**Africa Energy Unit**
**Sustainable Development Department**
**Africa Region**
***and***
**Energy Sector Management Assistance Program**
**(ESMAP)**

## Economic and Sector Work

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# Sierra Leone

# Power Sector Recovery Strategy

# Phase I

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Energy Unit
Africa Region
The World Bank

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## Executive Summary

Power Planning Associates has been appointed by the World Bank to prepare a strategy for the recovery of the National Power Authority (NPA). The assignment is divided into two phases. The first phase covers a high level technical and financial audit of NPA and proposed counter measures to improve the performance of the utility. The second phase covers development of a feasible scenario for the recovery of NPA, supported by financial modelling.

The Consultant's team visited Freetown over the period 25 September – 5 October 2006. This Preliminary Report presents the findings of the audit and proposes potential counter measures to improve NPA's technical and financial performance. These counter measures are presented at the end of each section of the report and are summarised below.

NPA is locked in a downward spiral of under-performance, wherein generation plant breakdowns and fuel shortages exacerbate cash flow constraints. In addition, poor commercial performance, including high losses and low revenue collection rates, are also at the root of the cash flow problems. This cycle needs to be broken at a number of points, and the following series of counter measures represent the Consultant's initial proposals, in order of priority:

1. Measures to address the management performance at Kingtom which has led to unacceptably low availability of the generating plant.
2. Further major investment to increase the capacity and improve the reliability of the distribution system and to reduce losses.
3. Implementation of short term management and technical support at Kingtom, with remuneration linked to the availability of the generating units.
4. Leasing of up to 15 MW of emergency generating plant.
5. Implementation of the proposed management contract for NPA.
6. Introduce tendering procedures for fuel purchasing.
7. Implement measures to reduce the present high levels of technical and commercial losses.
8. Develop and implement cost recovery tariffs.
9. Continue to deploy pre-payment meters, after supply reliability has improved.
10. Seek the funds to reduce the non-functioning staff on NPA's payroll.

The financial audit findings are that, since the Power and Water Credit Agreement was finalised in 2004, NPA has not made progress towards achieving the financial covenants that are embedded in the loan agreement.

Furthermore, it is unlikely that the stipulated financial ratios will be achieved in 2006 or 2007.

The following is a summary of specific short term actions required to initiate the NPA recovery plan:

- NPA should urgently seek proposals from consultants/contractors/utilities interested in providing short term management, operation and maintenance support at Kingtom.

- NPA should urgently seek the required funding for, and procure, the spare parts necessary to bring the two Sulzer units and the Mitsubishi unit back into service.

- Government/NPA should develop and implement competitive tendering procedures for fuel purchases.

- NPA should urgently consider leasing some emergency plant to provide a reliable source of generation to supply, at least, a base load of 10-15 MW.

- NPA should procure urgently some additional vehicles, line conductor, poles and fittings to allow the T&D Department to attend to urgent repair work and to work on the rebalancing of load between phases on the LV feeders which will have an immediate, and significant, impact on technical losses.

- NPA should seek alternative overhead line routes for primary underground feeder circuits that are old and subject to frequent outages, in particular Kingtom to Falconbridge.

- NPA should develop and deploy a tariff adjustment formula that responds to fluctuations in exchange rate and fuel prices.

- NPA should appoint a consultant to undertake a revaluation of its assets in order to comply with the requirements of the IDA Power and Water Credit. Unless and until NPA conducts an asset revaluation, the organisation's performance against many of the financial covenants set in the Power and Water Credit cannot meaningfully be assessed and monitored.

# 1 Generation

## 1.1 Current Situation

The power generation situation has deteriorated further during 2006 in spite of the IDA funding of almost US$1.5 million provided in 2005 for the purchase of spares and the funding of a consultant to supervise the rehabilitation works and to act as generation manager at the Kingtom thermal generation station. The consultant was originally contracted for a period of six months. The contract was subsequently extended for a further six months, until the end of August 2006.

There is virtually no generation at Kingtom. At the time of the field visit, all four large generators were out of service. The Mirrlees No. 3 unit suffered a major failure on Sunday 24 September in which a connecting rod became detached from the crankshaft and exploded through the side of the crankcase. Fortunately, the incident occurred during a Sunday evening and no one was injured. Both Sulzer units are out of service – No. 4 has recently been overhauled and was due to be put back into service but NPA is experiencing problems in re-commissioning the unit. No. 5 unit has been out of service since a fire in the exhaust manifold in March 2005, and is awaiting spare parts. Mitsubishi No. 6 unit has a connecting rod bearing problem. At the time of the visit, commissioning was in progress on the pre-owned 7 MW Mirrlees unit that is being provided by the South African government. Although the diesel generator unit was manufactured in 1974, it is understood to have only 8,000 recorded running hours.

Total generation at Kingtom for the first 8 months of 2005 was 24.4 GWh, averaging just 3 GWh per month, as compared to average monthly generation of 4.4 GWh in 2005, 7.1 GWh in 2004 and 9.1 GWh in 2003. However, the low availability of the generating plant is not the sole contributor to the problem, as NPA is not able to collect sufficient revenue to purchase the required fuel. On the basis of availability data provided by NPA, the Consultant estimates that the potential generation at Kingtom for the first 8 months of 2006 could have been about 36 GWh had the fuel been available, i.e. 50% higher than the actual generation achieved.

Following an improvement in generation in the period from 2000 to 2003, the position has deteriorated substantially year by year, as shown in the following table:

| | 2001 | 2002 | 2003 | 2004 | 2005 | 2006* |
|---|---|---|---|---|---|---|
| Generation (GWh) | 106.3 | 123.5 | 109.4 | 84.8 | 53.3 | 24.0 |

* 8 months - January to August

This shows that generation in 2005 was only 43% of that achieved in 2002 and 2006 is likely to be lower still.

## 1.2 Maintenance Procedures and Costs

In the past, maintenance overhauls of the diesel generating units have been difficult due to shortages of funds to purchase the necessary spare parts. Since early 2005, IDA has supported NPA by providing US$ 1.5 million for the purchase of spare parts that have allowed NPA to carry out maintenance overhauls on a number of the main generating units at Kingtom, some of which were substantially overdue. Details of the status of the units and the maintenance overhauls that have been undertaken in the recent past are as follows:

- Mirrlees No. 3 – 12,000 hr maintenance carried out in 2005, and 6,000 hr maintenance in February/March 2006. Since then the unit has been in operation until it failed on 25th September 2006.

- Sulzer No. 4 – has operated but is more than 23,000 hours overdue for a major overhaul (which should be carried out every 12,000 hrs). Currently out of service for minor repairs but NPA is having difficulty bringing it back. The units trips out at about 2.5 MW loading.

- Sulzer No. 5 – not operated since February 2005 when a fire in the manifold damaged the turbocharger. Up to that date, the unit had run for almost 10,000 hrs since a major overhaul was carried out in February 2003.

- Mitsubishi No. 6 – a major overhaul (due every 9,000 hrs) was carried out in January 2006. Since then the unit has run 2,000 hrs. It has been out of service since early August with cylinder head sealing and oil purifier problems for which the required spare parts are not available. The unit also has problems with one of the crankshaft bearings.

The costs of the overhauls is not recorded by NPA in their monthly reports, but is estimated to be approximately US$2 million.

The overhaul of Sulzer No. 5 unit is well overdue but has been held up due a shortage of spare parts to carry out the necessary repairs to the turbocharger following the fire in the exhaust system in February 2005. NPA has identified an amount of US$ 930,803 for spare parts required to bring the Sulzer No. 5 unit back into service, plus a modest quantity of 'running' spare parts for future operation of the two Sulzer units and auxiliaries, and the provision of some urgently required tools. Spare parts are also needed to bring the Mitsubishi No. 6 unit back into operation. These cover repairs to the oil purifier plus running spares for the unit. No cost estimate was available for the Mitsubishi spare parts. It is understood that JICA may be willing to fund these spares.

## 1.3 Fuel Supply and Procurement

Procurement of fuel is a major problem for NPA as it does not have the funds to make the necessary fuel purchases. The utility has been caught in a downward spiral of low revenues due to low levels of generation which in turn lead to low revenue collection which then reduces further the funds available for fuel purchases. Many customers have large arrears which are difficult for NPA to collect whilst the electricity supply situation is so bad. Some of NPA's customers are saying that they want their meters removed as they are not willing to pay the monthly fixed charge whilst not receiving any power. In other instances meters are vandalised, and in a few cases meter readers have been assaulted.

NPA has tried to address the fuel supply problem by getting government to pay for its electricity consumption three months in advance and using the funds directly to purchase fuel. In return the government is given preferential supply. In other cases, loans have been taken out with commercial banks backed by future electricity revenues.

Fuel delivery is also a problem since the hostilities, when a fuel barge was sunk in front of Kingtom, blocking the access to the unloading point. NPA has requested funding from IDA for the removal of the barge.

The restrictions in the supply of fuel have contributed significantly to the demise of generation at Kingtom. On the basis of information provided by NPA, the Consultant estimates that about the generation could have been increased from 24.4 GWh to about 36 GWh during the first 8 months of 2006, had the additional fuel been available.

Improvements have been made in the fuel treatment at Kingtom and the wastage of fuel has been reduced in 2005/06 from about 5% of total purchases to about 2% of total purchases.

## 1.4 Additional Generating New Plant

GoSL is to receive funding from BADEA for three new diesel generators, each of 7.56 MW capacity to be installed in an new power house at Blackhall Road. The project is divided into two phases: Phase 1 includes the new power house and the first 7.56 MW unit. Phase 2 comprises a further two units, one to be funded by BADEA and the other by the Saudi Fund. It is expected that the first unit will be in service by the end of 2007 and the subsequent two units, which will be subject to a separate procurement, should follow within 12 months of the first unit.

GoSL has requested funding from JICA for the supply of a further two diesel generator units each of 5 MW capacity. It is understood that the funding has been agreed in principle but is subject to final Japanese government approval in February 2007. The units are to be installed on the existing Kingtom power

station site and are expected to be commissioned in February/March 2009. The estimated cost of the two units is US$10 million.

The Consultant also learned that GoSL has been considering measures to boost the short term generation capacity in the Western Area and has received a proposal from Aggreko for the supply of emergency diesel generating plant of up to 20 MW on a leased basis. The leasing payments and fuel costs would be directly funded out of the revenue generated from the sales.

In addition, the Consultant understands that GoSL is planning to procure six diesel generating units, each of 2 MW capacity for installation at provincial centres throughout the country and, following a recent assessment of NPA by a team from the Moroccan electricity utility and their findings, include a recommendation that feasibility studies should commence immediately on the Benkongor 95 MW hydro project.

## 1.5 Emergency Generation

In order to address the current generation crisis, NPA should consider leasing some emergency diesel plant in packaged units to provide a reliable source of generation to supply, at least, a base load of 10-15 MW. The advantage of leasing is that the plant would be operated and maintained by the plant provider and would therefore make no demands on NPA's generation staff, allowing them to focus on Kingtom. The plant could be operational 6-8 weeks after a contract is placed with the leasing company.

It is estimated that electricity from this type plant should cost approximately 34 USc/kWh (1,020 Le/kWh) which includes 6 USc/kWh (180 Le/kWh), for fixed charges, (capacity charge, service charge covering O&M, mobilisation/demobilisation charges and fuel storage charges) plus a fuel cost of about 28 USc/kWh, based on the current fuel price of Le 13,500 per imperial gallon (IG) in Freetown.

It should be noted that the current fuel price was fixed in early-July 2006 at the height of the recent price rises when oil prices reached over 75 US$/bbl. The oil price has now dropped by approximately 20%, to under 60 US$/bbl. On the basis of current oil prices, and assuming taxes/duties on the fuel to be used by the emergency diesel plant were to be waived by the government, then the fuel element of the electricity cost should reduce to about 17 USc/kWh, giving an estimated total cost of approximately 23 USc/kWh (690 Le/kWh).

Based on the generated price of 23 USc/kWh (690 Le/kWh) and allowing for distribution losses of approximately 35%, the cost delivered to the consumer would be about 35 USc/kWh (1,050 Le/kWh), excluding NPA's staffing and other costs. This would require a substantial increase in electricity tariffs, particularly residential tariffs which are currently 16 USc/kWh (479 Le/kWh), for an average consumption of 100 kWh/month.

## 1.6 Performance Indicators

Under the Power and Water Project agreement, NPA has agreed to improve performance targets for the utility including the following targets for generation:

| Indicator | 2006 Target | Achieved[1] |
|---|---|---|
| Energy generated (MWh/day) | 434 | 99 |
| Station use (%) | 4.7% | 8.3% |
| Fuel efficiency (kWh/IG) | 22.4 | 17.8 |

Fuel efficiency has inevitably suffered due to the low availability of fuel and the large number of stops and starts. A large part of the auxiliary consumption is essentially fixed, regardless of the loadings and numbers of units in service. Thus, the low generation of the plant results in an increased percentage of auxiliary losses.

The total availability of the four major generating units during the first 8 months of 2006 has been only 47%, which is very low. The Sulzer No. 5 unit has been out of service for the whole period. The other units have been unavailable due to planned maintenance outages and have also suffered unplanned outages.

The availability figures by unit are shown in the following table:

| | Mirrlees No. 3 | Sulzer No. 4 | Sulzer No. 5 | Mitsubishi No. 6 | Total |
|---|---|---|---|---|---|
| **Availability** | 41% | 74% | 0% | 56% | 43% |

Only the Sulzer No. 4 unit has had reasonable availability. All other units fall way below the expected values. The newer Mirrlees and Mitsubishi units should have an availability of 80-85%, and about 70-75% for the older Sulzer units. The reasons for the poor availability are considered to be:

1. Inadequate management in the planning and execution of maintenance;

[1] January to August

2. Weak management and supervision of the power station work force, leading to low morale and lack of motivation from the key skilled power station technicians;

3. Shortages of funds to purchase running spare parts ahead of time to prevent unplanned outages and reduce the down-time on planned outages; and

4. Inadequate of routine maintenance on auxiliary plant leading to unplanned outages of the generating units.

## 1.7 Proposed Counter Measures

The availability of the generation units at Kingtom is unacceptably low. Over the past 18 months, there have been two main reasons for this: a) mechanical breakdowns and other failures of the four main diesel generating units, and b) shortages of fuel. The first of these factors results from poor management at the station and technical shortcomings in many of the station auxiliaries. The second factor stems from cash flow problems that are, again, caused by multiple shortcomings including: a tariff that is not set at cost-recovery levels and is not directly linked to a fuel price adjustment formula; high technical and commercial losses; and an unsatisfactory 'collections ratio'

Short term measures:

- To address the failings of Kingtom in the short term, until the management contractor is appointed, NPA should seek immediate technical and management support to arrest the rapidly deteriorating performance of the station. Strengthening the management of the station is needed in order to provide greater focus on the planning of maintenance, whilst ensuring that the required spare parts are available before units are taken out of service. Technical support is also needed to supervise, and to provide on-the-job training, to the maintenance staff, in particular in the area of preventative maintenance. The preventative maintenance should focus on the auxiliary plant, including cooling water systems, fuel treatment systems, lube oil pumps, compressors, etc, to ensure they are in good condition. The management/technical support should ideally comprise three persons, a power station manager, a mechanical maintenance engineer and an electrical maintenance engineer. The immediate action required is to seek proposals from consultants/contractors/utilities interested in providing short term operation and maintenance support at Kingtom, under an arrangement that links payments to the availability of the generating units.

- In parallel with the first item, NPA should urgently seek the required funding for, and procure, the spare parts necessary to bring the two Sulzer units and the Mitsubishi unit back into service. The procurement should include sufficient quantities of disposable

'running' spares required for the operation of the units for at least 12 months.

- In order to address the immediate generation crisis, NPA should urgently consider leasing some emergency plant to provide a reliable source of generation to supply, at least, a base load of 10-15 MW. The plant could be operational within 6-8 weeks of a contract being placed, and could provide electricity at a cost of approximately 26 USc/kWh, if fuel duties and taxes are waived by the government and procedures are put in place for the competitive tendering of fuel.

Medium/long term measures:

- The management contractor should be incentivised to improve the availability of the Kingtom units, either through direct incentive payment linked to the plant availability or through a mechanism whereby the contractor receives a share of NPA's revenue.

- An assessment should be made of the future role of Kingtom once Bumbuma and the new generating plant to be provided under BADEA/Saudi and JICA funding comes into service, including the option of decommissioning Kingtom. The siting of the new diesel generators units to be provided under JICA funding should also be re-assessed with a view to finding an alternative site.

# 2 Transmission and Distribution

## 2.1 Existing System

The distribution system in Freetown is old[2] and suffers from poor maintenance and under-investment. The primary 11 kV switchgear has been subject to daily operation for many years due the load shedding operations. Shortages of equipment and materials have also contributed to a deterioration in system reliability and increased system losses.

Extensive rehabilitation of the Western Area transmission and distribution network, which commenced in 1995, was not completed due to a long period of hostilities. A partial rehabilitation of the network was started in 1995 (under EU funding) but was suspended in 1997, and was not completed until 2005. The original 1995 project included for the construction of a 33 kV sub-transmission network interconnecting major existing 11 kV substations at Kingtom power station, Wilberforce, Wellington and Blackhall Road. The 33 kV project was only partially completed prior to the outbreak of hostilities.

Much of the 11 kV network in the city area of Freetown is under-grounded. Many of the primary cables have faults which NPA is not able to locate as the fault detection equipment and associated vehicle have broken down. At the time of the Consultant's visit, all three 11 kV cables between Kingtom and Falconbridge substations were out of service. This reduces substantially the capacity of the distribution network to supply to heavy demand in the centre of the city, as the system has to be fed through the secondary 11 kV network.

Frequent switching and shortages of spares have resulted in deterioration of the switchgear and substantial reductions in supply reliability and safety. Many of the secondary substations are in a very poor state with some switchgear that is non-operational and many LV fuses by-passed.

### 2.1.1 Emergency Rehabilitation Project

Following the preparation of a master plan study in 1995[3], a project was identified to address emergency distribution works in the Western Area covering;

- Rehabilitation of substations, and
- Rehabilitation of HV and LV distribution lines.

[2] Much of the distribution system dates from the early 1960s.

[3] Power Sector Master Plan, Sierra Leone, Lahmeyer International, November 1995.

Work commenced in 1995 but was stopped in May 1997 when hostilities broke out. The transmission and distribution suffered serious damage in an attack in January 1999, especially in the Eastern Area of Freetown. Emergency repairs were carried out in 2000/01 using funding from GOSL and the EU, following which the EU funded a more comprehensive emergency work programme to improve the capacity, safety and reliability of the HV and LV network in the Western Area, and to reduce system losses. The project was completed in mid-2005. The principal components of the project were: the supply and installation of 11 kV transformers (8 no.), HV switchboards (23 no.), LV distribution boards (74 no.), 11km of 11 kV and 86 km of LV overhead distribution lines, replacement of 10,000 service drops, replacement of 1.1 km of HV underground cable and refurbishment of 1 km of street lighting. The cost of the project was Le 3.5 bn.

## 2.2 Operation and Maintenance

The maintenance of the distribution network is the responsibility of the T&D Department of NPA. Distribution maintenance is hampered by shortages of material and vehicles. At the time of the visit to Freetown NPA did not have any wood poles or overhead line conductor. Both the 11 kV and LV underground cable networks in the Western Area are very old and suffer numerous faults. Data collected from the NPA monthly operational reports indicates the following average number of faults on the distribution network. The figures are presented as monthly averages due to missing reports for some months:

| Year | HV cable faults | | LV cable faults | | New connections | |
|---|---|---|---|---|---|---|
| | Reported | Repaired | Reported | Repaired | Estimates | Completed |
| 2004 | 8.0 | 6.9 | 9.2 | 8.6 | 133 | 125 |
| 2005 | 8.9 | 6.4 | 6.5 | 5.8 | 75 | 120 |
| 2006 | 9.0 | 5.8 | 6.8 | 4.6 | 73 | 95 |

The number of HV cable faults has remained essentially constant, although the repair rates have dropped, indicating that some faults cannot be repaired due to shortages of materials (cable, cable joints, etc.) or due to the breakdown of the fault detector equipment. LV cable faults have exhibited a similar trend.

The numbers of new connections have dropped substantially since 2004 due to shortages of material and supply problems. The numbers of consumers provided with service connections have dropped from 125 per month in 2004 to 95 per month in 2006.

The main problems experienced by the T&D Department are, in order of importance:

1. shortage of electricity supply;

2. lack of materials and vehicles; and

3. lack of fault detection equipment.

The T&D Department operates a customer fault reporting centre at Falconbridge, which is staffed around the clock. Every day the centre receives between 400 and 1,000 calls from customers reporting faults. The faults are investigated by the standby teams and most of them can be repaired immediately. Those that cannot be repaired are referred to the overhead line or cable teams, who then carry out the repairs provided materials and transport are available. On the day of the visit to Falconbridge there was no transport available and therefore no work maintenance or repair work could be carried out. The standby and maintenance teams depend for transport on two 15 year old Land Rovers.

## 2.3 Proposed 33 kV System and Rehabilitation

IDA is providing funding under the Power and Water Project credit for the completion of the 33 kV system in the Western Area, giving a capacity to supply demand of up to 60 MW. Tenders have been received and are currently under evaluation by NPA. The design of the 33 kV system includes for a double circuit steel tower line between Kingtom and Blackhall Road. It is proposed that one of the circuits should be diverted to feed Wilberforce substation, forming a three loop system:

- Kingtom to Blackhall Road
- Blackhall Road to Wilberforce
- Wilberforce to Kingtom

The 33 kV line between Kingtom and Blackhall Road is partially constructed, (half of the towers have been built) but much of the conductor that was originally supplied has been used by NPA on other parts of the distribution network, and some has been vandalised. Only a single 33/11 kV transformer is proposed at Kingtom but this, together with the existing 11 kV primary network and the 161 kV transmission line from Bumbuna which terminates at Kingtom, should provide adequate supply reliability. Since the construction of the line was stopped, there has been substantial low grade housing constructed under, or close to, the route of the line on the section close to Kingtom. The route is being studied and an assessment made of the number of households that may need to be relocated.

The rehabilitation element of the project includes for 11 kV/LV transformers, packaged substations and ring main units. However, consideration should be given to installing a larger number of smaller capacity transformers which will lead to shorter LV feeder lengths and lower LV losses.

The IDA-funded Power and Water Project also includes an LV rehabilitation component covering the immediate needs of the network. This covers the

replacement of LV distribution boards, LV feeders, repair of the cable test van, transformer oil filtration plant, wood poles and street lights.

In particular, the completion of the refurbishment of the LV systems and replacement of service drops needs to be addressed. It is estimated that the EU project and IDA-funded Power and Water project should cover the refurbishment of approximately half of the LV networks in the Western Area. It is estimated that an additional US$ 4-6 million will be required depending on the final scope of work under the Power and Water Project. The completion of the refurbishment of the LV and service drops is vital if NPA is to make significant progress in reducing both LV technical losses and commercial losses. The replacement of service connections provides and opportunity to identify illegal connections and to either regularise them or to remove them from the system.

The requirements for the 11 kV system will be less than for the LV system and will again depend on the finally agreed scope of work to be funded under the Power and Water project. An estimated additional US$ 1-3 million may be required.

In view of the large number of faults on the 11 kV primary cables, which have led to numerous joints, it is recommended that consideration should be given to the replacement of some key underground cable feeders by overhead lines where there is a feasible overhead route.

## 2.4 Performance Indicators

The key performance indicators for the distribution system are technical losses and supply reliability. It is not possible at the present time to make a separate assessment of loss of supply due to distribution faults, as opposed to a lack of generation. The key performance indicator included in the Power and Water Project for distribution is system losses. On the basis of system studies made during a study in 2004[4], the components of the total energy losses were estimated, based on 2002 data. The components of the system energy losses in 2002 are shown in the following table:

[4] Rehabilitation and Reinforcement of the Western Area Sub-transmission and Distribution, Power Planning Associates, April 2004.

| | Energy Losses % |
|---|---|
| Generation auxiliaries | 5.3% |
| 11 kV system | 4.1% |
| LV system | 9.5% |
| Commercial losses | 21.9% |
| **Total** | **40.8%** |

Actual generation, sales and losses data for the period 2002 to 2006 is shown in the table below:

| | 2002 | 2003 | 2004 | 2005 | 2006 |
|---|---|---|---|---|---|
| Energy Generated (kWh)* | 123,499,068 | 109,386,209 | 84,816,249 | 53,253,105 | 22,361,950 |
| Station Use (%) | 5.4% | 5.7% | 6.5% | 6.7% | 8.4% |
| Energy sent out (kWh) | 116,860,469 | 103,173,772 | 79,303,738 | 49,693,195 | 20,488,843 |
| Energy Sold (kWh) | 73,087,897 | 68,937,466 | 53,193,250 | 33,353,643 | 12,619,603 |
| System losses (kWh) | 43,772,572 | 34,236,306 | 26,110,488 | 16,339,552 | 7,869,240 |
| System losses (%) | 37.5% | 33.2% | 32.9% | 32.9% | 38.4% |

2006 figures are for January to July

This shows that station auxiliary consumption has increased consistently over the period, reaching 8.4% in 2006. Distribution system losses, including both technical and commercial losses, stabilised at about 33% of net generation over the period 2003 to 2005, but have increased to over 38%[5] for the first 7 months of 2006. Some improvement in the distribution system technical losses might have been expected due to the completion of the EU-funded emergency rehabilitation project. However, the data does not show any improvement. It is possible that any improvement in technical losses has been countered by an increase in commercial losses.

## 2.5 Proposed Counter Measures

Short term measures:

- NPA should urgently procure some additional vehicles, line conductor, poles and fittings to allow the T&D Department to attend to urgent repair work and to work on the rebalancing of load between phases the LV feeders which will have an immediate and significant impact on technical losses.

[5] It should be noted that the system losses figures in the second table are technical losses plus commercial losses and are expressed as a percentage of net generation whereas the figures in the first table express total losses including station auxiliary use as a percentage of gross generation.

- NPA should seek alternative overhead line routes for primary underground feeder circuits that are old and subject to frequent outages, in particular Kingtom to Falconbridge.

Medium/long term measures:

- NPA should urgently seek additional funding to complete the 11 kV and LV rehabilitation work on the Western Area system. Even allowing for the work to be undertaken under the present Power and Water Project, there is still an urgent on-going need for further work to complete the refurbishment of the 11 kV and LV systems, including the replacement of service connections. It is estimated that a further US$4-6 million is needed for LV refurbishment and US$1-3 million for 11 kV refurbishment. The amount of the additional funding required will depend on the finally agreed scope of the component of this work to be included in the IDA-funded Power and Water Project.

# 3 Commercial and Staffing

## 3.1 Commercial Matters

### 3.1.1 Tariffs

Electricity tariffs in Sierra Leone are set by GoSL and are not subject to regulatory oversight. Although NPA's tariff requirement is very sensitive to fluctuations in international oil prices, there is no fuel price adjustment mechanism. Crude oil prices rose appreciably in late 2004, throughout 2005 and during the early part of 2006. In June 2005, in response to the steep rise in fuel prices to that point in time, a 30% increase in NPA's tariffs was approved by GoSL.

NPA has estimated the average tariff under revised tariff structure is Le 816/kWh or US¢ 27.2/kWh. The Consultant has not had the opportunity to verify this average, but it appears to be a reasonable estimate.

It should be noted that households consuming less than 30 kWh per month are subject to a lifeline tariff of just Le 373/kWh, or US¢ 12.4/kWh.

Under the revised tariff structure, service charges were not increased by a uniform 30%; residential customers' service charge increased from Le 1,820 per month to Le 5,000 per month, whilst some tariff groups such as industries, welders and street lighting did not increase at all.

### 3.1.2 Customer Numbers

The NPA Key Performance Indicators (KPIs) for recent years indicate a shallow rising trend in customer numbers, with a total number of 44,600 at end-June 2006, including 40,000 residential customers. These statistics are misleading, however. These figures represent the number of customers registered on NPA's database. The reality is that customers that have been disconnected (at the nearest pole) for account arrears, remain in the database but are not actively receiving power from NPA. Approximately 12,300 customers on the database are currently classified as 'inactive billable', as opposed to 'active billable'. Active customer numbers are therefore closer to 32,000.

In each of the past 4 years, between 2,100 and 2,600 new customers have been added to the system. Typically, these are new houses that are being connected for the first time. Only between 70 and 80% of applicants for new supply are actually connected. The failure of 20 to 30% of applicants to obtain a connection is attributable to a number of factors. Some of these factors relate to the property developer/owner not completing the building, or the household wiring, or paying for the NPA material supply (e.g. poles, conductors, cables, etc.). A major factor, however, is that NPA may not have sufficient meters to install on the applicant's premises.

### 3.1.3 Sales, Revenues, Arrears and Collections

Currently, NPA has approximately 44,600 customers logged on its database. As noted above, approximately 12,300 of these are classified as 'inactive billable'. These 12,300 customers have aggregate arrears of Le 3.46 bn; an average of Le 281,500, or US$94, per customer. These customers are not currently supplied with electricity by NPA, or at least not supplied officially.

The remaining 32,300 customers, classified as 'active billable', remain connected to NPA supply. Whilst the accounts of most of these customers are 'current' (i.e. paid-up), approximately 11,300 customers are in arrears to an aggregate of Le 4.90 bn; an average of Le 433,400, or US$144, per customer. NPA has a policy of not writing-off bad debts, and many of these arrears have been in the system for several years.

Since 2002, NPA's global KPI statistics indicate a 'collections ratio' in excess of 90%. Whilst this is nominally better than the financial covenant stipulated in the Power and Water Credit (85%), and better than is achieved in many developing countries, the statistics bear closer scrutiny. In each year since 2003, Revenue Collected in the largest-consuming tariff category, MDI Customers, has been greater than the Sales in this category. Collections exceeding sales in a given year may possibly be explained by a successful campaign to collect previous arrears. For collections to exceed sales in each of four successive years, however, suggests that there is a serious anomaly in the record-keeping. The Consultant understands that the MDI customers generally have a good record on timely payments, which reinforces the doubt that arrears are being collected, year-on-year. The reasons for this apparent anomaly have yet to be explained to the Consultant and, if they are indeed an anomaly, they tend to distort the overall position.

For residential and small commercial customers, in contrast, revenue has been appreciably lower than sales in each year. The Collections Ratio for these groups, in each of years, or part years, is presented in the following table.

| **Year** | **2003** | **2004** | **2005** | **2006 (Jan-Jun)** |
|---|---|---|---|---|
| **Collections Ratio** | 89% | 72% | 59% | 87% |

The difference between residential sales and residential revenue over the 3.5 year period is approximately Le 11.4 bn. By itself, had half this sum been recovered from customers, it would have been more than sufficient for NPA to make the severance payments to the 241 'dormant' staff members that have been identified for termination.

NPA has installed around 2,000 prepayment meters over the past 18 months. Generally, these meters have been installed on single-phase connections in specific districts.

It has not been possible to undertake meaningful analysis of the impact of these meters, for the short period that they have been operational.[6] However, the following positive impacts are to be expected:

- Improved collections ratio;
- Reduction in debtors, with consequential impact on cash flow;
- Fewer 'zero readings' due to meter change-out;
- Reduced opportunities for collusion with corrupt meter readers;
- Reduced potential for billing anomalies, due to either inefficient systems or fraudulent practices.

From this list of potential impacts it can be seen that prepayment meters should both improve collections and reduce non-technical losses in the system.

One of NPA's greatest problems, in commercial terms, is that the extremely low reliability of mains supply from NPA has led a number of important MDI Customers (Large Industrial) withdrawing from NPA supply. One of these, the cement manufacturer Leocem, typically consumed between 300 and 400 MWh per month, and accounted for around 20% of NPA's sales to the MDI customer group. Leocem was also very good at settling bills promptly, and their payments were typically sufficient for NPA to meet salary payments each month.

The table of sales (in kWh) to the MDI Customer group over the past 30 months is very informative, and is reproduced below. The decline in sales to these important customers not only has a major impact on NPA's revenues and cash flow, but also to the economy of Sierra Leone as a whole. The period covered by the table commences at a time when NPA was encountering reliability problems at Kingtom, but nevertheless was endeavouring to maintain supplies to large industrial and commercial customers.

| Sales (in kWh) | 2004 | 2005 | 2006 |
|---|---|---|---|
| Jan | 1,516,440 | 1,819,751 | 1,102,703 |
| Feb | 1,610,000 | 1,432,647 | 875,167 |
| Mar | 2,117,039 | 1,350,332 | 410,398 |
| Apr | 1,620,310 | 1,296,315 | 595,167 |
| May | 2,661,200 | 1,318,462 | 524,197 |
| Jun | 1,345,960 | 1,312,803 | 497,760 |
| Jul | 1,345,542 | 817,533 | 654,814 |
| Aug | 1,083,581 | 645,400 | 550,588 |

[6] An initial analysis indicated that, during the early part of 2006, the average revenue collected from credit meter customers was around Le 106,000, whereas the revenue collected from prepayment customers was just Le 69,000. For a more meaningful assessment it would be necessary to undertake a 'before and 'after' analysis of the data.

| | | | |
|---|---|---|---|
| Sep | 1,438,145 | 657,700 | 324,182 |
| Oct | 1,075,675 | 847,126 | - |
| Nov | 1,589,940 | 1,194,242 | - |
| Dec | 1,429,544 | 408,279 | - |
| **Total** | **18,833,867** | **13,100,590** | **5,534,975** |

The energy supplied to MDI customers during the first 9 months of 2006 is only 52% of that for the equivalent period in 2005, and only 38% of that supplied during the same period in 2004.

3.1.4 Disconnections

NPA customers that do not pay their bills on time have their fuses removed. If the arrears are not subsequently paid in full, the customer is 'pole disconnected'. The number of customers that are 'pole disconnected' each year is very significant, but the NPA data on the subject is ambiguous.

3.1.5 Skills, Systems and Training in the Commercial Function

Although the Consultant has not been able to undertake a comprehensive review of the Commercial function within NPA, it is apparent that the staff and the systems at their disposal are not performing adequately. NPA management is not being provided with information that fully represents the status of commercial activities, which constrains the ability to make informed policy decisions, or to monitor non-technical losses in the system.

The Consultant recommends that the management contractor should be tasked with undertaking an assessment of the commercial systems (i.e. metering, billing and collection systems and management information systems) and with conducting a training needs assessment in the Commercial function.

## 3.2 Staffing Issues

3.2.1 Staff Numbers and Customer/Employee Ratios

In 2002, NPA staff numbers stood at 636. In 2003, this had reduced by 10% to 574. With customer numbers of 42,069, the nominal customer:employee ratio stood at around 73. If 'inactive billable' customers of approximately 10,000 are excluded, the ratio translates to 59.

For comparison purposes, the Consultant presents a handful of equivalent statistics for a range of electricity utilities:

| Utility | Customers/Employee Ratio |
|---|---|
| NPC, Sierra Leone, 2003 (unadjusted) | 73 |
| NPC, Sierra Leone, 2003 (adjusted) | 56 |
| Botswana Power Corporation, 2003 | 52 |
| KPLC, Kenya, 1991 | 26 |
| KPLC, Kenya, 1996 | 50 |
| KPLC, Kenya, 2004 | 100 |
| UK RECs, 2004 | 600 |
| Ecuador, recent | 245 |
| Jamaica, recent | 301 |
| ESCOM, Malawi, 2004 | 66 |
| UEB, Uganda, 1998 | 100 |
| NPC, Sierra Leone, 2006 (excluding 'dormant' staff) | 91 |

The 2003 'unadjusted' ratio is based on 42,069 customers and 574 staff members, whilst the 'adjusted' ratio is based on 32,069 customers (42,069 – 10,000). The ratio for 2006 is based on excluding 241 'dormant' staff from the total staff number of 595, i.e. 354 staff members and 32,153 customers (44,577 – 12,424).

At this point it is important to explain the reference to 'dormant' staff in NPA. A recent study by NPA senior management identified 241 staff members for retrenchment. The Consultant's understanding is that these 241 individuals are on the NPA payroll but undertake little or no productive work for the organisation (hence the Consultant's adoption of the term 'dormant'), and termination of their service would have no negative impacts on the operation of the utility. Unfortunately for NPA, legislation and the terms of service for these individuals is such that severance payments totalling around Le 4.5 bn would have to be paid, and NPA does not have adequate cash flow or finance to make these payments. The issue of the 'dormant' staff is revisited in this report.

Looking at the table of customer:employee ratios presented above, it is apparent that there is still potential for improvement in efficiency at NPA. The current NPA system is generally a very dense system with only limited transmission line networks and rural electrification.

In addition to the 241 staff members on NPA's payroll that reportedly undertake little or no active work, there is a further anomaly in the staff numbers. For several years, NPA's provincial activities have been almost negligible. NPA no longer generates and distributes electricity in its isolated networks. Its activities in these networks are restricted to minimal maintenance to preserve the assets. Approximately 80 members of staff are nominally employed in the regions, although 32 of these have been redeployed to Freetown. The remaining 48, however, are under-employed in the regions. These 48 represent approximately 14% of NPA's non-'dormant' staff numbers.

It is important, when comparing customers:employee ratios, to consider operational practicalities. At the present time, NPA T&D Department has virtually no working vehicles, due to lack of investment and shortages of spares. Because of the need to undertake rotational load shedding, a large proportion of the T&D workforce is permanently stationed at the various substations, since it is not possible to transport them from location to location.

Utilities with 'best practice' customers:employee metrics typically have the support of effective SCADA systems, working vehicles, etc. Until the support infrastructure at NPA is upgraded to a good standard, NPA will not be able to aspire to the efficiency levels achieved at 'best practice' utilities.

Furthermore, NPA have lost a number of key professional staff in recent years. Over the period since the beginning of 2004, 10 professional staff have been lost from the financial and audit department and 6 engineers. The current staff complement in the T&D Department indicates vacancies for 7 engineers. In the Generation Department there is a staff complement of 8 mechanical engineers, but the staff list does not show a single electrical engineer.

3.2.2 Skills Shortages, Recruitment and Training

NPA have lost a number of key professional staff in recent years. Over the period since the beginning of 2004, 10 professional staff have been lost from the financial and audit department and 6 engineers. The current staff complement in the T&D Department indicates vacancies for 7 engineers. In the Generation Department there is a staff complement of 8 mechanical engineers, but the staff list does not show a single electrical engineer.

Increasingly, the march of globalisation means that there is high mobility of experienced professionals such as managers, engineers and accountants. In evidence, NPA's Financial Accountant migrated to Australia at the end of September 2006. There is also high mobility in the region for technicians, and the resurgence of the mining industry in Sierra Leone has led to NPA losing a number of its best electrical and mechanical technicians. The rates of remuneration offered by NPA need to be consistent with the market, and any structural impediments to this need to be addressed as a matter of urgency.

A related factor is that skilled young individuals are more likely to exercise their career mobility options if they view NPA as a 'failing' organisation. The evidence over the past 4 or 5 years is that NPA is in a downward spiral, which is a negative factor in attracting and retaining good staff.

Quite apart from not having adequate skilled professionals at present, NPA needs to recognise that it faces major changes in the immediate future. The commissioning of the 50 MW Bumbuna hydropower project is less than 18 months away, and should more-or-less coincide with the commissioning of significant new thermal capacity in the Western Area. In the months and years immediately ahead, NPA will need intensive programmes to extend the network, connect new customers, and to ensure that associated metering,

billing and collection is undertaken efficiently. NPA will therefore need to recruit and train good people, and in order to do this they will require: a) attractive remuneration and service terms, b) good training facilities and trainers, and c) to create the perception that NPA is an organisation with a positive future.

### 3.3 Proposed Counter Measures

Short/medium term measures:

*Commercial:*

- NPA should develop and deploy a tariff adjustment formula that responds to fluctuations in exchange rate and fuel prices[7].

- The financial difficulties of NPA will never be fully resolved until cost recovery tariffs are levied, to the extent that direct subsidies are not available. Moreover, the base tariff in this formula should be set at a cost recovery level. It should also be remembered that the true 'cost recovery' level of tariffs cannot be established until NPA's assets are revalued.

- The commercial function at NPA is in particular need of skills and systems augmentation. The Consultant therefore recommends that the management contractor should be tasked with undertaking an assessment of the commercial systems (i.e. metering, billing and collection systems and management information systems) and with conducting a training needs assessment in the Commercial function.

- NPA's proposed expansion of pre-payment meters is supported, provided this is preceded by improvements in the availability of electricity supply. Experience in other countries shows that prepayment metering initiatives are more acceptable to customers if the supply is reliable and customers feel that they are not simply paying standing charges without receiving a reliable supply of electricity. To-date NPA has deployed about 2,000 pre-payment meters on the system during 2004 and 2005. Initially, areas were targeted where NPA could have a maximum impact in terms of improving revenue collected. The performance of the pre-payment meters is being closely monitored by NPA and the initial results are encouraging, although the recent generation crisis has led to problems with customers having to pay for standing charges without receiving supply.

[7] This is one of the financial covenants to the Power and Water Credit.

*Staffing:*

- Shortages of management skills in NPA are evident within all sections of the organisation. The proposed management contract should provide the much needed strengthening of the management and provide an injection of technical, financial and commercial skills that are needed if the recovery of NPA is to have a realistic chance of success. This is considered to be a key element in the NPA reform strategy.

- Financing the cost of retrenchment is a high priority, as NPA's cost-base is inflated due to the large proportion of 'dormant' staff (241 out of 595, equates to 40%).

- At the same time, NPA is currently experiencing a skills shortage that may be exacerbated as major new generation capacity is added to the system. To address this skills shortage, any structural impediments to market-based remuneration packages need to be addressed.

- Once recruited, technicians will need to be trained in appropriate training facilities and by suitably-qualified trainers. Good staff will not be recruited and retained unless NPA can reverse the current perception that it is a 'failing' organisation.

# 4 NPA's Current Financial Position

## 4.1 Current Position

4.1.1 Financial Status

*4.1.1.1 Overview*

At the time that the Power and Water Credit was being prepared, in early 2004, the Financial and Commercial performance of NPA was poor. From the audited accounts for 2003, NPA made a loss of Le 21 bn. This is despite the fact that historical cost accounting is adopted, which understates depreciation and hence also understates losses. The investments anticipated in the Power and Water Credit, in addition to a number of other initiatives and investments planned by NPA, were expected to yield operational and consequential financial performance improvements from the second half of 2004 onwards. However, generation plant failures in 2004 led to forced outages that were appreciably greater than anticipated during project preparation. The energy generated in 2004 was only 78% that achieved in 2003, and only 69% of that in 2002. Consequently, NPA made a loss of Le 27.6 bn in 2004. These losses were not only understated due to the use of historical cost accounting, but also due to the fact that NPA's interest obligations for the year were reduced by around Le 6 bn on account of interest suspension as part of the terms of the Power and Water Credit.

In 2005, the energy generated at the Kingtom power station declined even further, to just 43% of that in 2002. This was partly due to difficulties in procuring fuel supplies, caused by cash flow constraints and exacerbated by high world oil prices, and partly to generation plant failures. Draft accounts for 2005 indicate a loss of almost Le 20 bn. Once again, the full interest obligations of NPA were not included.

In the first half of 2006, generation plant failures and fuel supply difficulties continued, and the energy generated in the first 6 months of the year equated to just 32% of the equivalent period in 2002. Major industrial customers, such as the cement works (Leocem), have ceased taking supplies from NPA, and there is a trend for residential customers to de-register since they have to pay standing charges whilst actually receiving very little energy.

Since the Power and Water Credit Agreement was finalised in 2004, NPA has not made progress towards achieving the financial covenants that are embedded in the loan agreement. It is unlikely that the stipulated financial ratios will be achieved in 2006 or 2007.

*4.1.1.2 Key Performance Data*

The following table presents a selection of NPA's operational and financial performance measures. The data for the first half of 2006 cannot be taken as entirely reliable, at the moment.

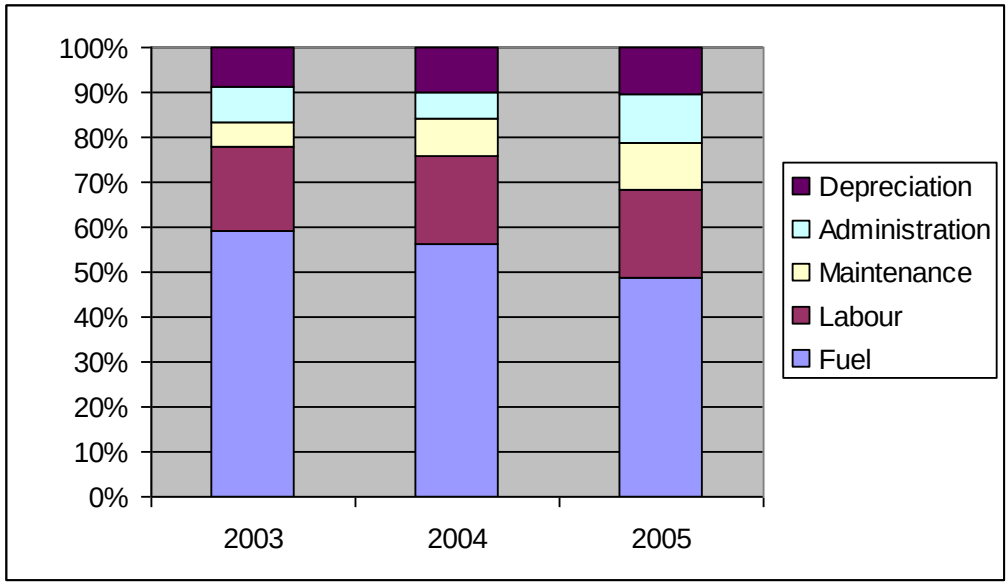
| Parameter | 2001 | 2002 | 2003 | 2004 | 2005 | Jan-Jun 2006 |
|---|---|---|---|---|---|---|
| Gross Generation (GWh) | 106.3 | 123.5 | 109.4 | 84.8 | 53.3 | 19.4 |
| Sales (GWh) | 62.8 | 73.1 | 68.9 | 53.2 | 33.3 | 12.6 |
| Losses (%) | 38% | 38% | 33% | 33% | 33% | 29% |
| Sales Billed (Le million) | 27,521 | 31,823 | 38,350 | 33,648 | 27,675 | 12,500 |
| Revenue Collected (Le million) | 21,521 | 30,196 | 35,707 | 33,400 | 24,890 | 11,111 |
| Collections Ratio (%) | 78% | 95% | 93% | 99% | 90% | 89% |
| Debtors (months of sales) | 5 | 4 | 3 | 3 | 5 | 7 |
| Cost of Sales (Le/kWh gen'd) | 292 | 214 | 259 | 348 | 621 | 687 |
| Cost of Sales (Le/kWh sold) | 494 | 361 | 412 | 555 | 973 | 1,041 |
| kWh/IG MFO | 15.55 | 16.19 | 16.70 | 17.02 | 17.48 | 17.76 |
| Workforce | 607 | 636 | 574 | 570 | 535 | 551 |
| Customers (on Database) | 37,476 | 41,105 | 42,069 | 43,406 | 44,586 | 44,577 |
| Customers/Employee* | 62 | 65 | 73 | 76 | 83 | 81 |
| Collections/Employee (Le m.) | 2,955 | 3,956 | 5,184 | 4,883 | 3,629 | 1,680 |
| Revenue (Le million) | | 30,028 | 39,024 | 34,038 | 24,957 | |
| Cost of Sales (Le million) | | 25,422 | 27,730 | 30,828 | 18,339 | |
| Gross Profit (Le million) | | 4,605 | 8,196 | 6,307 | 6,617 | |
| Other Income (Le million) | | 1,102 | 2,904 | 2,257 | 6,356 | |
| Admin Expenses (Le million) | | 11,605 | 9,634 | 10,990 | 13,580 | |
| Finance Charges (Le million)** | | 4,593 | 5,558 | 357 | 470 | |
| Exchange Loss (Le million) | | 9,055 | 16,941 | 24,783 | 14,528 | |
| Loss for the Year (Le million) | | 19,546 | 21,034 | 27,567 | 19,557 | |

* As noted in the text, customer numbers are overstated, and include around 10-12,000 pole disconnected customers, and the employee numbers include around 241 'dormant' staff. The ratio needs to be handled with caution, therefore.

** Finance Charges are grossly understated in the audited accounts for 2004 and in the draft 2005 accounts, due to a misinterpretation by NPA and their auditors, PKF.

#### *4.1.1.3 NPA's Cost Structure*

The chart, below, provides a comparative breakdown of NPA's operating costs for the years 2003 to 2005, and for the first 6 months of 2006. Fuel constitutes a significant proportion of NPA's cost base, although it has been declining gradually since 2003. This decline is almost entirely due to the reduced energy generation, and hence fuel consumption, at the Kingtom power station, and this is despite the large increase in fuel prices since late 2004.




Maintenance costs have risen, in both real terms and as a proportion of total costs.

Administration costs have also risen, in both real terms and as a proportion of total costs. The reasons behind this rise have not been ascertained, yet.

Depreciation costs have been reasonably constant, which reflects the fact that there has been very little new investment in the period, and that NPA does not, still, revalue its fixed assets.

Labour costs have declined, slightly, in real terms, but have increased in proportionate terms due to the reduction in fuel costs.

4.1.2 Accounting Systems and Resources

*4.1.2.1 Systems*

The Great Plains accounting software package was procured in 2004. After some initial problems, the system became fully operational in March 2005 and has functioned well since that time. Historical data for 2003 and 2004 has been transferred across from the manual system.

The system is able to produce monthly accounts, trial balances, P&L and annual accounts. Although the system is on a single computer with no remote terminals, Finance has two key operators that were trained by the local accounting firm, Bertin & Bertin.

*4.1.2.2 Resources*

NPA's Financial Controller, Mr Maurice Cole, resigned from NPA effective July 2006. Dr Henry Saccoi, formerly the NPA Management Accountant has been appointed as Acting Financial Controller. Mr Mohammed Bah, NPA

Financial Accountant has resigned effective end-September 2006. NPA has thus lost 2 or its 3 most senior Finance staff in the past 3 months. At the moment, the loss of these resources is being covered internally by the Finance team. There are no advanced plans for recruiting replacements for these positions at the moment. The efficiency of the Finance function is likely to be strained until such time as new appointments are made.

### 4.1.3 Cash Flow and Fuel Supplies

#### *4.1.3.1 Fuel Supply Constraints*

Since 2005, NPA has intermittently been obliged to constrain generation at Kingtom due to fuel shortages, arising from its own cash flow constraints. International oil prices rose sharply throughout most of 2005, which exacerbated NPA's cash flow difficulties, and electricity tariffs generally did not keep pace with the increased cost of generation. In 2005, the cash flow situation was mitigated somewhat by the GoSL initiative to prepay 2005 government electricity bills and to settle arrears. This payment amounted to around Le 4.0 bn. This prepayment was not sufficient to ensure adequate cash flow to purchase fuel throughout the year, however, and some supply constraints ensued.

In addition to the prepayment of GoSL bills, there was a subsidy paid to NPA by GoSL of Le 3.6 bn (US$1.2m) in October/November 2005. NPA has not received further subsidies from GoSL, since that time, and consequently power shortages due to fuel constraints have become a familiar feature during 2006.

Until around December 2004, NPA received fuel from the National Petroleum Company (NPC) on credit. Failure by NPA to settle a bill, around that time, led to NPC rescinding its credit arrangement. For the past 20 months or so, NPA has had to prepay NPC for the fuel it orders.

NPA purchases DFO from both NPC and Afritone, a Nigerian/Sierra Leonean supplier.

#### *4.1.3.2 Fuel Prices*

An important consideration is the price paid for MFO and DFO fuels. Previous studies undertaken for the World Bank by Power Planning Associates have indicated that fuel prices paid by NPA are at the high end of expectations, especially for MFO.

Currently, although DFO is purchased from both NPC and Afritone, MFO is only obtained from NPC. It is understood that in recent months a number of suppliers have offered to supply MFO to NPA at prices significantly below the prices levied by NPA. These suppliers include Afritone and the Sitral Group. Although talks have been held with these suppliers, it is understood that NPA has been able to exert its powerful position to maintain the monopoly on

supply of MFO to NPA. Although no longer a parastatal, NPC's owners have considerable power in the country.

Verbally, Afritone has informed the Consultant that they could supply MFO at a price of Le 5,800 per IG-delivered, inclusive of all taxes and charges. This compares with a current price of NPC supply of Le 6,000. Afritone say that fuel storage facilities and road tanker capacity would not present a problem, although the Consultant is unable to verify this assertion. Afritone supplies fuel in Liberia and Togo, in addition to Sierra Leone. Afritone would source the MFO from Abidjan. The Consultant views this information as a strong indication that NPA could obtain MFO at lower prices than at present.

Many utilities hold tenders for their fuel supplies, with the delivered price linked to an international benchmark such as Platt's, but NPA does not use this system. NPA does, however, go out to tender for its lube oil, every 12 months. The Consultant does not see any major impediment to NPA holding similar tenders for its MFO and DFO.

Afritone supplies DFO to NPA at a small (0.2%) discount to the NPC price. NPC's price is Le 13,500 per IG, whereas Afritone's equivalent price is Le 13,470 IG.

## 4.2 Compliance with Financial Covenants

The Power and Water Credit Agreement sets down a number of loan covenants to which NPA is obliged to comply. In general terms, NPA was a long way from meeting these criteria in 2004, when the loan was agreed, and NPA's financial position has actually deteriorated over the intervening two years.

### 4.2.1 Financial Management System

The Loan Agreement to the Power and Water Credit stipulated (4.01 (a)) that,

> *"NPA shall establish and maintain a financial management system, including records and accounts, and prepare financial statements, all in accordance with consistently applied accounting standards acceptable to the Association, adequate to reflect its operations and financial condition and to register separately the operations, resources and expenditures related to Part A of the Project and NPA's general operations."*

The Great Plains accounting software package was procured in 2004 and the system became fully operational in March 2005 and has functioned well since that time. Although the Consultant has reservations on the period of time required for all the data for each monthly statement to be entered, NPA is generally compliant with this covenant.

Clause 4.01 (b) requires that each set of annual accounts should be audited. NPA is generally compliant with this covenant. The 2004 accounts have been audited by PKF, but not signed-off by the NPA Board, since the Board was dissolved in 2005 and has not been reconstituted to-date. The 2005 Accounts are due to be made available to NPA, by PKF, in early October 2006. In respect of this covenant, NPA is late in presenting the audited accounts to the Association, since they should be made available within 6 months of the end of the financial year in question.

4.2.2 Financial Monitoring System for the Project

The Loan Agreement to the Power and Water Credit stipulated (4.02 (a)) that,

> *"Without limitation upon NPA's reporting obligations set out in Schedule 4 to the Development Credit Agreement, NPA shall prepare and furnish to the Association a financial monitoring report, in form and substance satisfactory to the Association, etc."*

These reports are supposed to be prepared quarterly and submitted to the Association within 45 days of the end of each quarter. Whilst the NPA PIU for the Power and Water Credit has management accountants diligently maintaining accounts for the Project, the reporting mechanism has not generally met with the covenanted requirements. The PIU has recently received guidance on the presentation of the accounts and records from World bank staff. It has also taken recent steps to tender for auditors of the Project accounts.

4.2.3 Reduction in Accounts Receivable

In 2003 and in 2004, at the time that the Power and Water Credit was under preparation, NPA's accounts receivable stood at around 3 months, or 90 days. The Loan Agreement to the Power and Water Credit stipulated (4.03 (a)) that,

> *"Reduce its accounts receivables to at least (i.e. below): (i) 90 days in 2005; and (ii) 60 days in 2006 and thereafter."*

Although debtors remained reasonably static through 2005 and the first 6 months of 2006, the large reduction in sales during the period has translated to an overall worsening of the debtor-days position. At the end of 2005 it stood at around 5 months, or 150 days, and at end-June 2006 it stood at around 7 months, or 210 days. NPA is not, therefore, compliant with the loan covenant.

4.2.4 Revaluation of Fixed Assets

As noted above, project preparation work undertaken by Power Planning Associates in 2004, in advance of the Power and Water Credit, highlighted the fact that NPA was not revaluing its assets on any kind of basis. Losses were therefore being understated. The Loan Agreement to the Power and Water Credit stipulated (4.03 (b)) that,

*"As of January 1, 2005, (NPA should) revalue its assets, on an annual basis, in accordance with consistently maintained methods of valuation satisfactory to the Association."*

To-date, NPA has undertaken a revaluation of its headquarters, Electricity House, at a cost of US$4,000. The revaluation has not yet been carried into the NPA accounts. NPA has plans to revalue the land and buildings at Blackhall Road and Falconbridge, as soon as funds become available for this exercise. NPA currently has no plans to undertake a general revaluation of its generation, transmission and distribution assets.

4.2.5 Major New Investments

The Loan Agreement to the Power and Water Credit stipulated (4.03 (d)) that,

*"(NPA should) not enter into any investment of US$1,000,000 equivalent or more without undertaking consultations with the Association."*

The Consultant understands that NPA has not made any investments that breach this limit.

4.2.6 Operating Profit

The Loan Agreement to the Power and Water Credit stipulated (4.04 (a)) that,

*"Except as the Association shall otherwise agree, NPA shall produce for: (i) its fiscal year ending December 31, 2005, total revenues equivalent to not less than the sum of its total cash operating expenses (excluding interest and other charges on debt); and (ii) its fiscal year ending December 31, 2006, and thereafter, total revenues equivalent to not less than the sum of its total cash operating expenses and interest and other charges on debt."*

The draft accounts for 2005 indicate revenue of Le 24.96 bn and other income of Le 6.62 bn, producing total income of Le 31.31 bn. Cost of sales of Le 18.34 bn and administrative expenses of Le 13.58 bn produce total outgoings (excluding interest charges) of Le 31.92 bn. NPA was thus very close to meeting the covenant for 2005.

The draft accounts for the first 6 months of 2006 indicate that NPA is unlikely to meet the covenant for 2006. Excluding interest charges, NPA made an operational loss during the first 6 months. When interest charges are taken into consideration, as per the covenant in the Loan Agreement, the deficit will be even greater.

The level of debt interest to be considered in the 2006 calculation is subject to some debate. NPA auditors, PKF, have assumed that interest on old IDA loans to NPA are suspended, as provided by the terms of the Power and Water Credit. To-date, however, the Consultant has been unable to verify this

provision. The Consultant understands that, during preparation of the Power and Water Credit, there was some debate on the issue of temporary suspension of NPA's IDA debt obligations, but this suspension does not appear to have been incorporated in the documentation.

Clause 4.04 (b) requires NPA to inform the Association the outcome of its review of whether this covenant would be met. The Consultant does not know the status of this review or whether this briefing was undertaken.

Clause 4.05 appears to contradict Clause 4.04, and it is the Consultant's opinion that 4.04 probably better reflects the original intention.

4.2.7 Return on Assets

The Loan Agreement to the Power and Water Credit stipulated (4.06 (a)) that,

> *"Except as the Association shall otherwise agree, NPA shall take all necessary action to earn for its fiscal year ending December 31, 2005 and each of its fiscal years following thereafter, an annual return for: (i) fiscal year 2005 of not less than 1% of the average current net value of NPA's fixed assets in operation; (ii) fiscal 2006 of not less than 3% of the average current net value of NPA's fixed assets in operation; and (iii) each of the fiscal years following thereafter not less than 4% of the average current net value of said fixed assets."*

There are two key issues to consider in relation to this covenant. The first of these is that NPA has yet to revalue its fixed assets. Although the remaining economic life of many of NPA's fixed assets is quite short, the book value of these assets does not reflect the true economic value since NPA does not revalue its assets. Until the assets are revalued, therefore, it is not possible to reliably determine the value of this parameter.

The second issue is that in order to achieve a positive value for this parameter, NPA would require a positive value for its 'Net Operating Income'. In all recent years, NPA has had a Net Operating Income that is appreciably negative. Moreover, if fixed assets were to be revalued, then the depreciation charge would be higher, which would depress the Net Operating Income value even further.

4.2.8 Debt Service Cover Ratio

The Loan Agreement to the Power and Water Credit stipulated (4.07 (a)) that,

> *"Except as the Association shall otherwise agree, NPA shall not, for each of its fiscal years following next after its fiscal year ending on March 31, 2005 (sic), incur any debt unless a reasonable forecast of the revenues and expenditures of NPA for each fiscal year during the term of the debt to be incurred shall be at least 1.5 times."*

NPA is unlikely to meet this financial covenant in 2005 and 2006, due to the difficulty in achieving Total Revenues that exceed Total Cash Operating Expenses.

The HIPC debt relief scheme (see below) is likely to have a significant impact on NPA's prospect of achieving this financial covenant.

4.2.9 Tariff Adjustment Formula

The Loan Agreement to the Power and Water Credit stipulated (4.09 (a)) that,

> *"NPA shall provide in its tariff structure for the adjustment under a formula satisfactory to the Association, of its electricity rates to levels appropriate to changes that may occur: (i) in the rates of exchange between the dollar and the Leone; (ii) in fuel costs; and (iii) taking into account the thermal-hydro mix of power generation."*

It is the Consultant's understanding that NPA has neither developed nor implemented a tariff adjustment formula that would meet this obligation.

In addition, Clause 4.09 (b) stipulated that:

> *"NPA shall: (i) review the levels and structure of its tariffs; and (ii) furnish to the Association semi-annually by June 30 and December 31 of each year a report on (A) the adequacy of its tariffs to meet NPA's financial objectives under the Project, and (B) the effects of its tariffs on autogeneration of electricity by consumers."*

It is the Consultant's understanding that NPA has not complied with this requirement.

4.2.10 Forward Projections

Although the Consultant has yet to undertake fresh financial projections based on the latest profile of expenditure under the Power and Water Credit, it is the Consultant's considered opinion that NPA will not achieve the three main financial covenants until the Bumbuna hydro project and the BADEA-funded thermal projects are seen to deliver reliable power to the Western Area, for this power to be legitimately absorbed into the system, and for revenues relating to these sales to be collected efficiently. The year 2008 is the earliest possible fiscal year that NPA is likely to achieve the stipulated financial covenants.

## 4.3 Power and Water Credit

4.3.1 Current Status

The Power and Water Credit was agreed in 2004. The Power Component of the cofinanced project involved lending from IDA, IDB and OPEC/BADEA.

The project also anticipated investment grants from GoSL and self-financed investments by NPA.

The Power Component had 5 main elements, as follows:

A. Power Sector Reform Component;

B. Capacity Building and Institutional Strengthening/Training;

C. Infrastructure Component;

D. Social Impact and Environmental Mitigation; and

E. Project Supervision.

Each of these components had a number of distinct sub-projects, each with a different mix of funding from the parties

Since the Credit was agreed, however, there have been a number of developments, accompanied by delays and inaction. Firstly, IDB and OPEC/BADEA have decided to support the power sector outside the Power and Water Credit, and are no longer participating in the project. Secondly, the rate of disbursement of IDA funds has been slower than originally anticipated.

Disbursements under the Credit commenced in 2005Q1. By the end of 2006Q3, total payments on the Project amounted to approximately US$3.9 million, i.e. around 20% of the IDA share of the Credit.

4.3.2 Audit of the PMU Accounts

The Power and Water Credit PIU is currently holding a tender round to appoint an accounting firm to undertake the first audit of the accounts for the Power Component. A number of local and international firms with local offices are to be asked to tender.

The Consultant has been shown the quarterly accounts for the Power Component. At present, these accounts only reflect sums relating to the IDA-funded element of the Power Component; disbursements by GoSL and NPA are not captured. It is understood that the other cofinancing bodies (IDB, OPEC and BADEA) are no longer directly involved in the Power Component of the Credit. Since the auditors will be tasked with auditing the entire Power Component, the PIU will need to incorporate relevant sums expended by GoSL and NPA.

## 4.4 Impact of HIPC Debt Relief

Under the amendments to the HIPC debt relief scheme agreed at the Gleneagles Conference in 2005, Sierra Leone is expected to qualify for debt relief under the HIPC scheme by December 2006. The likely outcome is as follows:

- In 2007Q1, IDA will cancel all previous commitments to Sierra Leone;
- In 2007Q3, IMF will cancel all previous commitments to Sierra Leone;
- In 2008Q1, the other Bretton Woods lenders (e.g. AfDB) will cancel all previous commitments to Sierra Leone;
- The Paris Club of bilateral lenders (including EU/EIB) will be expected to 'match' HIPC. The PV of their debt has to be brought below an as yet undetermined threshold. It is possible that 80 cents in the dollar will be forgiven.
- The London Club of commercial lenders will also be expected to match HIPC; possibly to the same 80 cents in the dollar level.

Since the Power and Water Credit is not yet fully disbursed, and is in fact only partially disbursed, the position of this loan with respect to HIPC is uncertain.

The impact on the power sector is not known with 100% certainty, but the following is understood to be the working assumption:

- Since the Power and Water Credit is not yet fully disbursed, and is in fact only around 20% disbursed, the position of this loan with respect to HIPC is uncertain. The working assumption is that sums disbursed before the end of 2006 will be written-off;
- The AfDB loans to the Bumbuna project will be written-off from the beginning of 2008;
- NPA's IDA loans will be written-off from the beginning of 2007.
- NPA's EIB loan will be written-off from the beginning of 2008.

The impact of HIPC debt relief on NPA will be considerable, in terms of the structure of the Balance Sheet. However, NPA's cash flow will not be significantly impacted, since NPA has not been servicing these debts for a great many years. The cancellation of the AfDB loans should entail a slightly lower cost-recovery tariff for supplies from the Bumbuna project, which will in turn lower NPA's cost-recovery tariff level.

### 4.5 Proposed Counter Measures

As amplified throughout this report, NPA's financial recovery will depend on a wide range of investments and initiatives across the organisation, including the generation, T&D and commercial functions. Each of these has a cost implication. A crucial question to be addressed specifically under this 'Finance' section of the study, however, is whether specific initiatives in NPA finances can play a role. As noted above, for instance, NPA constantly suffers from inadequate working capital from which to address the demands for fuel

procurement, generator maintenance and repair, operational vehicle maintenance and repair, etc. An assessment of these working capital requirements will be undertaken in Phase 2 of the current study.

Short term measures:

- NPA should urgently review its fuel purchasing procedures and should implement a competitive tendering process for fuel procurement.

- Unless and until NPA conducts an asset revaluation, the organisation's performance against many of the financial covenants set in the Power and Water Credit cannot meaningfully be assessed and monitored. It is therefore an urgent priority that an asset revaluation be conducted without further delay. Typically, an asset revaluation study of this nature would be undertaken by a consortium comprising an international engineering consultancy, a reputable accountancy firm, and a locally-based firm of land and estates valuers. In view of the relatively modest extent of NPA's assets, the Consultant estimates that the asset revaluation study would cost in the region of US$200,000 to 250,000. The Consultant understands that NPA's asset register is in a reasonable condition, and would provide a good basis for revaluing certain classes of fixed assets on a systematic basis, e.g. furniture, computer equipment, etc. Other assets would require a more careful examination based on their replacement costs and assessed remaining economic lives[8].

[8] From the Consultant's observations, many of NPA's operational fixed assets are close to being fully-depreciated. Even some of the more recent capital investments, such as the Mirrlees No. 3 and Mitsubishi No. 6 generation units at Kingtom are likely to have shorter residual economic lives than might have been anticipated at the time of their commissioning. The valuation of generation assets would have to carefully assess the remaining economic lives of the units. For T&D assets, the valuation may have to be based on extrapolation from surveys of typical feeders. NPA has an extensive vehicle fleet, which is largely inoperative due to inadequate maintenance. Again, the question for the valuers would be whether these assets can be returned to service cost-effectively.

# Appendix 1 – Terms of Reference

## TERMS OF REFERENCE

## SIERRA LEONE: NPA RECOVERY STRATEGY

**August 2006**

### 1. Background to this Study

The NPA is Sierra Leone's public power utility, which in mid-2006 supplies about 4 MW to Sierra Leone's capital Freetown. In 2005, NPA's generation output dropped to 48 GWh from 85 GWh in 2004. Once constructed, it will become the single buyer of electricity to be produced by the Bumbuna Hydroelectric Plant (50 MW). The healthy operation of NPA is critical for the development of an electricity supply infrastructure for Sierra Leone's population and the country's economic development. The financial analyses carried out during the appraisal of the Bumbuna project indicate that NPA would need to pay US$12-11 million a year in the initial years to cover the debt service obligations of the Bumbuna Special Purpose Company (the Power Purchase Agreement (PPA) is structured around the project's debt service obligations plus the O&M cost of Bumbuna). NPA's sales revenue in 2004 was about US$12 million.

The following key constraints to NPA's healthy performance exist: (a) increases in unscheduled outages of NPA's generating capacity; (b) increases in the level of system losses, including generation auxiliary consumption, technical and non-technical losses (about 38 percent, up from 33 percent, as measured at end-2004); and (c) the system inefficiency resulting from the age of the installations, leading to high operating costs, including fuel and lube oil consumption.

Additional factors exacerbating NPA's financial situation included: (q) the historical cost accounting in an environment of high inflation, which makes inadequate provision for the replacement of NPA's fully depreciated assets; (b) an uneconomic tariff-setting structure; and (c) the absence of an experienced staff to manage the Kingtom power station (NPA's only generating plant) and to improve the plant's efficiency. In 2005, NPA auditors concluded that continued operations were not sustainable in the face of its accumulated losses and weak cash-flow.

In June 2006, the Minister of Energy and Power identified the following as key issues affecting NPA's performance:

- over-staffing

- high cost of pensions including pensions granted as a surrogate separation package for an earlier round of redundancies

- high cost of debt servicing. Approx. Le 6 billion (US$2 million) in debt?

- weak revenue collection due to theft and corruption

- little room for tariff increase since it is already very high at $0.19/kwh.

In the legal documents for the Power and Water project, the GoSL agreed to the following performance targets for NPA: (a) NPA's total revenues should be equivalent to not less than the sum of cash operating expenses and interest and other charges on debts; (b) NPA should earn an annual rate of return of 3 percent on its average revalued fixed assets in operation for FY06 and 4 percent for each year thereafter starting in FY07 ; (c) NPA's net revenues should be at least 1.5 times the company's estimated debt service requirements; and (d) NPA will reduce its accounts receivable to 90 days of billings in FY05 and to 60 days in FY06.

To monitor the achievement of the above targets, the legal agreements require NPA to send to IDA, before January 1 in each fiscal year, a review showing, on the basis of forecasts prepared by NPA and satisfactory to the Association, whether it will meet the agreed targets.

GoSL has also agreed that NPA shall: (a) review the levels and structure of its tariffs; and (b) furnish to the Association semi-annually by June 30 and December 31 of each year a report on (i) the adequacy of its tariffs to meet NPA's financial objectives under the project, and (ii) the effects of its tariffs on autogeneration of electricity by consumers. If any such review shows that NPA would not meet the requirements set forth in the legal agreements, NPA shall promptly take all necessary measures (including adjustments of the structure or levels of its tariffs) in order to meet such requirements.

In the said legal agreements, the GoSL further agreed to achieve the following targets during the implementation period of the Power and Water project:

- 85% of energy sales are collected (excluding arrears).
- Fuel efficiency of 18 kWh/IlG.
- Reduction of the non-technical losses from 13.6% to 10.2% in 2006 and 6.8% in 2007.
- Staff ratio of NPA at 90 customers per employee.
- Increase in the amount of gross generation (GWh) from 120 GWh to 150

Although neither GoSL nor NPA have sent any documentation on NPA's financial performance during FY05 to IDA (no audit report is available), indications are that in mid-2006 NPA's financials have worsened and that it does not comply with the agreed targets for its financial performance. To ensure that NPA will be in a position to pay for the power it receives from Bumbuna and thus avoid calls on the IDA partial Risk Guarantee, it is critical to comprehend clearly the reasons for the further decline in NPA's financial performance and to prepare a strategy for a turnaround. The assessment of NPA's performance and future prospects is also important for the Government to develop a contractual basis for the appointment of a Management Contractor for NPA. The Government expects to issue the request for proposals for the Management Contract to short-listed firms before the end of calendar year 2006.

**2. Study Objective**

The objective of the study is to provide guidance on what mix of reforms will do the most to help GOSL achieve the following two objectives:

a) How can GOSL reform NPA so that it will provide & distribute reasonable power on a sustained basis?

b) How can GOSL ensure that NPA will be able to buy and distribute power from Bumbuna Hydroelectric project on a sustained basis?

The consultant is required to critically and comprehensively review NPA's technical, human resources, and financial performance and to prepare a set of recovery scenarios based on a mix measures to be implemented over the next 12 months. These measures include improvements in technical and commercial efficiency and labor productivity, as well as tariff adjustments and direct subsidies from central government budget.

**3. Scope of Work**

In support of its objective, the study will cover the following topics. Topics 3.1 and 3.2 are part of Phase I of the study and topic 3.3 part of Phase II. The consultant will agree with the World Bank on the timing and additional cost for carrying out Phase II following the completion of Phase I.

(3.1) Technical and financial audit of the utility:

The technical audit of the utility will include an evaluation of the system, generation station, distribution and transmission network, maintenance procedures and costs, fuel supply and procurement procedures, and staffing needs. The financial analysis will evaluate NPA's current financial position and liabilities (see Annexes 1 and 2). A financial model from a previous assignment exists and will be made available to the consultants. Also, the consultant will review whether NPA is in compliance with the financial covenants included in the Power and Water project and outline what changes, if any, are required in the financial covenants to ensure the efficient performance of NPA.

(3.2) Development of counter-measures;

Based on the findings of (3.1), the consultants will present a set of counter-measures to improve NPA's technical and financial performance. These are likely to include (a) cost cutting measures at the level of plant and distribution/transmission network; (b) revenue enhancing measures (e.g. customer management, loss reduction, increasing customer base); (c) staff rationalization; (d) tariff mechanisms; (e) financial/debt restructuring; (f) budget support; (g) maintaining or ending pensions granted to previously fired employees in lieu of redundancy packages.

(3.3) Strategy development

Under Phase II of the assignment, the consultant will compare a baseline (the status quo of NPA's operation) with scenarios under which sets of measures are undertaken as developed under (3.2). The consultants will develop and justify a feasible scenario for the recovery of NPA. The baseline should take into account that Bumbuna Hydroelectric Plant will provide power from mid-2007. It should also include committed investment support from IDA and other donors/lenders and identify financing gaps. The consultant will provide guidance on estimated costs, timing and sequencing of options for a recovery strategy.

**4. Staff Requirement**

The consultant's team shall include at least one financial specialist and one technical/engineering specialist with more than 10 years experience in the area. Knowledge of Sierra Leone's energy system is an asset.

**5. Terms of Assignment**

The assignment is expected to be concluded within a maximum period of 3 months from the commencement date. The Consultant may however propose a different duration which in his opinion is more appropriate for the performance of the study. Such duration will be taken into consideration in the evaluation of the proposals.

The assignment will necessitate a field visit to Freetown, Sierra Leone, for the purposes of technical and financial audit. The assignment may be extended as required.

The payment terms will be 10% upon signing of the contract, 60% upon receipt of the preliminary report, and 30% upon receipt of the final report.

**6. Study Reports for Phase I**

- **Preliminary Report:**
  Two weeks from the start of field mission.

- **Final Report**
  This should be submitted two (2) weeks after comments on the draft have been received from the World Bank.

An executive summary should be provided as part of all reports.

**Number of copies:** for draft and final reports to be submitted, five (5) copies should be presented.

**Language** - All reports should be written in English.

**7. Organization**

The consultants will report to the World Bank Task Team Leader for Sierra Leone. The consultant is expected to visit Sierra Leone in September (to overlap with the Bank's proposed mission in end-September).

# Annex 1: NPA's Past Performance

**NPA'S PAST PERFORMANCE:** Summary of the key performance indicators of NPA from 2001 to 2004

| *Description* | *2001* | *2002* | *2003* | *2004* |
|---|---|---|---|---|
| Energy Generated (kWh) | 106,312,033 | 123,499,068 | 109,386,209 | 84,816,249 |
| Station Use (kWh) | 5,740,850 | 6,472,080 | 6,235,014 | 5,232,096 |
| Station Use (percent) | 5.40% | 5.20% | 5.70% | 6.17 |
| Energy Available for Sales (kWh) | 100,571,183 | 117,026,988 | 103,151,195 | 79,584,153 |
| Energy Sold (kWh) | 62,764,571 | 73,087,897 | 68,937,466 | 53,151,932 |
| System Losses (percent) | 38% | 38% | 33% | 33 |
| Sales Billed (Le Million) | 27,535 | 31,823 | 38,350 | 33,648 |
| Revenue Collected (Le Million) | 21,521 | 30,196 | 35,707 | 33,400 |
| Percent Revenue Collected to Billed | 78% | 95% | 93% | 99 |
| Total Debtors (Le Million) | 11,457 | 11,198 | 10,578 | 9,334 |
| Debtors Expr. As Month of Sales | 5 | 4 | 3 | 3 |
| Cost of Sales (Le Million) | 31,013 | 26,412 | 28,370 | 29,498 |
| Cost of Sales/kWh Generated (Le Million) | 292 | 214 | 259 | 348 |
| Cost of Sales/kWh Sold (Le) | 494 | 361 | 412 | 555 |
| MFO Used (IG) | 6,127,654 | 7,076,087 | 6,348,316 | 4,501,924 |
| Diesel Used (IG) | 1,009,606 | 762,157 | 351,251 | 155,906 |
| Lubricant Used (IG) | 99,304 | 78,522 | 73,786 | 59,296 |
| kWh/IG MFO | 15.55 | 16.19 | 16.7 | 18.84 |
| kWh/IG Lubricants | 1,071 | 1,573 | 1,482 | 1,430 |
| Workforce excluding contractors | 607 | 636 | 574 | 570 |
| Number of Customers | 37,476 | 41,105 | 42,069 | 43,406 |
| Average Customers Paying in Month | 14,932 | 16,211 | 19,158 | 16,013 |
| Number of Customers/Employee | 62 | 65 | 73 | 76 |
| Collection/Employee (Le Million) | 35 | 47 | 62 | 59 |

## Annex 2: Review of Management Accounts for 2004 Year-End

The total sales for the year amounted to Le 33.760 billion for a budgeted sales figure of Le53, 601 billion, or a reduction of Le19, 841 billion (37 percent). The reason for the decrease in sales is attributed to the poor generation experienced during the year and the increase in systems losses.

The Authority net operating loss for the year was Le2.727 billion (or about US$1 million) as compared to a budgeted profit of Le7.305 billion (or about US$2.65 million). This excludes interest on existing loans from foreign donors.

The following reasons are attributed to the loss: high systems losses; high cost of generation; high fixed cost; low volume of generation; high cost of repairs on generating plants. The average cost per kWh of electricity generated is presently higher than the tariff for the year. This cost is Le807 per kWh (or about US29 cents) compared to the tariff of Le619 per kWh (or US22.5 cents), which entails a structural loss of Le188 (or US6.5 cents) for every 1 kWh generated.

**NPA's Sales and Management Information and Accounting System**

In November 2004, NPA ordered an additional 1000 Prepaid meters (700 single phase and 300 three phase) at a cost of USD117, 700. The order was made possible using the revenues collected from the previous 1000 Pre-paid meters already installed. It is expected that the meters will arrive in Freetown before the end of March 2005.

The new Management Information System software (The Great Plains Accounting/Information Package) is working with minimal problems. NPA is currently using the package for the preparation of its financial statements and the nominal ledgers, while at the same time, keeping manual records in parallel for comparison. It is expected that NPA would be fully computerized this year.

The audit of the 2004 financial statements is expected to start before the end of March 2005. The Audited Financial Statements will be forwarded to all stakeholders before the end of May 2005 (a condition of Board presentation).

**NPA's Future Financial Performance**

The present financial situation of NPA continues to threaten the "going concern" of its operations. Out of a total of four base load diesel generators, which provide about 25 MW, NPA has at the moment only two operational engines that generate about 10.5 MW.

This continued increase in the downtime of the generators has impacted negatively on the following performance indicators of the utility: unit generated; cash flow; profitability; ability to meet contractual financial covenants; and consumer's trust and confidence. The above situation is further exacerbated by the delay in receiving financial support from the Islamic Development Bank (IDB), the OPEC Fund and BADEA for procuring essential spare parts to continue running the generators.

In order to alleviate these constraints, the following are being considered:

(i) As per the ESKOM's "Report on Improvements in Power Utility in Freetown, Sierra Leone", dated December 20, 2004, ESKOM is expected to make available 2 X 6.8 MW of medium speed generation by end-December 2005. The specific details on the procurement methods and plan to acquire these generators are to be jointly worked out between ESKOM and NPA by end-March 2005. The Government of South Africa has provided funding for this activity for US$10 million. The two generators are being installed and are expected to start operation in mid-2006.

(ii) The World Bank supported Power and Water project has financed US$1.5 million worth of spare parts for overhauling the Mitsubishi, Mirrless, Sultzer and Catepillar generators. This work has already enabled available capacity to increase to 11 MW. Work is to be completed in early Fall of 2006. Work to rehabilitate the HFO separators is ongoing.

(iii) Further additional generation capacity (about 10.8 MW) is contemplated to be funded out of the proceeds of the upcoming BADEA financing and about 20 MW more from IDB financing (other than the PWP's IDB/BADEA-financed program);

(iv) The Power and Water project is also financing the rebuilding and rehabilitation of the 33 kV network in the Western area (US$4 million). NPA is evaluating bids received and work is expected to start in October 2006.

(v) Procurement is about to start for the removal of the sunken barge in front of the water intakes for the Kingtom power station and to rehabilitate the fire fighting system at Kingtom.

| **NPA' s Financial Performance As of December 2004** | | | | | |
|---|---|---|---|---|---|
| Current Ratio | = | 5749 / 9591 | 0.6:1 | | |
| Debt Service Coverage | = | 1.8 | | | |
| Return on Equity | = | (2,112) / (95,435) | = | 2.2% | |
| Debt to Equity | = | 154,284 / (249,720) | = | 0.61:1 | |
| Average Collection Period | = | 5,749x365 / 32,066 | = | 65 days | |
| Net Profit Margin | = | (2,112) / 31,244 | = | 0.0676 | |
| Return on Total Assets | = | (2112) / 36,180 | = | 0.058 | |