EXECUTIVE SUMMARY OF THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT
ABBREVIATIONS

CAP Compensation Action Plan
CO Carbon Monoxide
CO₂ Carbon Dioxide
DB Decibel
EAP Environmental Action Plan
ESIA Environmental and Social Impact Assessment
EIS Environmental Impact Statement
FL 1500 Flue Lourd 1500 (heavy fuel oil)
FMO The Netherlands Development Finance Corporation
HFO Heavy Fuel Oil
HGV Heavy Goods Vehicle
IFC International Finance Corporation
LBZG Limbé Botanic and Zoological Gardens
LPG Liquefied Petroleum Gases
LPP Limbé Power Project
MINEF Ministry of Environment and Forestry
NOₓ Nitrogen Oxides
PAPs Project Affected Persons
SO₂ Sulphur Oxides
SONARA Société Nationale de Raffinage
SCDP Cameroon Petroleum Depot Company
TMS Traffic Management Statement
WBG World Bank Group
WHO World Health Organisation
AES-SONEL INVESTMENT PROGRAM
EXECUTIVE SUMMARY OF THE
ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

Project Name : AES SONEL Investment Program
Country : Cameroon

1. INTRODUCTION

1.1 AES-Sonel, a recently privatized integrated electric utility in Cameroon, has embarked on a capital expenditure program to improve and expand the electricity generation, transmission and distribution system in order to address the urgent electricity shortage in the country. Currently AES SONEL supplies electricity to over 425,000 customers from both thermal and hydroelectric generating plants with installed capacity of 844 MWs by way of two independent transmission networks, Southern and Northern grids. The transmission system consists of 487.5 km of 225 kV, 1360.9 km of 90 kV transmission lines, and has 17 main substations. The first project to be initiated under the expansion program is the Limbé Power project (LPP) will include a power plant, a 90kV overhead transmission line, and the construction of a new substation and modification of an existing electrical substation. All project components will be located in the southwestern region near the town of Limbé. The plant will utilize heavy fuel oil (HFO) to produce 80 MW of new power supply. It will be situated adjacent to the SONARA oil refinery, which will provide the necessary fuel.

1.2 In line with the Bank’s environmental and social assessment procedures, the project has been treated as a category 1 undertaking, and a full Environmental and Social Impact Assessment of the project has been undertaken by Black & Veatch Ltd. of USA, on behalf of AES-SONEL. The Compensation Action Plan (CAP) has been prepared by AES-SONEL as a separate document. The ESIA has also been carried out in accordance with the requirements of the Ministry of Environment and Forestry (MINEF), the ministry that is responsible for the review and approval of ESIs in Cameroon, and those of potential lenders for this project, including the International Finance Corporation (IFC) and the European Investment Bank (EIB. The ESIA has been published in three volumes:

- Vol. 1: The EIS – main text;
- Vol. 2: The EIS – appendices, which provide background information to the EIS;

1.3 This document summarizes the findings of the ESIs, the legal and policy frameworks under which the assessments were undertaken, a description of the project environment, an analysis of project alternatives, an evaluation of potential impacts, and information related to the Environmental and Social Management Plan (ESMP). It also provides some insight into the consultative process and compensation management plan developed to deal with affected persons.
2. PROJECT DESCRIPTION AND JUSTIFICATION

2.1 The LPP proposes to generate approximately 80MW of power to cover the projected shortfall in electricity in the southern region of Cameroon. The LPP is designed to operate in an intermediate load to baseload range during the dry season (November to March). During the wet season, the plant is expected to be primarily in a standby mode but will likely operate during some periods.

The proposed works will comprise:

(a) the installation of a new power plant of approximately 80MW, which would use heavy fuel oil, and its associated structures, adjacent to the SONARA oil refinery at Cape Limboh, which is near the town of Limbé, south-west Cameroon;

(b) approximately 11.6km of new 90kV single circuit overhead transmission line between the new power generation plant and the existing Limbé 90/30kV substation;

(c) a new high voltage (90kV) substation located next to the new power generation plant; and

(d) extension of bays at the existing Limbé 90/30kV substation so as to connect the 90kV line to the grid.

2.2 Power Generation Plant

The new 80MW power plant will consist of five medium speed diesel engine units in a single building about 40m wide x 50m long and 13 m high on a site immediately adjacent the existing SONARA oil refinery site. Additionally, there will be a number of fuel and cooling system tanks and associated ancillary structures on the site. The location next to the oil refinery also allows for convenient access to the site, as well as the delivery of heavy fuel oil (HFO), and other associated services. Construction will include a wide range of activities including leveling the land and constructing foundations. Piling and use of explosives for construction will not be required. The short time period for the construction programme will be possible in part by the proximity of the oil refinery and the associated services. It is anticipated that a peak construction work force of approximately 350 people will be needed during the eleven month total construction period.

2.3 Transmission Line

A new transmission line from a new substation at the power plant site to the existing AES-SONEL substation at Limbé will be constructed as part of the LPP.

2.4 Justification of Project

2.4.1 The existing national electricity generation and transmission system in Cameroon is principally separated into three independent subsystems. The northern system supplies Ngoundéré, Garoua, Guider and Maroua, the eastern system supplies the eastern province - Bertoua, Abong-Mbang and Batouri, whilst the southern interconnected system covers the southwest region - Yaoundé, Douala, Bafoussam and Bamenda. Throughout the country there are small areas that are supplied with electricity that are isolated from the three principal subsystems.
2.4.2 On the southern interconnected system, there is currently an inability to reliably meet dry season demand due to low water levels in the reservoirs, low rainfall levels, insufficient investment in thermal generation and transmission capacity, and insufficient redundancy in all areas of the electric system. This imbalance between supply and demand is exacerbated by the fact that demand has grown rapidly over the past 5 years.

2.4.3 The LPP will be connected to the southern interconnected system. Cameroon’s primary sources of electricity in the southern system are the older hydro power stations at Edéa and Song Loulou, both on the Sanaga River. The installed capacity and average production of these hydropower stations taken together is some 650MW with an annual production of about 3200 GWH in 2002. Due to the wet season / dry season hydrological imbalance, annual capacity factor of these plants is approximately 55%. In addition to these hydro power stations, there are a number of thermal generation plants which have an installed capacity of about a further 90MW.

2.4.4 Studies have shown that if no investment were made to increase the production capacity of AES-SONEL, there would continue to be a serious capacity/energy deficit, even if future years see better hydrological conditions than have recently been experienced. This generation capacity shortfall would cause an inability to reliably meet demand and could partially affect the growth of the Cameroonian economy.

3. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

3.1 The Ministry of Environment and Forestry (MINEF) is responsible for conservation of the environment in Cameroon. Matters relating to Environmental Management are governed by Law No. 96/012 (the "Environment Act") dated 5 August 1996. It is represented in Buea, south-west Cameroon by a provincial delegation. Other ministries of relevance include the Ministry of Transport (MINT), responsible for transportation of people and goods by sea, air and land, the Ministry of Culture and the Ministry of Town Planning and Housing.

3.2 The Main Concession Agreement provides that AES SONEL shall comply with environmental rules deriving from the concession agreements, domestic law (legislative and regulatory provisions) and especially those deriving from international commitments of the State. However, concerning those activities of AES Sonel which did not comply with the environmental rules at the date of signature of the concession agreements due to facts or acts occurred prior to the date of signature (i.e. 18 July 2001), AES Sonel’s obligation to comply with environmental rules will only take effect 3 years after the date of signature (i.e. 18 July 2004). All new AES Sonel’s installations must comply with environmental rules deriving from the concession agreements, domestic law (legislative and regulatory provisions) and especially those deriving from international commitments of the State. Although some of the implementing texts of the applicable laws and regulations relating to environment do not appear to have been issued or enacted, it results from the combination of the Environment Law, the Specific Installations Law and the Specific Installations Decree that: (a) An environmental impact assessment ("EIA") will have to be conducted by AES Sonel in the context of the LPP. The EIA must be notified to MINEF and approved by this administration within 4 months from this notification pursuant the Section 20 (1) of the Environment Act further to the prior advice of the Inter-Ministerial Committee of Environment; and (b) the LPP is a classified installation of which the setting-up and operation may be subject to the MINEF's prior approval required for first class installation (the "First Class Installations Authorisation").
4. DESCRIPTION OF THE PROJECT ENVIRONMENT

4.1. The information presented in this section is based on data from a mixture of existing project literature; a specific literature search; local and national maps from the Cartographic Institute and information collected from relevant Ministries and Departments in Cameroon. In addition the consultations, site visits and surveys undertaken for the ESIA have contributed to the database. Household surveys were undertaken for the ESIA by staff of Limbé Botanical and Zoological Gardens to identify the socio-economic characteristics of project affected persons along the transmission line route.

Air Quality

4.2 Air quality is not systematically recorded in Southwest Cameroon. Land use is therefore likely to provide the main background input into the determination of air quality at the project sites. The SONARA oil refinery is the closest source of potentially significant anthropogenic emissions to air. The refinery has a capacity of 2 million tonnes of crude oil per year and is also known to operate three 3MW diesel fuel engines. However, data on precise emissions are not available. Likewise, Mount Cameroon, located 26km to the north east of the site, may be a significant source of sulphur dioxide in the local area, however there is no data available regarding ambient levels from this active volcano. Volcanic gases usually consist of steam, followed in abundance by carbon dioxide and compounds of sulphur and chlorine.

Noise

4.3 Indicative ambient noise levels were measured by an independent consultant, in August 2002 at the three noise-sensitive receptors within the vicinity of the power plant site: residential properties along the access road to the site, the athletic club and the guesthouse. Based on 5-minute samples, typical background (LA90) noise levels for the guesthouse and residential properties are 46 and 45 dB(A) respectively.

Cultural Heritage

4.4 Site surveys and consultations with local officials and village chefs indicate there are no sites of cultural heritage within or immediately adjacent to the power plant site. There is one grave located within the wayleave of the transmission line route.

Land Use

4.5 The proposed power plant will be located adjacent to the SONARA oil refinery in a greenfield site, off the main N3 road which runs from Douala, to the east of the project site, to Idenao, which is located to the west of the project site. Along the access road to the power plant site there are approximately 30 residential properties for the SONARA oil refinery workers and a SONARA guesthouse and an athletic club. There are also a number of villages in the study area, including those to the west of the site which comprise some 7000 people with schools and hotels serving the area and the coastal holiday trade. Along the route of the transmission line there are a further eight villages, though no structures are located within the 45metre wide wayleave. Land use along the transmission line route is predominantly commercial palm plantations owned by the Cameroon Development Corporation (CDC); this comprises approximately 5.7 kms of the route. Surveys indicate that approximately 0.67km is owned by Chantier Naval (the navy) and 1km of the route is owned by SONARA. The remaining 4.23kms of the line route comprises village land and privately held land.
Traffic and Transport

4.6 The refinery is located off the N3, the main road from Douala, to the east, to Idenao in the south-west peninsular of Cameroon. An existing track provides access to the proposed site; residential properties are situated adjacent to this track near the main road. A separate entrance road serves the refinery and its dedicated port. Traffic surveys were undertaken by AES-SONEL in summer 2003 and showed that although the roads immediately within and outside Douala were heavily congested and in poor condition, the roads outside of Douala were adequately maintained and traffic was relatively light.

Recreation and Amenity

4.7 A guesthouse and an athletic club are located approximately 650m to the north west of the proposed plant site. The beach at Mile 6 is a bay located immediately to the west of the power plant site. This beach is popular with local people during the weekends, whilst generally the coastal area attracts some tourism from Douala and Yaoundé. Along the main road, which runs adjacent to the route of the transmission line, the main amenities are hotels serving local and wider tourism, with a large new hotel currently under construction along an access road to the transmission line route. There are also three schools, two secondary and one primary, located along the main road.

Climate

4.8 The climate of south-west Cameroon is a tropical monsoon climate, the Guinea monsoon, ensuring it is very wet and warm with one short, less humid season from December to March. The average annual rainfall is from 2000 to almost 10,000mm. Air temperature varies seasonally from 27 to 32 degrees C; relative humidity varies between 75 to 85%, and is influenced by the area’s maritime location. Sunshine hours are short for most of the year due to cloud cover and rainfall. The general wind direction is from the south-west. Wind speeds are typically in the range of 0.5 to 2 m/sec. The onshore wind is responsible for the near-saturation humidity.

Geology and Soils

4.9 Western Cameroon lies on the junction of the West African and Congo continental plates. Stresses and instability in this area have resulted in the formation of a series of volcanoes of which Mount Cameroon is the largest in West and Central Africa. Most soils in the study area are therefore of volcanic origin or are alluvial deposits from rivers, estuaries or the sea. A geological site investigation was undertaken for AES-SONEL in March 2003. This showed the proposed power generation plant site is underlain by predominantly volcanic rocks, with some partially consolidated deposits of loose volcanic materials.

Topography

4.10 The power plant site is approximately 11m above sea level (ASL), rising to 13m toward the north of the site. The project area is dominated by the presence of Mount Cameroon, West and Central Africa’s highest volcano (4,095m), which is 26km to the north of the power plant site. A dome 50km long and 35km across the mountain starts at the sea and first rises to a small subsidiary peak of 1713m called Etinde or Small Mount Cameroon. The topography along the transmission line route rises from approximately 13m ASL at the power plant site to an elevation of 50m ASL then undulates gently between 30-80m along the remainder of the line apart from two noticeable hills where the land rises to over 110m.
Hydrology and Drainage

4.11 Drainage in south-west Cameroon is characterised by semi-permanent and permanent streams which can more than triple their volume during the rainy season. The most important streams are the Sanje, Limbé and Ombe. These streams discharge large quantities of inland sediment and organic matter into the Atlantic Ocean. There are no existing drainage channels across the proposed plant site. A number of seasonal drains cross several access roads to the transmission line route.

Water Resources and Quality

4.12 There are no watercourses or ponds on the power generation plant site. The water resource requirements of the SONARA site are provided by wells that have been drilled into the groundwater supply. There are no permanent watercourses that dissect the transmission line site. High precipitation and numerous coastal rivers provide large quantities of warm and low salinity water in the area. The main discharges into the sea in the vicinity of the power plant generation site are a result of natural drainage from the SONARA oil refinery site.

Flora and Fauna

4.13 The south-west Province of Cameroon is recognised as being rich in biodiversity. The Limbé Botanical and Zoological Gardens (LBZG) were commissioned to undertake an ecological survey of both the proposed plant site and of the transmission line route on 22-23 November 2003. The conservation value of the plant and animal species found were compared with the list of protected species in Cameroon and also the IUCN Red data species list (IUCN 1997) as well as the World Conservation Monitoring Centre (1995) list of threatened tree species. The natural vegetation at the power plant site and along the route of the transmission line is almost absent due to intensive and repeated human activities. There were no threatened habitats or species on the power plant site. There were also no locally important medicinal species. The surveys did not identify any threatened habitats or plant or animal species.

Marine Ecology

4.14 There are no data readily available for the marine ecology directly off the coast at the proposed power plant site. Information for the Gulf of Guinea however indicates that this Gulf is rich in marine life, including deep sea and coastal fisheries, sea birds, sea turtles and marine mammals. Extensive mangroves occur along the coast and provide critical habitat for many crustaceans, molluscs, fish and birds. Several beaches provide important nesting sites for the Green and Olive Ridley turtles although Limbé Botanic and Zoological Gardens staff have confirmed that no turtles or turtle nests have been sighted either at the power plant site or in the Limbé area. Pelagic fish communities are widely distributed from the estuaries to offshore up to 10 nautical miles. White shrimp (Parapeneaeopsis altantica, Palaemon hastatus) fall within the nearshore and are fished in the artisan fishery. There are however no known fisheries in the immediate vicinity of the power plant site.
**Landscape**

4.15 The SONARA oil refinery buildings, towers, and process equipment dominate the landscape around the power plant site. The refinery is clearly visible from the main road and borders the proposed power plant site. The refinery also has a port, and there are often large tankers moored at this port dominating the seascape. Along the transmission line route, the landscape is typically cultivated land, dominated by palm plantations forming part of the CDC estate. Local plantations intersect the CDC plantations at intervals along the transmission line route. Inland from the transmission line route, looking north, the landscape is dominated by Mount Etinde and Mount Cameroon.

**Hazards**

4.16 The study area is located within a major fault zone, along which volcanic activity occurs. Mount Cameroon, an active volcano on this fault line, last erupted in June 2000. A study undertaken for SONARA indicated that the topography of the surrounding land would prevent lava flows from a volcanic eruption at Mount Cameroon from reaching the SONARA site, and thus the LPP site. Consultations also indicate that Cape Limboh has not experienced coastal flooding since it was constructed. In terms of man-made hazards, the main issue in the study area is the SONARA oil refinery. SONARA has extensive safety measures in place to deal with emergency fires, and many of the procedures that it has adopted are derived from the procedures of Total, who assists in managing the refinery. This includes spill prevention and clean-up procedures. It is therefore not anticipated that there is a major risk of impact from an accident at the SONARA refinery site.

5. **PROJECT ALTERNATIVES**

5.1 The analysis of options identified that the only options in the short term, taking into account suitable locations and fuel types, are the use of diesel engines burning diesel fuel at Logbaba or the use of HFO-fired diesel plant at the SONARA refinery, Limbé. The prohibitive cost of diesel fuel means that HFO is the only option that can deliver a more economic, immediate solution to the current electricity demand-supply deficit.

5.2 Since the transport of large amounts of HFO is both costly and technically problematic, the preferred solution is the installation of approximately 80MW of HFO reciprocating engines adjacent to the SONARA oil refinery at Limbé. Not only is this the cheapest fuel option, but this option will also minimize both short and long term environmental impacts. In the short term, with the fuel supply being available immediately adjacent to the plant and delivered by pipeline, the potential for spills is far less than if the fuel had to be trucked to an alternative location. In addition, the environmental impact of several trucks travelling the return trip from the Limbé refinery to whatever alternative location had been selected would be eliminated.

5.3 In the medium to long term, the power plant being located at Limbé also increases the possibility that natural gas will be developed in Cameroon. The likelihood of natural gas being selected as the fuel for AES-SONEL’s next power plant are high, but are still dependant on finalizing the price for gas at the potential gas delivery locations. The gas reserves that could be delivered to Limbé are reasonably close to the LPP site and to Cameroon’s commercial center - Douala. The fact that the LPP can be converted to a natural gas fired plant enhances the probability of future gas generation projects.
In addition to this overall siting for a power plant, options for the detailed siting of the plant in the vicinity of the SONARA oil refinery were assessed. The number of potential power plant sites was limited due to issues of land availability, but three possible locations were identified. These locations were at the entrance road, a site at the western edge of the refinery, or at the ocean front. The selection of the preferred site for the power generation plant was determined on the basis of size of sites; topography of sites; review of interconnection points with SONARA; nearby sensitive receptors e.g. residential properties; indicative noise survey; sea access; and visibility impact. The ocean front site was the preferred site as this location is more secure, there is a greater area of land available, the distance for fuel supply is shortest and it is furthest from sensitive receptors such as residential properties.

For the transmission line route, the impacts of four different routes were examined. The preferred transmission line route was selected in order to avoid houses and minimize the impact to lands and agriculture. The preferred route was also selected on the basis of minimising disturbance to several small settlements during construction and operation by slight deviation from the shortest route, and wherever possible routing the line alongside roads and existing infrastructure. A significant proportion of the line traverses the government-owned Cameroon Development Corporation palm plantations.

6. POTENTIAL IMPACTS AND MITIGATION MEASURES

6.1 The impacts assessed cover the direct effects and any indirect, secondary cumulative, short, medium and long-term, permanent and temporary, positive and negative effects of the development during the key stages of construction, operation and in many cases possible decommissioning. The likely significance of the impact is based on the identification and prediction of the magnitude of any impact caused by the project on (i) a receptor (e.g. human beings, community facilities etc), or (ii) an environmental resource (elements of the existing natural or built environment), or on (iii) any process which is essential, or of value, to the functioning of human or natural systems, and (iv) the identification of the importance (and/or sensitivity) of that receptor/ environmental resource/process. For all impacts, appropriate mitigating measures have been provided for, and contractors will be required to enforce them.

6.2 Positive Impacts

Overall, the operation of the LPP will result in a significant positive impact through a diversification of the generation capacity and improved system reliability. As such, this will allow AES-SONEL to significantly reduce the level of load shedding experienced in recent years, especially during the dry season. In providing a more reliable electricity supply to the grid it will bring benefits to the populous areas which include the capital, Yaoundé, and the main commercial centre, Douala. It will also reduce the overall cost of electricity for customer’s currently running diesel generators during load shedding periods by eliminating the need for them to purchase high cost fuel. There will also be an influx of temporary workforce which should in fact be a temporary positive impact through local employment opportunities and an increased demand for local goods and services. In all cases, the positive impacts will be enhanced to provide maximum benefits to the project area.
6.3 **Key Negative Impacts during Construction**

6.3.1 During construction of the power plant and the transmission line, the main adverse impact will be the increase in traffic as a result of construction-related deliveries and transport of the workforce to the site. Approximately 100 HGV movements will be required to transport the generation plant and other heavy/bulky equipment to the site, primarily taking place over a period of about 1 week. There will also be general construction-related traffic movements over a period of nearly 11 months. Delivery of equipment by HGV from a port or landing facility close to the plant site would significantly reduce the impact on traffic between Douala and the study area.

6.3.2 A further key negative impact may occur as a result of the influx of temporary workers to the study area placing pressure on existing resources and contributing to local health problems. The contractors will be required to prepare a statement of intention for the provision of accommodation and services to support an influx of temporary workers, including the requirement to brief employees on health risks such as AIDS.

6.3.3 During construction of the transmission line, the main impact will occur as a result of the clearance of the 45-metre wide wayleave. AES-SONEL has undertaken extensive surveys along the proposed route of the transmission line. Along the 11.6km comprising the line route, a total of 172 land owners and 164 crop owners will be affected by the project. There are no structures within the wayleave so no physical displacement will occur. Additionally, AES-SONEL anticipates very few, if any, cases of economic displacement occurring as a result of the loss of land or crops. Details of the Compensation Action Plan are given below.

6.3.4 In addition to the impact on land and crop owners within the wayleave, the construction of the transmission line could have an adverse impact on public and occupational health and safety, for example as a result of public access to the site during construction activities and the movement of traffic along access roads to the site.

6.3.5 A large volume of waste will be generated as a result of the excavation of the site for the foundations of the plant, ancillary equipment and the substation, resulting in the generation of approximately 6500m$^3$ of excavated material. It is the intention of the contractors to reuse excavated wastes on site wherever possible. Furthermore, they will be responsible for ensuring that all waste arising from the works is deposited, treated, kept, disposed of and carried in accordance with the provisions of relevant national and local environmental protection acts and also in accordance with any additional instructions decreed by AES SONEL. The burning of waste will not be permitted.

6.4 **Key Negative Impacts during Operation Phase**

6.4.1 Air and water quality and the generation of wastes as a result of the operation of the power plant could be of concern without mitigation measures in place. Good environmental practices in both the design of the generation plant and its operation will reduce the residual impacts to acceptable levels. Specifically, the contractor is required to provide a stack height of 80m, and sulphur dioxide emissions will be controlled by limiting the sulphur content of the fuel to 0.7%. Air quality modeling indicates that emissions from the power plant are not expected to result in exceedences of air quality guidelines at any of the sensitive receptors (inhabited villages) identified in the area, where people may be exposed to changes in air
quality. As such, the LPP will comply with the Cameroonian and funding organisation’s environmental regulations. AES-SONEL will implement a programme to monitor air quality during operation of the plant. Air quality in the population centres of southern Cameroon will further be improved by obviating the need for customers to use private generators during periods of load shedding.

6.4.2 A key impact of the operation of the power plant will be the generation of wastes such as fuel oil sludge, waste lubricating oil and sewage. A waste oil tank will hold the waste oils and oily water wastes, the contents of which will be removed and disposed of by a licensed operator approved by AES-SONEL. Sewage will go directly to a septic tank, which will be emptied and disposed of by a licensed operator approved by AES-SONEL. Furthermore, the impact of surface water drainage from oily sites could have a significant impact on seawater quality. To minimize this potential adverse impact, water will pass through an oil/water separator where site roads and hardstandings are drained. An oily wastewater drainage system will also be installed, with facilities in place to contain oil in the event of a catastrophic failure of the transformer. Additionally, visual monitoring of the discharge for oil/grease will be undertaken frequently and water quality of the discharge to the sea monitored monthly during operation of the plant. These mitigation measures will ensure that the overall impact on water quality during operation of the plant will be low.

6.5 Cumulative Impacts

6.5.1 Cumulative impacts are those incremental effects that result from an action when added to other past, present and reasonable foreseeable future actions. The main potential cumulative impact during construction is the increase in traffic and influx of temporary workers if the power plant site works and transmission line works are undertaken at the same time. It will be the responsibility of the contractors to liaise with each other with regard to traffic movements. They will also each be required to prepare a TMS that will ensure that the programme for the delivery of the main equipment in HGVs to each site respectively does not coincide, and therefore avoid cumulative impacts associated with HGV movements. Although there may be a net increase in the influx of temporary workers, these workers will be located at different sites and the overall numbers at any one time is not considered to significantly increase the overall impact on the local community.

6.5.2 The only known development currently under construction in the study area is a major hotel at Ngeme, a village along the transmission line route. There may be a minor net increase in traffic movements along the access road to this site in the event that this road is used by the contractor to access the transmission line site at the same time that construction resumes on the hotel. Any incremental increase in traffic is likely to be minor as deliveries to the site for the LPP would only take place over a period of 1 week. These impacts will be managed through the development and implementation of the TMS.

6.5.3 Consultation with FMO indicates that there is a proposal to construct a shipyard to the east of the SONARA refinery, approximately 500 to 1000m from the proposed site of the LPP power plant. Although it has not been possible to obtain specific details on the timing of this project, it is understood that it is not likely to be constructed before March 2004. Should the construction of the shipyard and the LPP coincide, this could result in some additional construction-related traffic movements in the study area. Again, this will be managed through the TMS.
6.5.4 The location of the plant adjacent to the SONARA oil refinery offers a number of synergies through the provision of shared facilities such as fuel oil and water supply, thus minimizing the impact associated with the construction of new facilities. In addition, the selected site will have a lower cumulative impact than would be associated with developing generation capacity at a number of other possible locations as the Limbé site will provide an opportunity in the medium term to develop the site for gas-based power generation, as discussed earlier in this summary.

7. ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

7.1 As part of their corporate commitment to managing its project in a responsible, safe and sustainable manner such that protection of the environment and safety of people take priority, AES SONEL has prepared an Environmental Action Plan (EAP) that describes the environmental and social management measures that it intends to implement. The EAP incorporates all mitigation measures required to ensure that all environmental regulations are met. It also incorporates mitigation measures that have been agreed following extensive consultations with a wide range of interested parties. It includes the specific mitigation measures identified in the ESIA and details the organisation/body responsible for the action, the period for which the action should be taken, and the need for short, medium or long term monitoring.

7.2 The following principles were adopted in the preparation of the EAP: (i) compliance with relevant legislation, standards, codes, and practices in the application of safe technologies; (ii) minimisation of impacts on the environment and human beings; (iii) performance of all activities in a safe and effective manner; (iv) maintenance of all equipment in good operating condition for the protection of the health and safety of all persons; and (v) to conserve the environment and property.

7.3 The project will be fulfilled under two contracts, one for the power plant and the other for the transmission line. The contractors will be required to have their own environmental management procedures, but will be required by their contracts to take into account the actions set out in the EAP. Thus each contractor will have to prepare an Environmental Management Plan, which will detail procedures, in the form of method statements, for the management and mitigation, of the following:

- Accommodation procedures (if required);
- Statement of intention on employment of local people;
- Waste management procedures;
- Noise management procedures;
- Air quality management procedures;
- Soil management procedures;
- Water quality and resource management procedures; and
- Procedures to manage impacts on flora and fauna.

7.4 In addition, the contractors will prepare (i) a Traffic Method Statement, which will describe the strategy for delivering workforce and materials adopting the measures to reduce accidents, set out in the EIS, and a HGV delivery schedule; and (ii) a Construction Emergency Oil Spill Plan, with information on the proper handling of pollutant spills and the procedures to be taken in the event of a pollutant spill, together with specific proposals for training construction personnel in accordance with the ESIA. Prior to the start of the relevant activity, each contractor will undertake all measures necessary to ensure that his staff and
sub-contractors comply with the measures set out in the EAP, including the required environmental monitoring and reporting to AES-SONEL. The contractor will also be required to identify an appropriately qualified Site Environmental Officer (SEO), acceptable to AES-SONEL, who will be responsible for implementation of the measures set out in EAP. The SEO will be identified in the Environmental Management Plan.

7.5 AES-SONEL will ultimately have responsibility for the operation and maintenance of the LPP. It recognises that environmental and social issues covered by the EAP during operation will change as time advances. AES-SONEL, therefore, accepts the responsibility of managing these changes in a pro-active manner on an ongoing basis. In order to ensure compliance of the project with the ESIA, through the framework of the EAP, AES-SONEL will designate a project Environmental Manager who will be responsible for ensuring that the contractors are fulfilling their obligations under their contracts. AES-SONEL will ensure that the project Environmental Manager is appropriately trained to discharge the requirements of the EAP, and that operational staff are conversant with the requirements and have adequate training to undertake their environmental responsibilities. The Environmental Manager will have the authority to stop the work of the contractors, or any of their sub-consultants, if they fail to comply with the EAP. The key responsibilities assigned to the project Environmental Manager will include the following: (i) point of contact for the Construction Contractor’s Site Environmental Officer; (ii) ensure that all environmental protection procedures are followed as planned; (iii) review and approval of the Construction Contractor’s Environmental Plan, Traffic Management Statement, Emergency Spill Oil Plan and Health and Safety plan; (iv) audit the Contractors work on site and ensure that corrective action is taken as appropriate; (v) liaise with members of the public, local organisations and governmental and nongovernmental; and (vi) report results of mitigation and monitoring activities to the lenders and other relevant parties. The Environmental Manager shall report directly to the LPP Project Director.

7.6 The EAP also contains provisions for environmental auditing. The Contractors will be responsible for the auditing of their staff and any sub-contractors employed by them for all activities related to the work specified in their Contracts. AES SONEL will be responsible for auditing the Contractors performance against the EAP during construction, and for auditing AES SONEL staff performance against the Environmental Management Plan during operation.

7.7 Decommissioning

7.7.1 At the end of the useful life of the power station, in approximately 25 years, the plant may be decommissioned in accordance with legislative guidelines and technology current at that time, or the plant may be re-engineered and re-permitted if required. The key factors that determine when the plant is to be decommissioned are the economics of maintaining the plant to ensure that it remains safe to operate, compliance with environmental requirements and reliability, together with the cost of fuel. Decommissioning will therefore be reviewed on an annual basis once it is evident that the plant is nearing the end of its working life. The extent of dismantling, demolition and site clearance will depend upon the future use of the site. The need for soils surveys and any subsequent remediation works will also be considered in the light of the intended use of the site and its history of contamination. The whole plant may be decommissioned at one time or it may be decommissioned piecemeal over a prolonged period. The decommissioning phase is likely to take place over several months.
Independently validated plant closure/demolition methodologies have been developed for power plants that are at the end of their useful life. This methodology covers demolition of the plant and buildings of any contaminated and hazardous material from the site. When demolishing the power plant, it will be a matter of policy to ensure that the site is left with no environmental risks. A competent contractor (or contractors) will be appointed to undertake dismantling, disposal and demolition. Lead contractors will be nominated and will produce safety plans for the work. Stored materials suitable for reuse will be sold and taken from the site. The plant will be made safe for dismantling by draining and venting water and gas stored in vessels and pipework, and purging pipes and vessels of gases. Closed vessels, pipes and other areas which could have hazardous gases will be tested to ensure that they are safe before entry is permitted. Any stored substances, hazardous and non-hazardous, will be removed from site for disposal. Once the plant is completely disconnected, drained, purged and tested, as appropriate, it will be certified as being out of commission and handed over to a competent contractor to complete the dismantling and demolition work.

It is probable that most of the plant and equipment will be, at the end of its useful operating life, unsuitable for further use and will need to be dismantled for recycling. Decisions on reuse of plant items, recycling of materials or the disposal to waste will be made at the time of decommissioning in the light of technology then available, economic considerations and legislation. Much of the plant on site will be made suitable for recycling. In addition a large proportion of the buildings will be constructed of pre-fabricated steel and will therefore also be of interest to a scrap metal merchant. After the removal of the main items of plant and steel buildings the remaining buildings will be demolished to ground level. All underground structures will be either removed to made safe. The site will be returned to a condition suitable for reuse.

8. PUBLIC CONSULTATIONS

The broad objective of the Public Consultation Process was to provide the local population, statutory bodies, local organisations and interested parties with the opportunity to identify issues, concerns and opportunities regarding the proposed development. This allowed the ESIA team to explain to the public and others how the project might affect them, and receive feedback on particular concerns that they might have, in order that subsequent studies undertaken and actions could reflect those concerns. Accordingly, AES-SONEL undertook a consultation programme for the LPP.

Cultural sensitivity is an important approach in successful relations in a multicultural society and the LPP project team followed Cameroon protocols using culturally appropriate methods for undertaking public consultation activities. In all instances, French and English have been used for consultation purposes. In addition, where required local languages have been used in correspondence and in the dissemination of information. Pictoral representation has been used to reach the illiterate population and appropriate channels for communication and organisation of village meetings have been used.

The consultees for the LPP included (i) those associated with the proposed power generation plant site; (ii) those associated with the transmission line route; and (iii) those having an interest in the project, statutory and non-statutory (generic consultees). Three stages to the consultation process were planned. These were: (i) Development of the scope of works in order to agree the scope of works for the ESIA with the funding consortium and MINEF; (ii) During ESIA/Project development: to inform people that the project is being
undertaken, to record and understand any concerns, and to allow the project to be designed and the ESIA scoped so as to reduce any adverse impacts to an acceptable level; and (iii) On completion of ESIA: to inform people of the outcome of the ESIA for the LPP; to communicate how issues/concerns have been addressed; and (iii) to record, and where necessary act upon any further issues/concerns.

8.4 Results from consultations and surveys show that 97% of the project affected people support the project - given that the following measures are considered: (i) allowance be made for existing crops to be harvested; (ii) compensation be paid before construction commences; (iii) provisions be made for underground cabling; (iv) allowance be made for the planting of annual crops under the constructed transmission line; (v) employment opportunities be provided to youths of the affected communities; and (vi) there be improvement in power supply to eradicate frequent power failures. AES-SONEL has integrated these concerns in its design specifications and EAP. In addition to the above, AES-SONEL will ensure that consultees continue to be kept well informed during construction and, where appropriate, operation of the LPP.

9. RESETTLEMENT AND COMPENSATION

9.1 Due to the linear nature of the project, the relatively small impact on any individual landholder, and the selection of the line route to avoid all structures, no physical displacement will occur as a result of the project or related construction activities. AES-SONEL anticipates very few, if any, cases of economic displacement as well. The need for economic displacement may occur if the impacts to the plot as a result of the project make the affected persons economic base no longer economically viable. The land compensation agreements will be settled between the Compensation Commission and the project affected landowners on a case by case basis.

9.2 To manage the compensation process, AES-SONEL has prepared a Compensation Action Plan (CAP). The principles contained within the CAP are intended to meet the needs of the Cameroonian government as well as the international financing community. A survey was carried out to capture census information as well as social data, such as mortality, fertility, household size, incidence of disease, literacy, affected cultural properties, and economic information on household level income streams and expenditures. Results indicate that a total of 334 people will be affected and the total land take for the wayleave will be 522,000 m2. 51% of the affected people are male and 49% are female, while 60% of the affected population is comprised of non-indigenes.

9.3 The affected area is characterized by mixed crop farming. Farmers along the transmission line typically own more than one agricultural plot of land. Farm sizes are generally less than 1 hectare for annual crops and 4 hectares for perennial crops. For the affected communities other than the Mile 2 area, the distances from residences to the affected plots of agricultural land vary from a few meters up to 1km. For the Mile 2 area agricultural owners live up to 10km away from their agricultural plots. In most of the affected agricultural plots, mixed cropping was observed - as is the case in other rural communities involved in subsistence agriculture. The number of crops per agricultural plot varied, with as many as 14 different crops in some farms. Crops were not often found of the same age, as they were planted at different times (relay cropping). Since the crop counts were conducted during the planting season, most of the short cycle crops like maize were still young unlike the longer cycle ones like cassava, plantains, etc. which were mature or near maturity age. There is no
differentiation under Cameroon law for right of way and way leave, therefore it is anticipated
that either the plot will be partially or wholly affected as a result of the project. In situations
where the plot is partially affected and the remaining portion of land is no longer economically viable and / or the whole plot has been affected, resettlement may be necessary. In these situations either cash compensation or land for land or both will be offered.

9.4 In situations where cash compensation is appropriate or has been selected by the
project affected person upon consultation, AES-SONEL will calculate and pay compensation
according to the following principles: (i) compensation rates will be calculated in
consultation with representatives of affected populations to ensure that rates are fair and adequate; (ii) compensation for land and crops will be sufficient to enable affected people to restore their standard of living; and (iii) compensation payments will be made before any acquisition of assets or physical resettlement takes place unless those payments are staggered to enable affected people to begin preparation of new sites.

9.5 In cases where in-kind compensation is selected, the following principles will be
observed: (i) new land offered will be equivalent or superior in productive potential to the
land from which people will be displaced; (ii) new land will be provided free of any
“transaction costs” such as registration, fees, transfer taxes, or customary tributes; and (iii)
new land will be prepared for productive levels similar to those of the land from which
people will be displaced.

10. CONCLUSION

10.1 The main benefits of the LPP are the provision of generation capacity and energy to
address the current electricity demand-supply deficit in the southern interconnected system of
Cameroon. In particular, the project will address the urgent need for new generation capacity
in the next dry season with the lowest possible generation cost available given the time
constraint. The installation of approximately 80MW of HFO-burning plant will result in a
diversification of the generation capacity and will also result in improved system reliability.
There will be a reduction in electrical outages experienced in recent years while supporting
the national economy with an increased reliable supply of electricity. In providing a more
reliable electricity supply to the grid it will bring benefits to the populous area which includes
the capital, Yaoundé, and the main commercial centre, Douala. It will also reduce the overall
cost of electricity for customer’s currently running diesel generators during load shedding
periods by eliminating the need for them to purchase high cost fuel.

10.2 The choice of the fuel type plant type and site location has been affected by
availability, cost and technical factors. At the same time opportunities to minimize
environmental impacts in the short and long term have also been considered in the selection
of the LPP as a preferred option. The HFO’s low sulphur content was a big factor. Also,
with the fuel supply being available immediately adjacent to the plant and delivered by
pipeline, the potential for spills is far less than if fuel had to be trucked to an alternative
location. This site avoids the impact associated with significant movements of HGVs to
deliver fuel that would be required with an alternative location further from the refinery fuel
source.
10.3 In the long term, the Limbé site is good in that it provides opportunities for synergies with the oil refinery, such as combined fuel and water supply, and has the advantage of being highly suitable as a landing point for offshore gas. The infrastructure developed at this site could, in the future, act as a catalyst for the introduction of natural gas as an additional source of fuel for electricity generation. The LPP is therefore seen as contributing towards the development of AES-SONEL’s Business Development Plan in the medium term and facilitating the development of more environmentally benign electricity generation in the future.

10.4 As part of the environmental impact assessment of the LPP a number of impacts during the construction, operation and decommissioning phases of the project were identified. Appropriate mitigation measures have been identified as part of the EIA process to mitigate such impacts. An Environmental Action Plan (EAP) has been prepared which identifies all mitigation measures relevant to the LPP, including those required to ensure that all environmental regulations are met and those that have been agreed following extensive consultations with a wide range of interested parties.

10.5 To manage the compensation process, AES-SONEL has prepared a separate document, the ‘Compensation Action Plan’ (CAP). Surveys undertaken along the route of the transmission line have identified a total of 172 land owners and 164 crop owners who will be directly affected as a result of clearance of the transmission line, although no physical displacement will occur. AES-SONEL anticipates very few, if any, cases of economic displacement. Compensation will be provided for both affected land and agricultural assets, and AES-SONEL has enhanced the compensation level beyond that required under Cameroonian law to fulfill the guidelines of the international finance community.

10.6 The ESIA studies undertaken have provided a clear enough understanding of the impacts to support a positive decision on the project. It is found to be environment-friendly, economically sustainable, and socially acceptable. This executive summary is, therefore, submitted to the Board for consideration.
11. DOCUMENTS CONSULTED

AES SONEL (January 2003), Draft Business Development Plan.


Black & Veatch (November 2002), Screening documents for the Permanent Power Project, Cameroon. AES SONEL.


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13. Web link

The full ESIA and CAP may be examined by visiting the following web site:
http://www.afdb.org/about_adb/OESU_projects.htm