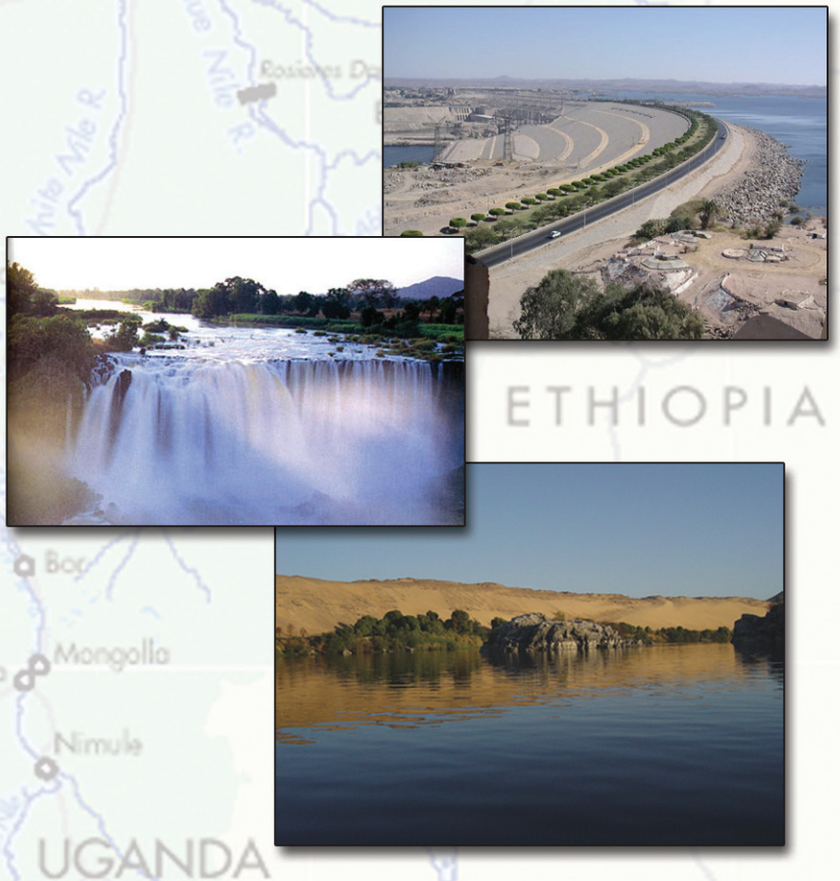
Nile Basin Initiative

REGIONAL POWER TRADE PROJECT

Environmental Assessment Framework for Regional Power Projects in Nile Basin Countries



Executive Summary

Februrary 2008

TECSULT

Tecsult International Limited
consultants
85 Sainte-Catherine Street West, Montréal, Québec, Canada

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05-16005

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EXECUTIVE SUMMARY

1 Background

The Nile riparian countries (Burundi, Democratic Republic of Congo, Egypt, Ethiopia, Kenya, Rwanda, Sudan, Tanzania and Uganda) established in February 1999 the Nile Basin Initiative (NBI) to address common concerns and interests, particularly poverty alleviation. The Vision of the NBI is to achieve sustainable socio-economic development through the equitable utilization of, and benefit from, the Nile basin water resources. To translate this Vision into action, the NBI includes two main components: a basin-wide Shared Vision Program (SVP) and Subsidiary Action Programs (SAP).

The Regional Power Trade Project (RPTP) is one of the components of the Shared Vision Program. The RPTP is to be implemented basin-wide to help establish a foundation for transboundary regional cooperation and to create an enabling environment suitable for investments and action on ground within an agreed basin-wide framework. The RPTP aims to establish the institutional means to coordinate the development of regional power trade and markets among the NBI countries.

The Nile Basin covers an area of nearly 3.1 million km^2 representing about 10% of the African continent (Figure 1). Table 1 shows the distribution of the basin within the 10 riparians countries. The two downstream countries of the basin, Sudan and Egypt, encompass 63% and 10% of the Nile river basin. At the opposite, upstream countries such as Burundi, DRC and Rwanda occupy each less than 1% of the basin.

Table 1 Area of the Nile River basin by country

Country	Total area (km²)	Basin area in country (km²)	% of the country	% of the basin
Burundi	27 834	14 318	51.4	0.5
DRC	2 345 000	28 180	1.2	0.9
Egypt	995 450	304 246	30.6	9.8
Eritrea	121 320	24 699	20.4	0.8
Ethiopia	1 127 127	349 625	31.0	11.3
Kenya	582 650	44 599	7.7	1.4
Rwanda	26 338	20 917	79.4	0.7
Sudan	2 505 810	1 947 683	77.7	63.0
Tanzania	945 087	115 219	12.2	3.7
Uganda	250 066	241 359	96.5	7.8
Total	**8 926 682**	**3 090 844**	**34.6**	**100.00**

In the Nile basin region, cheap and reliable supply of electricity is a critical input for economic growth, employment generation and poverty alleviation. The power sector in the NBI countries is quite diversified, but in general does not meet the total demand in power. It includes a variety of hydropower, thermal power and geothermal power facilities, as well as power transmission lines and some interconnections. Table 2 below presents a synopsis of the existing situation in the NBI countries, and potential power investment plans as identified in the major power master plans.

Table 2 Power sector in the NBI countries

Countries	Current energetic picture	Strategic energetic investment plans
Burundi	100% hydroelectric	100% hydroelectric
Democratic Republic of Congo	84.3% hydroelectric 15.7% thermal	52.3% methane (Kivu Lake) 47.7% hydroelectric
Egypt	86% thermal 13% hydroelectric 1% wind	69.3% natural gas 21.5% wind 8.2% nuclear 1% hydroelectric
Ethiopia	87.4% hydroelectric 11.6% thermal 1% geothermal	97.4% hydroelectric 2.6% coal
Kenya	58.3% hydroelectric 17.9% diesel 11.3% geothermal 10.1% gas 2.3% steam	45.6% coal 42.4% geothermal 6% natural gas 6% wind
Rwanda	75.6% hydroelectric 24.4% diesel	57.8% hydroelectric 42.2% methane (Kivu Lake)
Sudan	59% thermal 41% hydroelectric	45.5% hydroelectric 36.8% gas oil 17.2% HFO 0.5% diesel
Tanzania	70.7% hydroelectric 29.3% thermal	31.1% natural gas 1% diesel 67.9% hydroelectric
Uganda	97.5% hydroelectric 2.5% thermal	100% hydroelectric


LEBANON
SYRIAN ARAB REPEBLIC
Mediterranean Sea
IRAQ
ISRAEL
JORDAN
CAIRO
Nile R.
Assiut
LIBYA
EGYPT
Nag-Hamady
Esna
SAUDI ARABIA
1st Cataract
Aswan
Lake Nasser
2nd Cataract
3rd Cataract
Red Sea
Nile R.
4th Cataract
5th Cataract
6th Cataract
Atbara R.
KHARTOUM
ERITREA
ASMARA
CHAD
Jebel Aulia
Khashm El Gibra
YEMEN
SUDAN
Sennar
Blue Nile R.
White Nile R.
Lake Tana
DJIBOUTI
Roseires
Finchaa
SOMALIA
ADDIS ABEBA
Sabat R.
ETHIOPIA
CENTRAL AFRICAN REPUBLIC
Lake Turkana
Lake Albert
Lake Kyoga
SOMALIA
UGANDA
KENYA
Owen Falls
KAMPALA
Semliki R.
INDIAN OCEAN
Lake Edward
DEM. REP. OF CONGO
NAIROBI
RWANDA
Lake Victoria
KIGALI
Lake Kivu
Kagera R.
BUJUMBURA
BURUNDI
Lake Tanganyika
TANZANIA
Legend
National capitals
International boundary
Dams
Nile basin
Nile basin countries
Review of EIA Frameworks and Procedures in Regional Power Investment Projects
NILE RIVER BASIN
Sources :
FAO, Aquastat, 2005
0 100 200 300 400 km
WGS 84
February 2008
Figure 1
Nile Basin Initiative
TECSULT

2 Environmental assessment frameworks of NBI countries and funding agencies

The level of detail of the environmental assessment (EA) procedures and frameworks of the Nile basin countries varies significantly from one country to another. Some countries such as Egypt and Ethiopia do have comprehensive EA regulations and guidelines, whereas in some other countries (Burundi and Rwanda for example), EA is essentially based on the general principles stated by the Law. Key social issues, such as resettlement, indigenous communities, gender and cultural heritage, are not necessarily covered by EIA frameworks of each country. Considering the NBI's Vision which is to achieve sustainable socio-economic development, the key social issues shall be properly taken into account while evaluating specific regional power projects in the NBI countries.

No specific framework for power projects exists in the Nile basin countries. However, in Ethiopia and Egypt for example, there are some EIA guidelines for power projects that can be considered at the same level as international best practices.

In general, EA frameworks of funding agencies, especially World Bank and European Union, are much more detailed and restricting than frameworks of NBI countries. Apart from general EIA guidelines, the funding agencies do not also have specific EA frameworks for regional power projects. The International Hydropower Association (IHA) has a set of comprehensive sustainability guidelines for new and existing hydropower projects.

Considering the diversity of EA procedures and frameworks of the NBI countries, funding agencies and international initiatives, as well as the potential transboundary power projects in the pipeline, it is justified to develop and enforce a comprehensive standard framework of integrated environmental and social impact assessment, applicable to all regional power projects in the NBI countries, inspired from international and regional initiatives, and complying with international practices and NBI countries' policies and regulations.

3 Components of the EA framework for regional power projects

The main objective of this EA framework, which integrates environmental and social issues of power projects, is to contribute to NBI's vision, which is to achieve sustainable socio-economic development through the equitable utilization of, and benefit from, the Nile basin water resources. Another objective is to plan and implement the regional power projects according to best practices as far as sustainable development is concerned.

In this EA framework, guiding principles to achieve sustainable development through regional power projects cover ecological, social and economic aspects of projects sustainability. These guiding principles take into consideration the achievement of the Millennium Development Goals and important issues such as biodiversity, involuntary resettlement, changes to the environment and resource use in the area, indigenous communities, gender issues, public health issues, economic development, physical cultural resources, participation and consultation of the stakeholders, and positive impacts of the power projects on local communities.

In order to integrate all these ecological, social and economic guiding principles in the projects' cycle phases, a comprehensive environmental assessment process has been elaborated (see Figure 2). The EA process for NBI regional power projects complies with the general environmental impact assessments that are applied by most national environmental agencies and funding agencies, notably the World Bank and the African Development Bank. It follows the project cycle phases: i) identification; ii) preparation; iii) appraisal and approval; iv) implementation and supervision; v) post-evaluation. Eight steps are defined for the EA process: 1) pre screening; 2) screening; 3) scoping: 4) impact assessment; 5) review; 6) decision-making; 7) ESMP implementation and; 8) auditing.

At the project identification phase, the EA screening consists to determine if the power project is subjected to the Regional EA Process (REAP). Hydropower, thermal, geothermal and transmission lines projects are subjected to the REAP if i) The project affects or provides benefits to at least two NBI countries; ii) The project is likely to cause significant adverse transboundary impacts; or iii) The project is likely to cause significant adverse impacts on an international heritage site. In any case that the REAP is triggered, it is not necessary to duplicate the process by implementing the NEAP, because the REAP harmonizes the EA requirements of all NBI countries and funding agencies in general. The screening of the project consists also to determine the category of the project and therefore, the types of environmental and social studies to be carried out before decision-making.

At the project preparation phase, the objective of environmental scoping is to prepare the Terms of Reference (TOR) of the environmental and social studies in accordance with applicable national legislation and policies of the funding agency such as World Bank safeguard policies, while consulting affected groups and local NGOs. The NEA of the project country of origin approves the TOR prepared by the project proponent.

Figure 2 Organisational chart of the EA process

	Project Proponent (PP)	National Environmental Agency (NEA)	Regional EA Working Group (REAWG)	Funding Agency (FA)	Technical Review Committee (TRC)	Nile Technical Advisory Committee (Nile TAC)
Step 1 Pre-screening	Preparation of the power project notice	Screening of the project against NEAP and REAP triggering criteria				
↓						
Step 2 Screening			Determination of the project category Identification of the documents to prepare	Non-objection		
↓						
Step 3 Scoping	Consultation of affected groups and local NGOs Preparation of the TOR for required documents	Consultation of affected groups and local NGOs Approval of the scoping				
↓						
Step 4 Impact assessment	Preparation of the studies Public consultations	Review of compliance				
↓						
Step 5 Review of the studies	External review Completion of the studies	External review		Internal review of the studies	Internal review of the studies	
↓						
Step 6 Decision-making	Appeal in case of disputed decision	Recommendation for decision Deliverance of the environmental permit	Review of the process and decision	Non-objection		Appeal in case of disputed decision
↓						
Step 7 ESMP Implementation	ESMP implementation reporting	Control of the ESMP implementation		Supervision		
↓						
Step 8 Auditing	Preparation of the environmental and social audit	Review of the audit				

The impact assessment step comprises three main activities: 1) preparation of the studies; 2) further public consultations and; 3) review of compliance. Category A projects require a full Environmental Impact Assessment (EIA), an Environmental and Social Management Plan (ESMP), a Life Cycle Assessment (LCA). The EA of a Category B project may include a limited EIA or only an ESMP. Most social issues triggered by power and interconnection projects will be integrated in the terms of references of the EIA. However, it is likely that a Resettlement Action Plan (RAP) will be required for most NBI projects at the EIA stage. In some cases, indigenous people issues may also require special studies.

At the project appraisal and approval phase, the review of the studies comprises : 1) Internal review of the studies, including the national approval of a Clean Development Mechanism (CDM) project; 2) External review through disclosure and public consultation; 3) Completion of the studies; and 4) Decision making. This decision may be to authorize the project, with or without changes and under some conditions, or to turn down the project, and submitted to the funding agency for non-objection. Finally, it is important to ensure that the environmental recommended measures be integrated in the tender and contracting documents.

At the ESMP implementation phase, step 7 of the EA process consists basically to ensure, during the whole life of the power project, that the measures identified to offset, mitigate or compensate the environmental and social adverse impacts are properly executed. Finally, at the project post-evaluation phase, the last step of the EA process include: 1) Environmental and social audit; and 2) Review of the audit. Environmental auditing is an objective examination of whether or not practice complies with expected standard.

In order to facilitate the identification and mitigation of the environmental and social impacts of regional power projects during the preparation of EIAs of such projects in the NBI countries, this EA framework identifies issues to consider for hydropower, thermal and geothermal power, as well as for power transmission lines.

As far as hydroelectric projects are concerned, the operation of dams and reservoirs include several activities or components that can potentially induce significant environmental and social impacts. Issues include changes in the river system, fisheries and wildlife, non-resident workers, agriculture and resettlement. Since this type of project often involves important land acquisition and involuntary resettlement, the project design shall be based on a comprehensive analysis of alternatives.

Environmental impacts from thermal power plant operation normally include those on ambient air, water and soil quality, and the disposal of solid wastes. Impacts on vegetation, wildlife, local populations, and the health and safety of workers must also be considered.

On the environmental point-of-view, geothermal energy offers a number of advantages over fossil fuel used by thermal power plants. Indeed, geothermal energy is clean and safe for the surrounding environment. Moreover, geothermal energy is competitive on the economic standpoint and reduces reliance on costly fossil fuels.

Power transmission and distribution lines can open up remote lands to human activities such as settlement, agriculture, hunting, recreation, etc. Construction of the power line right-of-way can result in the loss and fragmentation of habitat and vegetation along the line. These effects can be significant if natural areas, such as wetlands or natural forests are affected, or if the newly-accessible lands are the home of indigenous peoples.

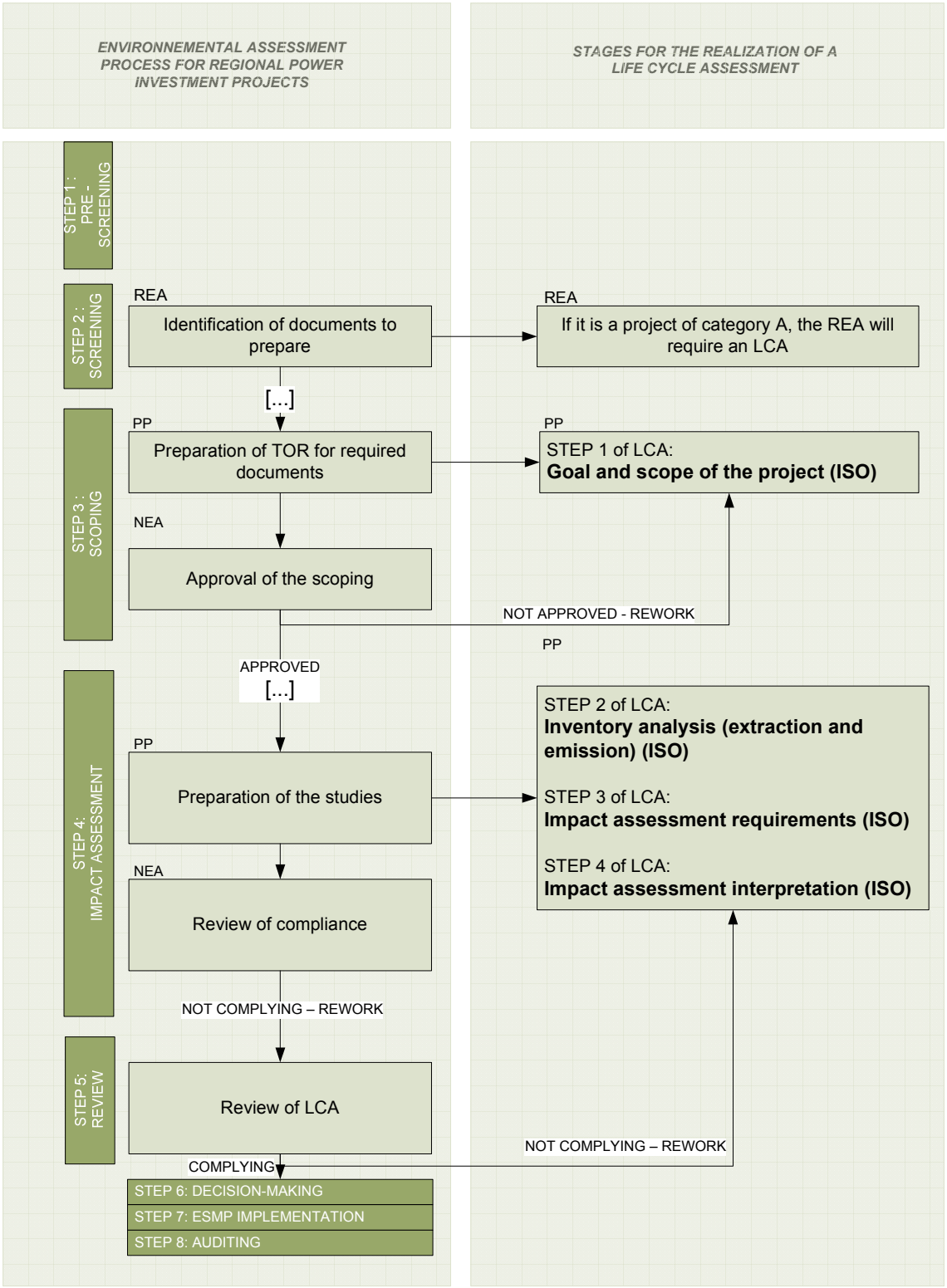
To better guide the preparation of environmental studies on regional power projects, it will be important that detailed EIA guidelines for power sector activities be prepared based on this EA Framework in the near future in order to harmonise the contents of the future studies.

4 Life Cycle Assessment

This EA framework considers also the integration of Life Cycle Assessment (LCA) in the EA of a regional power project. This approach is quite innovative but also interesting considering that, on a spatial scale, LCA is a global process encompassing the project from “cradle to grave”, which makes it complementary to the EIA studies. The LCA study needs to cover the various stages of the project life cycle, namely extraction and preparation of the raw materials and energy; construction of infrastructures, machines and inputs, as well as transportation; main production phase (in this case: electricity production) and transportation; waste processing; and finally decommissioning of the plant.

LCA is divided into 4 steps: 1) identification of the goal and scope, 2) inventory analysis, 3) impact assessment requirements, and 4) impact assessment interpretation. Figure 3 shows the relation between LCA and the EA process for regional power projects.

Figure 3 Life cycle assessment in the EA process



5 Clean Development Mechanism

The Clean Development Mechanism (CDM), developed under the umbrella of the Kyoto Protocol, is of greatest interest to the developing world because it allows channelling foreign investment to these countries to promote sustainable development and abate greenhouse gas emissions while generating certified emission reduction units (CERs) that industrialized nations can apply towards meeting their own emission reduction targets. To be eligible to CDM funds a project have to lead to real and measurable GHG emissions reductions, to result in additional GHG emissions reductions, and to contribute to sustainable development in the host country. Besides, more than one country can host an eligible project.

In most cases, selling certified emission reduction units (CERs) through the CDM will provide only part of the financing necessary for the project. Thus this source of “carbon financing” will still need to be completed with conventional financing (full or partial equity, financial contribution, loan or certified emissions reduction purchase agreement).

Figure 4 presents an overview of the integration of CDM in the EA process for regional power projects. During the whole process, the proponent will have to constitute a Project Design Document (PDD) which will be evaluated in turn by the Designated National Authority and the Executive Board (EB) of CDM. Designated Operational Entities (DOE) will have to report to the EB on the content of the PDD, and on the monitoring of emissions reductions before the first CERs being issued by the EB.

One of the first and the most crucial elements of the PDD is the baseline scenario. The baseline of a project is a measure of the emissions that would have occurred in the absence of the proposed project activity, and is used to estimate the emissions reductions from the project. Table 3 identifies the potential baseline scenarios in the NBI countries and therefore, the eligible projects based on the strategic power investment plans.

6 Operationalization of the EA framework

The process to enforce the EA framework for regional power projects is illustrated on Figure 5. The proposed enforcing Protocol shall be ratified by each NBI country, through regulations signed by the Minister in charge of Environment.

Figure 4 CDM in the EA process

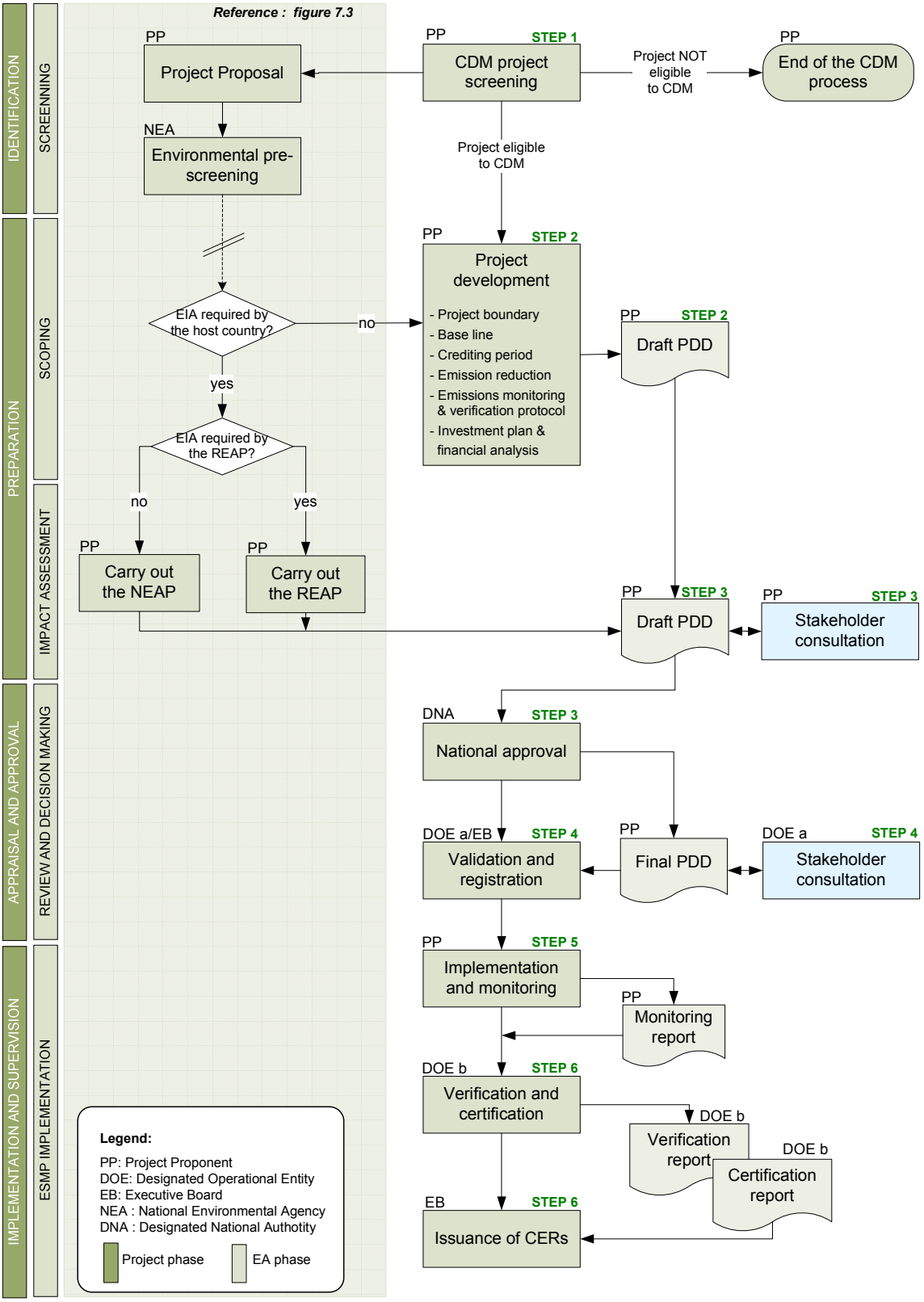


Table 3 Potential baseline scenarios and eligible projects based on the strategic power investment plans

Countries	Typical baseline scenario	Potential energy power generation project
Burundi(1)	Hydroelectric power plant	Renewable energies (wind power, solar power, biomass…)
Democratic Republic of Congo(1)	Methane gas power plant	Renewable energies (wind power, solar power, biomass…) Hydroelectric Geothermal
Kenya(1)	Coal fired power plant	Renewable energies (wind power, solar power, biomass…) Hydroelectric Geothermal Natural gas
Rwanda(1)	Methane gas power plant	Renewable energies (wind power, solar power, biomass…) Hydroelectric Geothermal
Tanzania(1)	Natural gas power plant	Renewable energies (wind power, solar power, biomass…) Hydroelectric Geothermal
Uganda(1)	Hydroelectric power plant	Renewable energies (wind power, solar power, biomass…)
Egypt(2)	Natural gas power plant	Renewable energies (wind power, solar power, biomass…) Hydroelectric Geothermal
Ethiopia(2)	Coal fired power plant	Renewable energies (wind power, solar power, biomass…) Hydroelectric Geothermal Natural gas
Sudan(2)	HFO(3) or gas oil fired plant	Renewable energies (wind power, solar power, biomass…) Hydroelectric Geothermal Natural gas

(1) Source: Strategic/Sectoral, Social and Environmental Assessment of Power Development Options in the Nile Equatorial Lakes Region, SNC Lavalin International, February 2007
(2) Source: Eastern Nile Power Trade Program Study, EDF – Generation and Engineering Division, March 2007
(3) HFO: heavy fuel oil

In order to ensure the implementation of the EA framework and based on a comprehensive institutional analysis, it is essential that the concerned staff of the institutional organisations involved in the process be trained and become familiar with the components of the EA framework. This EA framework proposes a preliminary capacity building program that will have to be validated by the proposed analysis of NBI countries environmental institutions.

The preliminary budget required to operationalize the EA framework for regional power projects is estimated at US$1.62 million during the 10 years following its acceptance by NBI authorities (Table 4). It is based on the assumption that 30 regional power projects will be evaluated in the next 10 years in the NBI countries.

Figure 5 Enforcement of the EA framework for regional power projects

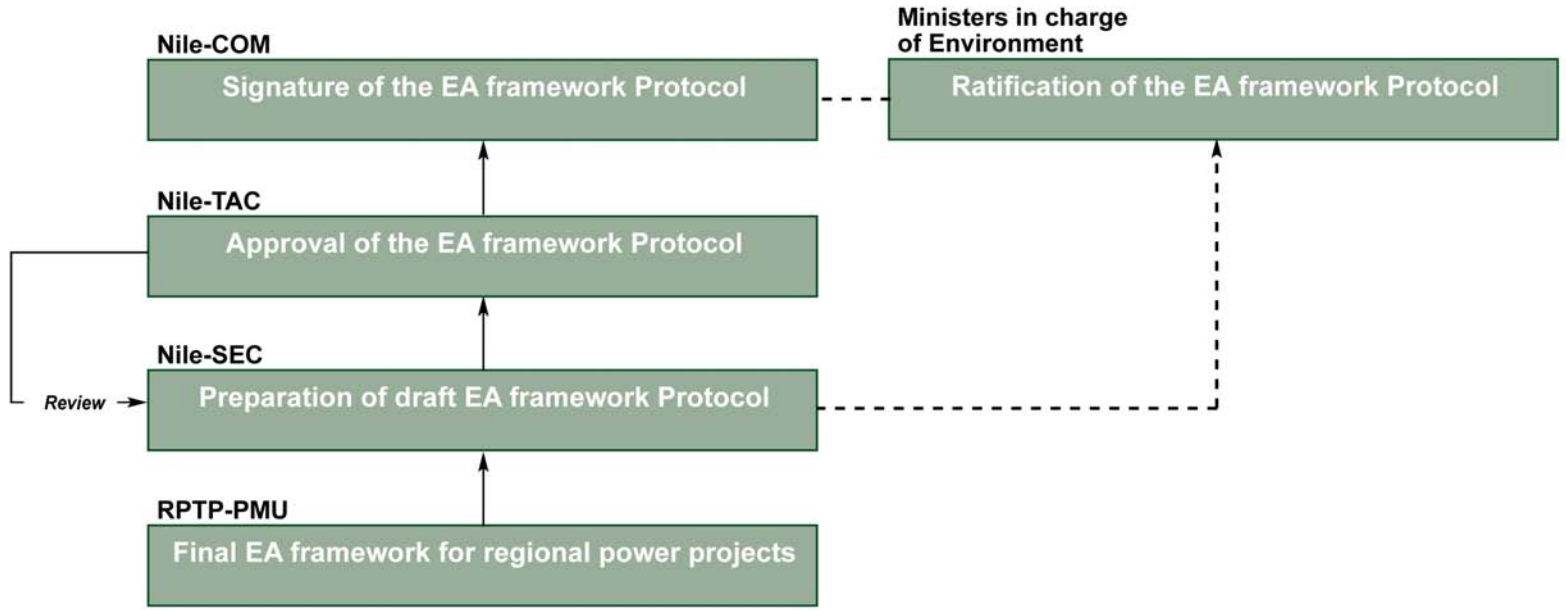


Table 4 Preliminary budget to operationalize the EA framework (in current US$)

Activities	Years										
	1	2	3	4	5	6	7	8	9	10	Total
Technical assistance											
Development of the EIA protocol	75 000										**75 000**
Detailed ESIA guidelines (3)	95 000	97 850	100 786								**293 636**
Capacity building											
Institutional study	95 000										**95 000**
Workshops (3)		70 000									**70 000**
Technical assistance for review of EIA (desk work)		25 000									**25 000**
Annual review		30 000	30 900	31 827	32 782	33 765	34 778	35 822	36 896	38 003	**304 773**
EA process implementation											
Regional EA Working Group (part-time)		25 000	25 750	26 523	27 318	28 138	28 982	29 851	30 747	31 669	**253 978**
National Environmental Agencies (part time)		50 000	51 500	53 045	54 636	56 275	57 964	59 703	61 494	63 339	**507 955**
Total	**265 000**	**297 850**	**208 936**	**111 395**	**114 736**	**118 178**	**121 724**	**125 375**	**129 137**	**133 011**	**1 625 342**