loss of native species or genetic diversity?			
1.30	Any other actions?			
2. Will construction or operation of the Project use natural resources such as land, water, materials or energy, especially any resources which are non-renewable or in short supply?				
2.1	Land especially undeveloped or agricultural land?			
2.2	Water?			
2.3	Minerals?			
2.4	Aggregates?			
2.5	Forests and timber?			
2.6	Energy resources?			
2.7	Any other resources?			
3. Will the Project involve use, storage, transport, handling or production of substances or materials which could be harmful to human health or the environment or raise concerns about actual or perceived risks to human health?				
3.1	Will the project involve use of substances or materials which are hazardous or toxic to human health or the environment (flora, fauna, water supplies)?			
3.2	Will the project result in changes in occurrence of disease or affect disease vectors (e.g. insect or water borne diseases)?			
3.3	Will the project affect the welfare of people e.g. by changing living conditions?			
3.4	Are there especially vulnerable groups of people who could be affected by the project e.g. hospital patients, the elderly?			
3.5	Any other causes?			
4. Will the Project produce solid wastes during construction or operation or decommissioning?				
4.1	Spoil, overburden or mine wastes?			
4.2	Municipal waste (household and or commercial wastes)?			
4.3	Hazardous or toxic wastes (including radioactive wastes)?			
4. 4	Other industrial process wastes?			
No.	**Questions to be considered in Scoping**	**Yes/No/?**	**Which characteristics of the project environment could be affected and how?**	**Is the effect likely to be significant? Why?**

4.5	Surplus product?			
4.6	Sewage sludge or other sludges from effluent treatment?			
4.7	Construction or demolition wastes?			
4.8	Redundant machinery or equipment?			
4.9	Contaminated soils or other material?			
4.10	Agricultural wastes?			
4.11	Any other solid wastes?			
5. Will the Project release pollutants or any hazardous, toxic or noxious substances to air?				
5.1	Emissions from combustion of fossil fuels from stationary or mobile sources?			
5.2	Emissions from production processes?			
5.3	Emissions from materials handling including storage or transport?			
5.4	Emissions from construction activities including plant and equipment?			
5.5	Dust or odours from handling of materials including construction materials, sewage and waste?			
5.6	Emissions from incineration of waste?			
5.7	Emissions from burning of waste in open air (*e.g.* slash material, construction debris)?			
5.8	Emissions from any other sources?			
6. Will the Project cause noise and vibration or release of light, heat energy or electromagnetic radiation?				
6.1	From operation of equipment e.g. engines, ventilation plant, crushers?			
6.2	From industrial or similar processes?			
6.3	From construction or demolition?			
6.4	From blasting or piling?			
6.5	From construction or operational traffic?			
6.6	From lighting or cooling systems?			
6.7	From sources of electromagnetic radiation (consider effects on nearby sensitive equipment as well as people)?			
6. 8	From any other sources?			
7. Will the Project lead to risks of contamination of land or water from releases of pollutants onto the ground or into sewers, surface waters or groundwater?				
7.1	From handling, storage, use or spillage of hazardous or toxic materials?			
7.2	From discharge of sewage or other effluents (whether treated or untreated) to water or the land?			
No.	**Questions to be considered in Scoping**	**Yes/No/?**	**Which characteristics of the project environment could be affected and how?**	**Is the effect likely to be significant? Why?**
7.3	By deposition of pollutants emitted to air, onto the land or into water?			
7.4	From any other sources?			

7.5	Is there a risk of long term build up of pollutants in the environment from these sources?			
8. Will there be any risk of accidents during construction or operation of the Project which could affect human health or the environment?				
8.1	From explosions, spillages, fires etc from storage, handling, use or production of hazardous or toxic substances?			
8.2	From events beyond the limits of normal environmental protection e.g. failure of pollution control systems?			
8.3	From any other causes?			
8.4	Could the project be affected by natural disasters causing environmental damage (*e.g.* floods, earthquakes, landslip, *etc*)?			
9. Will the Project result in social changes, for example, in demography, traditional lifestyles, employment?				
9.1	Changes in population size, age, structure, social groups *etc*?			
9.2	By resettlement of people or demolition of homes or communities or community facilities e.g. schools, hospitals, social facilities?			
9.3	Through in-migration of new residents or creation of new communities?			
9.4	By placing increased demands on local facilities or services e.g. housing, education, health?			
9.5	By creating jobs during construction or operation or causing the loss of jobs with effects on unemployment and the economy?			
9.6	Any other causes?			
10. Are there any other factors which should be considered such as consequential development which could lead to environmental effects or the potential for cumulative impacts with other existing or planned activities in the locality?				
10.1	Will the project lead to pressure for consequential development which could have significant impact on the environment e.g. more housing, new roads, new supporting industries or utilities, etc?			
10.2	Will the project lead to development of supporting facilities, ancillary development or development stimulated by the project which could have impact on the environment e.g.: • supporting infrastructure (roads, power supply, waste or waste water treatment, etc) • housing development • extractive industries • supply industries • other?			
10.3	Will the project lead to after-use of the site which could have an impact on the environment?			
10.4	Will the project set a precedent for later developments?			

10.5	Will the project have cumulative effects due to proximity to other existing or planned projects with similar effects?			

ANNEX D1: CONTENT OF TOR FOR EISTUDY

This guide may be expanded depending on the energy source and the scoping report. A general outline shall include among others:

1. Background information

The introduction of the TOR should give sufficient background information relating to the project. It must state the major negative impacts established during scoping and indicate which impacts require special examination. The scoping report should be attached.

2. Objective of the EIStudy

The objectives of the EIStudy should be to investigate in detail the positive and negative impacts associated with developing the project through the project cycle as well as a detailed plan covering mitigation of predicted impacts.

3. Scope of work

The scope of work to be undertaken should be clearly defined. This includes:

- Preparation of a public consultation plan. The plan should consider the stakeholders to be involved; implementation, in time and space, of the different approaches and techniques for stakeholder involvement; mechanisms to collect, analyse and present the results to the decision-makers; measures to ensure feedback to the stakeholders.

- Assessment of the alternatives to the project: The study tries to identify other options meeting the project objectives while reducing the environmental and social impacts. This could be options using other sources of energy, different siting with the same source of energy, energy conservation and pollution control technologies. The likely outcome of the no action alternative should be included.

- Description in detail of mitigation measures and their financial implications.

- Drawing up a detailed plan covering mitigation of predicted impacts, relocation, compensation schemes and other related issues that would ensure positive impacts

- Development of a mechanism that would enhance positive impacts and their cost.

- Preparation of a compressive and detailed plan covering the environmental and social variables to be monitored, the location and timing of sampling, the respective thresholds, and measures to be taken if thresholds are exceeded.

4. Expertise/Specialist for the study

The team composition will relate to the critical issues and areas of study as stated in the TOR of EIStudy. The specialists may include:

- An environmental impact specialist
- A natural resource specialist
- A hydrologist
- A sociologist
- A resettlement expert
- A socio-economist
- An ecologist
- An urban physical planner
- A forester
- A hydropower expert
- An energy expert
- An electrical engineer.

5. Output and Reporting

The output of the study is presented in the EIS which contains findings and recommendations of the EIStudy.

The TOR should indicate the number of copies of the EIS that should be submitted by the developer to NEMA.

6. Time frame

The TOR should indicate the time the study is likely to take. This will depend on the scoping report. E.g. large hydropower projects will take a long time to study due to a multitude of significant impacts they are likely to cause.

ANNEX D2: BASIC CONTENTS OF AN EIS

An EIS for an energy project should contain the following:

- **Executive Summary**
  A concise and accurate non-technical summary stressing the major findings and conclusions of the report. The recommended actions to be included in the proposed project should also be given.

- **Project Description**
  A concise description of the nature, objectives and scale of the project. Its activities during the different phases, and the technical, economic, social and physical context of the project should also be included.

- **Description of proposed project site and surroundings**
  A concise description of the existing physical, biological and human environment within which an energy project is located. Its environmental baseline, current trends and how it will change the environmental setting should be included. Consideration should also be given to any areas that are environmentally sensitive or characterised by unique cultural heritage or biophysical endowments.

- **Significant environmental impacts and risks**
  An accurate identification, description and/or quantification of impacts on different environmental and social receptors. An interpretation of significance of impacts should also be included.

- **Evaluation of project alternatives**
  A description of alternatives, the selection method used and the results leading to the proposed action.

- **Mitigation measures**
  Mitigation measures for adverse impacts concentrating on feasible, realistic and enforceable alternatives.

- **Monitoring and Evaluation of programme and recommendations**
  A description of the monitoring plan specifying what should be done, by who, where, when and at what cost.

- **Bibliography and literature review**

- **Appendices**
  - Preparation staff
  - Pertinent laws, regulations and policies
  - List of individuals, agencies and organisations consulted
  - Description of public consultation programme
  - Public and agency comments and responses thereto
  - TOR for the EI Study

ANNEX D3: EIS REVIEW CHECKLIST

Introduction

This checklist is designed for users who wish to review the quality of EIS (that is, the environmental information provided by developers) to check their adequacy for decision-making and consultation.

Two sets of instructions for using the checklist are provided.

- Firstly for users wishing to review a single EIS to determine whether the information is adequate for decision-making and consultation and if not, what more information is needed.

- Secondly for users wishing to review several EIS and grade them for comparative research or monitoring purposes.

Both methods use the same checklist. It is organised in seven sections:

- Description of the project
- Alternatives
- Description of the environment likely to be affected by the project
- Description of the likely significant effects of the project
- Description of mitigating measures
- Non technical summary
- Quality of presentation

Within each section there are numbered review questions. For some questions notes are provided to assist the reviewer.

Instructions for Reviewing a single EIS

Step 1

Briefly overview the EIS to understand how it is organised and where to find things within it.

Step 2

Decide for each review question, whether the question is relevant to the specific project. If so enter “Yes” in Column 2. At the end of each section of the checklist consider whether there are any special features of the project that mean that types of information not identified in the checklist could be relevant and add these to the Checklist.

Step 3

If a review question is identified as relevant, review the EIS in more detail and decide

whether the particular information identified in the question is provided and is sufficient for decision-making. If it is complete enter “Yes” in Column 3. If it is not enter “No”.

In considering whether the information is sufficient for decision-making the reviewer should consider whether there are any omissions in the information and if there are whether these omissions are vital to the decision-making process. If they are not then it may be unnecessary to request further information. This will avoid unnecessary delay to the process. Factors to consider will include:

- The legal provisions applying and the factors that the decision maker is required to take into account at this stage in the consent process for the project.
- Whether the consent process at the EIA stage is about the principle of the project or the detailed design.
- Whether there are later consents still required which will examine relevant environmental issues in more detail, for example pollution control consents such as IPCC.
- The scale and complexity of the project and the sensitivity of the receiving environment.
- Whether the environmental issues raised by the project are high profile.
- The views of the public and consultees about the project and the degree of controversy.

Step 4

If the answer to a review question is “No” consider what further information is required and note this in Column 4. The reviewer may also wish to make any suggestions on where or how the information could be obtained.

Instruction for Comparative and Monitoring Review

The checklist can also be used for more comparative appraisal of EIS. Reviewers may wish to compare the quality of EIS across a number of similar projects or between different project types, or look at trends in quality over time, or to investigate how well different parts of EIS are handled.

The steps in the process are the same as those described above except Step 3.

Step 3

When appraising quality across projects instead of entering either “Yes” or “No”.” in Column 3 the reviewer can use a grading system. A suggested system is outlined below but users are free to use any system that suits their purpose.

- A: Full provision of information with no gaps or weaknesses
- B: Good provision of information with only very minor weaknesses which are not of importance to the decision

- C: Adequate provision of information with any gaps or weaknesses in information not being vital to the decision process
- D: Weak provision of information with gaps and weaknesses which will hinder the decision process but require only minor work to complete
- E: Very Poor provision of information with major gaps or weaknesses which would prevent the decision process proceeding and require major work to complete.

The appraisal can be completed with a final step to provide an overall grade for the EIS. The reviewer grades the quality of information in each section of the checklist by aggregating the grades for the individual review questions and aggregates these to provide an overall grading. Aggregation will require judgement; so for example if one section has ten review questions and nine are graded B and one A, then a B grade overall is probably reasonable. If nine are graded B and one E, then an overall D grade is probably appropriate as overall the information is still inadequate.

Section 1: Description of the project				
No.	**Review question**	**Relevant?**	**Adequately addressed?**	**What further information is needed?**
The objectives and physical characteristics of the project				
1.1	Are the need for and objectives of the project explained?			
1.2	Is the programme for implementation of the Project described, detailing the estimated length of time and start and finish dates for construction, operation and decommissioning? (this should include any phases of different activity within the main phases of the Project, for example extraction phases for mining operations)			
1.3	Are all the main components of the project described ?			
1.4	Is the location of each Project component identified, using maps, plans and diagrams as necessary?			
1.5	Is the layout of the site (or sites) occupied by the project described? (including ground levels, buildings, other physical structures, underground works, coastal works, storage facilities, water features, planting, access corridors, boundaries)			
1.6	For linear projects, are the route corridor, the vertical and horizontal alignment and any tunnelling and earthworks described?			
1.7	Are the activities involved in construction of the project all described?			
1.8	Are the activities involved in operation of the project all described?			
1.9	Are the activities involved in decommissioning the project all described? (e.g. closure, dismantling, demolition, clearance, site restoration, site re-use etc)			
1.10	Are any additional services required for the project all described? (e.g. transport access, water, sewerage, waste disposal, electricity, telecoms) or developments (e.g. roads, power lines, pipelines)			
1.11	Are any developments likely to occur as a consequence of the Project identified? (e.g. new housing, roads, water or sewerage infrastructure, aggregate extraction)			
1.12	Are any existing activities which will alter or cease as a consequence of the Project identified?			
1.13	Are any other existing or planned developments with which the Project could have cumulative effects identified?			
The size of the project				
1.14	Is the area of land occupied by each of the permanent project components quantified and shown on a scaled map? (including any associated access arrangements, landscaping and ancillary facilities)			
1.15	Is the area of land required temporarily for construction quantified and mapped?			

No.	Review question	Relevant?	Adequately addressed?	What further information is needed?
1.16	Is the reinstatement and after use of land occupied temporarily for operation of the Project described? (e.g. land used for mining or quarrying)			
1.17	Is the size of any structures or other works developed as part of the Project identified? (e.g. the floor area and height of buildings, the size of excavations, the area or height of planting, the flow or depth of water)			
1.18	Is the form and appearance of any structures or other works developed as part of the Project described? (e.g. the type, finish and colour of materials, the architectural design of buildings and structures, plant species, ground surfaces, etc)			
1.19	For projects involving the displacement of people or businesses, are the numbers and other characteristics of those displaced described?			
1.20	For projects generating substantial traffic flows, is the type, volume, temporal pattern and geographical distribution of new traffic generated or diverted as a consequence of the Project described?			
Production processes and resources used				
1.21	Are all the processes involved in operating the Project described? (e.g. engineering processes, agricultural or forestry production methods, extraction processes)			
1.22	Are the types and quantities of outputs produced by the Project described? (these could be fuels, fuel plants, thermal or electric power)			
1,23	Are the types and quantities of raw materials and energy needed for construction and operation discussed?			
1.24	Are the environmental implications of the sourcing of raw materials discussed?			
1.25	Is efficiency in use of energy and raw materials discussed?			
1.26	Are any hazardous materials used, stored, handled or produced by the Project identified and quantified? • during construction • during operation • during decommissioning			
1.27	Are the transport of raw materials to the Project and the number of traffic movements involved discussed? • during construction • during operation • during decommissioning			
1.28	Is employment created or lost as a result of the Project discussed? • during construction • during operation • during decommissioning			

No.	Review question	Relevant?	Adequately addressed?	What further information is needed?
1.29	Are the access arrangements and the number of traffic movements involved in bringing workers and visitors to the Project estimated? • during construction • during operation • during decommissioning			
1.30	Is the housing and provision of services for any temporary or permanent employees for the Project discussed? (relevant for Projects requiring migration of a substantial new workforce into the area for either construction or the long term)			
Residues and Emissions				
1.31	Are the types and quantities of solid waste generated by the Project identified? (including construction or demolition wastes, surplus spoil, process wastes, by-products, surplus or reject products, hazardous wastes, household or commercial wastes, agricultural or forestry wastes, site clean-up wastes, mining wastes, decommissioning wastes) • during construction • during operation • during decommissioning			
1.32	Are the composition and toxicity or other hazards of all solid wastes produced by the Project discussed?			
1.33	Are the methods for collecting, storing, treating, transporting and finally disposing of these solid wastes described?			
1.34	Are the locations for final disposal of all solid wastes discussed?			
1.35	Are the types and quantities of liquid effluents generated by the Project identified? (including site drainage and run-off, process wastes, cooling water, treated effluents, sewage) • during construction • during operation • during decommissioning			
1.36	Are the composition and toxicity or other hazards of all liquid effluents produced by the Project discussed?			
1.37	Are the methods for collecting, storing, treating, transporting and finally disposing of these liquid effluents described?			
1.38	Are the locations for final disposal of all liquid effluents discussed?			
1.39	Are the types and quantities of gaseous and particulate emissions generated by the Project identified? (including process emissions, fugitive emissions, emissions from combustion of fossil fuels in stationary and mobile plant, emissions from traffic, dust from materials handling, odours) • during construction • during operation • during decommissioning			

No.	Review question	Relevant?	Adequately addressed?	What further information is needed?
1.40	Are the composition and toxicity or other hazards of all emissions to air produce by the Project discussed?			
1.41	Are the methods for collecting, treating and finally discharging these emissions to air described?			
1.42	Are the locations for discharge of all emissions to air identified and the characteristics of the discharges identified? (e.g. height of stack, velocity and temperature of release)			
1.43	Is the potential for resource recovery from wastes and residues discussed? (including re-use, recycling or energy recovery from solid waste and liquid effluents)			
1.44	Are any sources of noise, heat, light or electromagnetic radiation from the Project identified and quantified? (including equipment, processes, construction works, traffic, lighting, etc)			
1.45	Are the methods for estimating the quantities and composition of all residues and emissions identified and any difficulties discussed?			
1.46	Is the uncertainty attached to estimates of residues and emissions discussed?			
Risks of accidents and hazards				
1.47	Are any risks associated with the Project discussed? • risks from handling of hazardous materials • risks from spills fire, explosion • risks of traffic accidents • risks from breakdown or failure of processes or facilities • risks from exposure of the Project to natural disasters (earthquake, flood, landslip, etc)			
1.48	Are measures to prevent and respond to accidents and abnormal events described? (preventive measures, training, contingency plans, emergency plans, etc)			

Section 2: Consideration of Alternatives				
No.	**Review question**	**Relevant?**	**Adequately addressed?**	**What further information is needed?**
2.1	Is the process by which the Project was developed described and are alternatives considered during this process described?			
2.2	Is the baseline situation in the No Project situation described?			
2.3	Are the alternatives realistic and genuine alternatives to the Project?			
2.4	Are the main reasons for choice of the proposed Project explained, including any environmental reasons for the choice?			
2.5	Are the main environmental effects of the alternatives compared with those of the proposed Project?			

Section 3: Description of environment likely to be affected by the project				
No.	**Review question**	**Relevant?**	**Adequately addressed?**	**What further information is needed?**
Aspects of the environment				
3.1	Are the existing land uses of the land to be occupied by the Project and the surrounding area described and are any people living on or using the land identified? (including residential, commercial, industrial, agricultural, recreational and amenity land uses and any buildings, structures or other property)			
3.2	Are the topography, geology and soils of the land to be occupied by the Project and the surrounding area described?			
3.3	Are any significant features of the topography or geology of the area described and are the conditions and use of soils described? (including soil quality stability and erosion, agricultural use and agricultural land quality)			
3.4	Are the fauna and flora and habitats of the land to be occupied by the Project and the surrounding area described and illustrated on appropriate maps?			
3.5	Are species populations and characteristics of habitats that may be affected by the Project described and are any designated or protected species or areas defined?			
3.6	Is the water environment of the area described? (including running and static surface waters, groundwater, estuaries, and including run off and drainage.)			
3.7	Are the hydrology, water quality and use of any water resources that may be affected by the Project described? (including use for water supply, fisheries, angling, bathing, amenity, effluent disposal)			
3.8	Are local climatic and meteorological conditions and existing air quality in the area described?			
3.9	Is the existing noise climate described?			
3.10	Is the existing situation regarding light, heat and electromagnetic radiation described?			
3.11	Are any material assets in the area that may be affected by the Project described? (including buildings, other structures, mineral resources, water resources)			
3.12	Are any locations or features of archaeological, historic, architectural or other community or cultural importance in the area that may be bisected the Project described, including any designated or protected sites?			
3.13	Is the landscape or townscape of the area that may be affected by the Project described, including any designated or protected landscapes and any important views or viewpoints?			

No.	Review question	Relevant?	Adequately addressed?	What further information is needed?
3.14	Are demographic, social and socio-economic conditions (e.g. employment) in the area described?			
3.15	Are any future changes in any of the above aspects of the environment, that may occur in the absence of the project, described? (the so called Moving Baseline or No Project situation)			
Data collection and survey methods				
3.16	Has the study area been defined widely enough to include all the area likely to be significantly affected by the Project?			
3.17	Have all relevant national and local agencies been contacted to collect information on the baseline environment?			
3.18	Have sources of data and information on the existing environment been adequately referenced?			
3.19	Where surveys have been undertaken as part of the Environmental Studies to characterise the baseline environment are the methods used, any difficulties encountered and any uncertainties in the data described?			
3.20	Were the methods used appropriate for the purpose?			
3.21	Are any important gaps in the data on the existing environment identified and the means used to deal with these gaps during the assessment explained?			
3.22	If surveys would be required to adequately characterise the baseline environment but they have not been practicable for any reason, are the reasons explained and proposals set out for the surveys to be undertaken at a later stage?			

Section 4: Description of the likely significant effects of the project?				
No.	**Review question**	**Relevant?**	**Adequately addressed?**	**What further information is needed?**
Scoping of effects				
4.1	Is the process by which the scope of the Environmental Studies was defined described?			
4.2	Is it evident that a systematic approach to scoping was adopted?			
4.3	Is it evident that full consultation was carried out during scoping?			
4.4	Are the comments and views of consultees presented?			
Prediction of direct effects				
4.5	Are direct, primary effects on land uses, people and property described and where appropriate quantified?			
4.6	Are direct, primary effects on geological features and characteristics of soils described and where appropriate quantified?			
4.7	Are direct, primary effects on fauna and flora and habitats described and where appropriate quantified?			
4.8	Are direct, primary effects on the hydrology and water quality of water features described and where appropriate quantified?			
4.9	Are direct, primary effects on uses of the water environment described and where appropriate quantified?			
4.10	Are direct, primary effects on air quality and climatic conditions described and where appropriate quantified?			
4.11	Are direct, primary effects on the acoustic environment (noise or vibration) described and where appropriate quantified?			
4.12	Are direct, primary effects on heat, light or electromagnetic radiation described and where appropriate quantified?			
4.13	Are direct, primary effects on material assets and depletion of non-renewable natural resources (e.g. fossil fuels, minerals) described?			
4.14	Are direct, primary effects on locations or features of cultural importance described?			
4.15	Are direct, primary effects on the quality of the landscape and on views and viewpoints described and where appropriate illustrated?			
4.16	Are direct, primary effects on demography, social and socio-economic condition in the area described and where appropriate quantified?			

No.	Review question	Relevant?	Adequately addressed?	What further information is needed?
Prediction of secondary, temporary, short-term, permanent, long-term, accidental, indirect, cumulative effects				
4.17	Are secondary effects on any of the above aspects of the environment caused by primary effects on other aspects described and where appropriate quantified? (e.g. effects on fauna, flora or habitats caused by soil, air or water pollution or noise; effects on uses of water caused by changes in hydrology or water quality; effects on archaeological remains caused by desiccation of soils)			
4.18	Are temporary, short term effects caused during construction or during time limited phases of project operation or decommissioning described?			
4.19	Are permanent effects on the environment caused by construction, operation or decommissioning of the Project described?			
4.20	Are long term effects on the environment caused over the lifetime of Project operations or caused by build up of pollutants in the environment described?			
4.21	Are effects which could result from accidents, abnormal events or exposure of the Project to natural or man-made disasters described and where appropriate quantified?			
4.22	Are effects on the environment caused by activities ancillary to the main project described? (ancillary activities are part of the project but usually take place distant from the main Project location e.g. construction of access routes and infrastructure, traffic movements, sourcing of aggregates or other raw materials, generation and supply of power, disposal of effluents or wastes)			
4.23	Are indirect effects on the environment caused by consequential development described? (consequential development is other projects, not part of the main Project, stimulated to take place by implementation of the Project e.g. to provide new goods or services needed for the Project, to house new populations or businesses stimulated by the Project)			
4.24	Are cumulative effects on the environment off the Project together with other existing or planned developments in the locality described? (different future scenarios including a worst case scenario should be described).			
4.25	Are the geographic extent, duration, frequency, reversibility and probability of occurrence of each effect identified as appropriate?			
Prediction of effects on human health and sustainable development issues				
4.26	Are primary and secondary effects on human health and welfare described and where appropriate quantified? (e.g. health effects caused by release of toxic substances to the environment, health risks arising from major hazards associated with the Project, effects caused by changes in disease vectors caused by the project, changes in living conditions, effects on vulnerable groups)			
4.27	Are impacts on issues such as biodiversity, global climate change and sustainable development discussed where appropriate?			

No.	Review question	Relevant?	Adequately addressed?	What further information is needed?
Evaluation of the significance of effects				
4.28	Is the significance or importance of each predicted effect discussed in terms of its compliance with legal requirement and the number, importance and sensitivity of people, resources or other receptors affected?			
4.29	Where effects are evaluated against legal standards or requirements are appropriate local, national or international standards used and relevant guidance followed?			
4.30	Are positive effects on the environment described as well as negative effects?			
4.31	Is the significance of each effect clearly explained?			
Impact Assessment Methods				
4.32	Are methods used to predict effects described and are the reasons for their choice, any difficulties encountered and uncertainties in the results discussed?			
4.33	Where there is uncertainty about the precise details of the Project and its impact on the environment are worst case predictions described?			
4.34	Where there have been difficulties in compiling the data needed to predict or evaluate effects are these difficulties acknowledged and their implications for the results discussed?			
4.35	Is the basis for evaluating the significance or importance of impacts clearly described?			
4.36	Are impacts described on the basis that all proposed mitigation has been implemented i.e. are residual impacts described?			
4.37	Is the level of treatment of each effect appropriate to its importance for the development consent decision? Does the discussion focus on the key issues and avoid irrelevant or unnecessary information?			
4.38	Is appropriate emphasis given to the most severe, adverse effects of the Project with lesser emphasis given to less significant effects			

Section 5: Description of mitigation				
No.	**Review question**	**Relevant?**	**Adequately addressed?**	**What further information is needed?**
5.1	Where there are significant adverse effects on any aspect of the environment is the potential for mitigation of these effects discussed?			
5.2	Are any measures which the developer proposes to implement to mitigate effects clearly described and their effect on the magnitude and significance of impacts clearly explained?			
5.3	If the effect of mitigation measures on the magnitude and significance of impacts is uncertain is this explained?			
5.4	Is it clear whether the Developer has made a binding commitment to implement the proposed mitigation or that the mitigation measures are just suggestions or recommendations?			
5.5	Are the Developer's reasons for choosing the proposed mitigation explained?			
5.6	Are responsibilities for implementation of mitigation including funding clearly defined?			
5.7	Where mitigation of significant adverse effects is not practicable or the developer has chosen not to propose any mitigation are the reasons for this clearly explained?			
5.8	Is it evident that the EIA Team and the Developer have considered the full range of possible approaches to mitigation including measures to reduce or avoid impacts by alternative strategies or locations, changes to the project design and layout, changes to methods and processes, "end of pipe" treatment, changes to implementation plans and management practices, measures to repair or remedy impacts and measures to compensate impacts?			
5.9	Are arrangements proposed to monitor and manage residual impacts?			
5.10	Are any negative effects of the proposed mitigation described?			

Section 6: Non-Technical Summary				
No.	**Review question**	**Relevant?**	**Adequately addressed?**	**What further information is needed?**
6.1	Does the Environmental information include a Non-Technical Summary?			
6.2	Does the Summary provide a concise but comprehensive description of the Project, its environment, the effects of the Project on the environment and the proposed mitigation?			
6.3	Does the Summary highlight any significant uncertainties about the Project and its environmental effects?			
6.4	Does the Summary explain the development consent process for the Project and the role of EIA in this process?			
6.5	Does the Summary provide an overview of the approach to the assessment?			
6.6	Is the Summary written in non-technical language, avoiding technical terms, detailed data and scientific discussion?			
6.7	Would it be comprehensible to a lay member of the public?			

Section 7: Quality of presentation				
No.	**Review question**	**Relevant?**	**Adequately addressed?**	**What further information is needed?**
8.1	Is the Environmental Information available in one or more clearly defined documents?			
8.2	Is the document(s) logically organised and clearly structured so that the reader can locate information easily?			
8.3	Is there a table of contents at the beginning of the document(s)			
8.4	Is there a clear description of the process which has been followed?			
8.5	Is the presentation comprehensive but concise, avoiding irrelevant data and information?			
8.6	Does the presentation make effective use of tables, figures, maps, photographs and other graphics?			
8.7	Does the presentation make effective use of annexes or appendices to present detailed data not essential to understanding the main text?			
8.8	Are all analyses and conclusions adequately supported with data and evidence?			
8.9	Are all sources of data properly referenced?			
8.10	Is consistent terminology used throughout the document(s)?			
8.11	Does it read as a single document with cross referencing between sections used to help the reader navigate through the document(s)?			
8.12	Is the presentation demonstrably fair and as far as possible impartial and objective?			

ANNEX E: MONITORING REQUIREMENTS ON ENERGY PROJECTS

It is not possible to provide a standard monitoring plan, because it has to be developed specifically for each individual project according to the environmental resources involved, the predicted impacts, their magnitude and importance, and the proposed mitigation measures. The development of the monitoring plan is done within the EIStudy and has to be presented in the EIS. Which ones of the following variables to monitor thus depends on the management information needs. Monitoring for energy projects should begin before construction to determine baseline conditions. Construction and operational monitoring will determine the degree and significance of impacts that will occur during these phases of the project. Normally a year of preconstruction monitoring will be sufficient to characterize the environmental resources potentially affected by the project. The length of construction and operational monitoring will depend on the environmental resource that is being affected and the expected duration of the impact.

Hydroelectric projects

- **Water**
  - Rainfall
  - Stored water volume in the reservoir
  - Annual volume of sediment transported into reservoir
  - Water quality at dam discharge and at various points along the river, including:
    - Salinity
    - pH
    - Temperature
    - Electrical conductivity
    - Turbidity
    - Dissolved oxygen
    - Suspended solids
    - Phosphates
    - Nitrates
  - River flow at various points downstream
  - Volume of water used, by use type, at the reservoir and downstream
  - Hydrogen sulfide and methane generation behind dam

- **Flora and Fauna**
  - Limnological sampling of microflora, microfauna, aquatic weeds and benthic organisms
  - Fisheries assessment surveys (species, population size) in the river and reservoir
  - Wildlife (species, distribution, numbers)
  - Livestock (species, numbers, distribution, condition)
  - Vegetation changes (cover, species composition, growth rates, biomass) in the upper watershed, reservoir drawdown zone, and downstream areas
  - Impacts on wildlands, species or plant communities of special ecological significance

- **Social**
  - Public health and disease vectors
  - In and out-migration of people to area
  - Changes in economic and social status of resettlement populations and people remaining in the river basin.

Thermoelectric projects

- Continuous air monitoring of the primary pollutants emitted from the facility will be required. Monitors should be established to measure emission concentrations and ground level concentrations at previously defined air quality receptor locations (e.g., residential areas, agricultural areas, etc.). Meteorological conditions for the site need to be characterized for air modelling purposes. If appropriate meteorological data are unavailable, then meteorological monitoring will be necessary.

- Air monitoring of the workspace for dust, noise, and levels of toxic gases is necessary to protect operating personnel.

- The type and nature of the wastewater discharge will determine if surface water quality monitoring will be required. Expected pollutants should be measured as well as water quality parameters that are important for human health and public welfare. If not more frequent, seasonal water quality monitoring may be necessary. Groundwater monitoring may be required if contamination of groundwater is predicted. Monitoring should be conducted upstream at the point of discharge, and downstream from the point of discharge in any receiving water body used by the public or considered environmentally significant (e.g., rivers, drinking and irrigation wells). Geophysical testing of the site may be required to characterize geological conditions under the proposed facility. If groundwater is proposed for cooling, then a pump test may be required to determine groundwater quantity and quality.

- Biological monitoring may be appropriate if important biological resources occur near the project and are predicted to be affected, e.g., the discharge of cooling effluents into a estuary. In this case, sampling of representative kinds of aquatic organisms would be necessary. Important air quality receptors (e.g., sensitive crop species) and downwind of the stacks may require monitoring if adverse impacts are predicted. Sampling would be seasonal.

- Monitoring of the social environment may be warranted to ensure that infrastructure impacts are within acceptable limits.

Transmission lines

Monitoring construction activities may be required to assure that negative land use and/or ecological impacts are avoided and proper mitigation measures are employed. Monitoring of these impacts will be short-term (e.g., weeks) and occur along the line as it is constructed. Monitoring may be especially critical at crossings

of major water bodies or wetlands, near wildlands and cultural properties. The actual monitoring will be based on visual inspections of the materials being used, the construction practices, and mitigation measures. Monitoring of ROW maintenance activities is also to be required to assure proper vegetation control methods, to prevent invasion of exotic species, and to support decisions that take advantage of possible benefits to wildlife.

Oil or gas pipelines

- The actual monitoring may range from visual inspection of the mitigation system (e.g., sediment traps) to more extensive water quality monitoring during the pipeline construction across or near a water body. If pipeline construction involves the potential for resuspension of toxic substances, an extensive chemical and biological monitoring program may be required.

- Monitoring should occur before, during, and for some period after the pipeline is laid or buried. The objective of this monitoring program will be determined by the extent and duration of the recontamination of the water body. Monitoring of the operation of the oil and gas pipelines will be required to assure proper mechanical functions or to identify structural conditions resulting in leaks or ruptures.

Oil or gas development

Monitoring requirements include air emissions and waste discharges at drill rigs and processing facilities, visual checks of integrity of sludge pits and tank dikes, visual checks of areas around wells, pipeline routes, storage tanks, and transfer points for spills or leakage. Special monitoring requirements may be imposed for early detection of impacts on specific resources in conjunction with mitigation measures. Monitoring at processing facilities includes continual air quality sampling onsite and at site boundaries (automatic samplers), daily visual checks for spillage around tanks, pipelines and transfer points, frequent downstream checks of any surface drainages in the area (visual and water samples), and periodic groundwater sampling onsite and down gradient (monitoring wells).

ANNEX F: REFERENCES

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