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**POWER POOL OPERATING RULES
EXAMPLES FROM SOUTHERN AFRICAN POWER POOL
(ENGLISH LANGUAGE)**

**NIS Institutional Based Services Under the Energy
Efficiency and Market Reform Project
Contract No CCN-Q-11-93-00152-00**

**CAR Regional Energy Trade,
Electricity Contracting and Pricing Reform
Delivery Order No 11**

Final Report

Prepared for

U S Agency for International Development
Bureau for Europe and NIS
Office of Environment, Energy and Urban Development
Energy and Infrastructure Division

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SOUTHERN AFRICAN

POWER POOL (SAPP)

AGREEMENT

BETWEEN

OPERATING MEMBERS

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1

**SOUTHERN AFRICAN POWER POOL (SAPP)
AGREEMENT BETWEEN OPERATING MEMBERS**

PREAMBLE

This Agreement is made and entered into by the signatories herein referred to as 'Operating Members' who are also Members of the Southern African Power Pool

Signatories of this Agreement may be added from time to time provided they are also signatories of the Inter-Utility Memorandum of Understanding of the Southern African Power Pool

RECITALS

WHEREAS, the signatories of this Agreement are Electricity Supply Enterprises in their own countries and

WHEREAS, the 'Operating Members' wish to continue with the development of interconnections between their respective networks and expand capacity and energy trade among themselves, and

WHEREAS, the Operating Members desire to enhance the reliability of supply to their customers and share in the other benefits resulting from the interconnected operation of their systems and

WHEREAS the Operating Members' wish to create further opportunities to coordinate the installation and operation of generation and transmission facilities in their respective networks and

WHEREAS the Operating Members wish to co-operate and seek mutually beneficial arrangements wherever possible and refrain from arrangements that would be detrimental to any 'Operating Member' or 'Member'

NOW THEREFORE the 'Operating Members' agree to enter into this Agreement for the operation of the portion of the 'Southern African Power Pool' which is interconnected

ARTICLE 1 : PURPOSE AND CONTENT OF THIS AGREEMENT

1.1 PURPOSE:

The purpose of this Agreement is to establish the basic principles and rules under which the interconnected portion of the Southern African Power Pool (herein referred to as the "Pool" or the "SAPP") will operate. These are based on the need for all Operating Members

- (i) to co-ordinate and co-operate in the operation of their systems to minimise costs while maintaining reliability,
- (ii) to fully recover their costs and
- (iii) to share equitably in the resulting benefits

Among the benefits that will be achieved are reductions in required generating capacity, reductions in regional fuel costs and improved use of hydro-electric energy. This Agreement establishes the rules under which these benefits can be realised, but also recognises that these rules and their implementation as given in the Service Schedules may be modified from time to time as conditions change.

1.2 HIERARCHY OF THE DOCUMENTS GOVERNING THE SAPP:

The following documents shall govern the establishment and administration of the SAPP. In case of inconsistency, the first document shall have precedence over the second document, the second document over the third document and the third document over the fourth document.

- (i) The Inter-Governmental "Memorandum of Understanding" *Get*
- (ii) The Inter-Utility Memorandum of Understanding *Get*
- (iii) This Agreement between Operating Members
- (iv) The Operating Guidelines"

No other document can be construed as governing the establishment and administration of the SAPP

ARTICLE 2 - DEFINITIONS

In addition to the definitions given in the inter-utility MOU, the following definitions shall apply:

2.1 ACCREDITED CAPACITY:

The Accredited Capacity of an Operating Member shall mean its Net Generating Capacity plus Participation Power purchases minus Participation Power sales

2.2 ACCREDITED CAPACITY OBLIGATION.

The Accredited Capacity Obligation of an Operating Member shall mean its Monthly System Peak Obligation plus its Reserve Capacity Obligation based on its Annual System Peak Obligation

2.3 ANNUAL SYSTEM PEAK DEMAND:

The Annual System Peak Demand of a Member shall mean the highest hourly integrated system demand occurring in the supply area of such Member during the twelve month period from 1 April of a year until 31 March of the next year. This system demand shall include transmission losses but exclude the consumption of power station auxiliaries

2.4 AREA CONTROL ERROR (ACE).

The Area Control Error shall mean the difference between actual and scheduled tie line interchanges between Control Areas taking into account the difference between the actual and scheduled frequency

2.5 AUTOMATIC GENERATION CONTROL:

Automatic Generation Control shall mean control instrumentation as defined in the Operating Guidelines (see also Article 5.2)

[i.e. less cost of specific generating units + sale of their production, 2.27]

Maintenance (M_r) 100 % of the annual cost of maintenance, spares and maintenance contracts. This does not include costs of repairs that cannot be attributed to normal fair wear and tear. Station maintenance staff costs must be included in Labour.

Labour (L_r) 100 % of the annual labour cost for station operation and maintenance staff only. No administration staff or overheads to be included.

If, in a year, a Member fails to review the costs/rates above (as specified in Article 5.6) the costs/rates in Financial Year "n+1" shall be equal to the costs in Financial Year "n" multiplied by the ratio between the Production Price Index in the United States in October of Year "n" divided by that in October of Year "n-1".

2.8 COLD RESERVE:

Cold Reserve shall mean generating capacity available for operation but not synchronised to the system. It shall be equal to Slow Reserve plus Quick Reserve.

2.9 CONTROL AREA:

Control Area shall mean an electrical system with borders defined by Points of Interconnection and capable of maintaining continuous balance between the generation under its control, the consumption of electricity in the area and the scheduled interchanges with other Control Areas.

2.10 CO-ORDINATION CENTRE.

The Co-ordination Centre shall mean a Centre as defined in Article 7. It shall report to the SAPP structures as defined in the Inter-Utility Memorandum of Understanding of the SAPP.

2.11 ECONOMY ENERGY

Economy Energy shall mean energy produced at thermal power station(s) that one Operating Member purchases from another Operating Member to replace higher cost energy by lower cost energy (see also Schedule C)

2.12 EMERGENCY ENERGY:

Emergency Energy shall mean energy supplied from other Operating Members to an Operating Member who experiences a loss of generating or transmission facilities as the result of an unscheduled outage (or outages) or any cause not reasonably foreseeable. Such energy shall be available for a period of six hours starting from the occurrence of the emergency, after which the Operating Member must obtain other types of services or shed load should the shortage continue (see also Article 5 I and Schedule A)

2.13 EMERGENCY SITUATION:

An Emergency Situation shall mean a situation where a Member is faced with an unplanned loss of generation or transmission facilities or another situation beyond its control which impairs or jeopardises its ability to supply its System Demand, adjusted for imports and exports of Firm Power. Such emergency shall not exceed six hours

2.14 ENERGY BANKING:

Energy Banking or "Banking" shall mean an arrangement whereby one Operating Member can store energy in the system of another Operating Member and withdraw it at mutually agreed times (see also Schedule E)

2.15 ESCALATION

— Think about incentive effects

Escalation (or Standard Escalation) in a time interval shall mean the ratio of the Production Price Index as issued monthly by the Department of Commerce of the Federal Government of the United States of America at the end of the interval divided by the same index at the beginning of the interval

2.16 FINANCIAL YEAR:

Financial Year shall mean a twelve month period starting on 1 April of a year and ending on 31 March of the following year

2.17 FIRM POWER.

Firm Power shall mean contracted capacity and associated energy intended to be available at all scheduled times for the duration of the transaction. Unless arranged separately through another contract, Firm Power shall include the necessary Reserve Capacity to ensure adequate reliability of supply (see also Schedules F and K)

2.18 FORCE MAJEURE:

Force Majeure shall mean any of the following

- 2.18.1 any overwhelming occurrence of nature which could not reasonably have been foreseen or guarded against
- 2.18.2 any of the following occurrences initiated by human agency: war, blockade, foreign hostile acts, civil war, rebellion, revolution, insurrection or sabotage
- 2.18.3 strikes or other similar stoppages of work by employees which are not caused by unreasonable actions on the part of a Member;
- 2.18.4 any other cause beyond the control of a Member or a Member experiencing such cause and another affected Member(s) agreeing by mutual negotiation or otherwise that such cause should be regarded as Force Majeure

2.19 INADVERTENT ENERGY FLOW:

Inadvertent Energy Flow shall mean the difference between the nett scheduled energy delivered and the actual nett energy delivered in any specific hour

2.20 INTERRUPTIBLE OR CURTAILABLE LOAD:

Interruptible or Curtailable Load shall mean a consumer load or a combination of consumer loads which can be contractually interrupted or reduced by remote control or on instruction from the Member where such contracts are in place and such instructions have been given from the Member's Control Centre. The notice that such an interruption or reduction will take place, shall be less than the time specified in the Operating Guidelines for Quick Reserve to be converted into power and energy.

2.21 LEVELISED COST:

Levelised cost shall mean an amount expressed in constant money value (i.e. assuming constant purchasing power) and repeated every year over the life of the plant, which accumulates to a present value equal to the actual expenditure incurred. This expenditure may cover capital costs, production costs or any other type of cost.

2.22 MONTHLY SYSTEM PEAK DEMAND:

The Monthly System Peak Demand of a Member shall mean the highest hourly integrated system demand occurring in the supply area of such a Member during a calendar month. This system demand shall include transmission losses but exclude the consumption of power station auxiliaries.

2.23 MOTHBALLED CAPACITY:

Mothballed Capacity shall mean thermal plant which is dry stored, sometimes partially dismantled and which is specifically protected for a storage period longer than one year but which can be returned to operating status within three (3) years.

2.24 NETT GENERATING CAPACITY:

The Nett Generating Capacity of a Member shall mean that capacity in MW, that the generating facilities of such Member can supply simultaneously to its system and other systems at the time of its Monthly System Peak Demand. The generating units of a Member which are out of service for maintenance or repair for less than four (4) consecutive months as well as capacity in Cold Reserve which can be recommissioned within two (2) months, shall be included in the Nett Generating Capacity.

2.25 OPERATING RESERVE:

Operating Reserve shall mean the unused capacity above System Demand which is required to cater for regulation, short-term load forecasting errors and Unplanned Outages. It must be available within the time prescribed in the Operating Guidelines and consists of Spinning and Quick Reserve (see Schedule H)

2.26 OPERATING RESERVE OBLIGATION:

Operating Reserve Obligation shall mean the amount of Operating Reserve that an Operating Member is obliged to maintain in terms of the Operating Guidelines. The Operating Reserve Obligation can be met by own plant or by contract.

2.27 PARTICIPATION POWER:

Participation Power shall mean the lease of a specific generating unit (or units) or a portion of such unit(s) and the sale of its production by one Operating Member to another Operating Member. This capacity and energy shall be continuously available except when such unit (or units) is out of service for maintenance or repair during which time the delivery of energy from other sources shall be at the Seller's discretion (see Schedules G and L)

2.28 PLANNED OUTAGE:

Unless otherwise agreed between all relevant Control Centres, Planned Outages shall mean outages which are scheduled with the advance notice specified in the Operating Guidelines

2.29 POINTS OF INTERCONNECTION:

The Points of Interconnection between Operating Members shall be those locations where their respective transmission facilities are physically connected. Unless otherwise agreed, the transactions under the Service Schedules shall be deemed to take place at the Points of Interconnection. The Management Committee shall update from time to time, the list giving the Points of Interconnection between the networks of the Operating Members

2.30 POOL OPERATING RESERVE OBLIGATION:

The Pool Operating Reserve Obligation shall mean the amount of Operating Reserve that must be collectively maintained by the Operating Members in terms of the Operating Guidelines

2.31 QUICK RESERVE:

Quick Reserve shall mean curtailment of load or capacity readily available from Cold Reserve, which can be made available within the time period specified in the Operating Guidelines

2.32 RESERVE CAPACITY:

The Reserve Capacity of a Member (in a time interval) shall mean the excess in MW of such Member's Accredited Capacity above its System Peak Obligation in the same time interval (i.e. year, month, week etc.) Alternatively, the Reserve Capacity can also be expressed in percent of the Member's System Peak Obligation

2.33 RESERVE CAPACITY OBLIGATION:

The Reserve Capacity Obligation of a Member shall mean the amount of Reserve Capacity that such Member is obliged to maintain in terms of this Agreement. Reserve Capacity Obligation shall be equal to the Annual System Peak Obligation multiplied by the percentage (%) reserve level specified in Appendix 1

2.34 RESERVE STORAGE:

Reserve Storage shall mean thermal plant that is stored for more than three months in a wet or dry condition. Some auxiliary plant can be run occasionally to prevent degradation

2.35 SERVICE SCHEDULES:

Service Schedules shall mean schedules governing various types of transactions that may be entered into between Operating Members to reduce costs or improve reliability of supply. They are dealt with in Article 9 and Appendix 2 hereto

2.36 SHORT RUN MARGINAL COST OF GENERATION:

*NS DA relat
to plant loadings
SRMC*

The Short Run Marginal Cost of Generation (SRMC) shall be defined as follows

$$SRMC = \frac{F+W+C+M+L}{S} \quad \text{[US Dollar/MWh]}$$

Where

- F = Fuel variable cost of fuel to send out S MWh
- W = Water variable cost of water to send out S MWh
- C = Chemicals variable cost of chemicals to send out S MWh
- M = Maintenance variable cost of maintenance to send out S MWh
deemed to be 20% of total maintenance
- L = Labour variable cost of labour to send out S MWh
deemed to be 10% of total labour costs

S = Sent Out Generation		This is equal to the Generated MWh less the Auxiliary Station Power MWh
Fuel	(F)	variable cost of fuel (i.e. coal, furnace oil, nuclear fuel, gas or other). This is equal to the <u>average variable cost</u> per unit of fuel (ton, cubic meter etc.) for the year multiplied by the required quantity of fuel.
Water:	(W).	variable cost of water (cooling water, potable water etc) This is equal to the <u>average</u> variable cost of water for the year multiplied by the required quantity of water
Chemicals	(C)	variable cost of chemicals This is equal to the average variable cost of chemicals for the year multiplied by the required quantity of chemicals
Maintenance	(M)	20 % of the total cost of annual maintenance spares and maintenance contracts. This does not include costs of repairs that cannot be attributed to normal fair wear and tear Station maintenance staff costs must be included in Labour.
Labour	(L)	10 % of the annual labour cost for station operation and maintenance staff only No administration staff or overheads to be included

If, in a year, a Member fails to review the costs above (as specified in Article 5 6), the costs in Financial Year "n+1" shall be equal to the costs in Financial Year "n" multiplied by the ratio between the Production Price Index in the United States in October of Year "n" divided by that in October of Year "n-1"

2.37 SLOW RESERVE:

Slow Reserve shall mean capacity readily available from Cold Reserve and considered to be ready for synchronisation to the system within the time period specified in the Operating Guidelines. The purpose of Slow Reserve is to replace any generating unit or unplanned outage or to meet an unexpected surge in demand.

2.38 SPINNING RESERVE:

Spinning Reserve shall mean the unused capacity of synchronised generating units which can be delivered without manual intervention within the time period specified in the Operating Guidelines.

2.39 SPINNING RESERVE OBLIGATION:

Spinning Reserve Obligation shall mean the amount of Spinning Reserve that a Member is obliged to keep or contract for in terms of the Operating Guidelines.

2.40 SURPLUS ENERGY:

Surplus Energy shall mean hydro energy purchased by one Operating Member from another Operating Member to replace higher cost energy by lower cost energy (see also Schedule D).

2.41 SYSTEM DEMAND:

The System Demand of a Member shall mean the number of MWh which is equal to the number of MWh required in any clock hour to supply the consumers of electricity in the supply area of such Member. It includes transmission losses but excludes the consumption of power station auxiliaries.

2.42 SYSTEM ENERGY:

System Energy shall mean energy purchased by one Operating Member from another Operating Member to defer the use of fuel or water, to reduce transmission losses, to offset outages of generating units, to improve environmental conditions or for any other reason of a similar nature (see also Schedule B)

2.43 SYSTEM PEAK OBLIGATION (ANNUAL OR MONTHLY):

The Annual or Monthly System Peak Obligation of a Member shall mean its Annual or Monthly System Peak Demand minus the Firm Power purchases scheduled for that month plus the Firm Power Sales scheduled for the same month.

2.44 UNPLANNED OUTAGE:

Unless otherwise agreed between all relevant Control Centres Unplanned Outages shall mean outages which are not scheduled with the advance notice specified in the Operating Guidelines

2.45 WHEELING:

Wheeling shall mean transmitting a contractual amount of power over specified time periods through the system of an Operating Member who is neither the Seller nor the Buyer of this power (see also Schedule I)

ARTICLE 3 - COMMENCEMENT AND TERMINATION OF THIS AGREEMENT

3.1 COMMENCEMENT DATE:

Upon signature by the relevant Operating Members, this Agreement shall be implemented in several stages in accordance with what is technically and administratively feasible as new interconnections between Members and transmission of data between Control Centres become operational. It shall remain in effect until terminated in accordance with Article 3.2 below

3.2 TERMINATION:

Any Operating Member may terminate its participation in the Agreement between Operating Members as of midnight of 31 December 2004 or as at midnight on 31 December of any year thereafter by delivering written notice of such termination at least forty-eight (48) months in advance to every other Member, to allow for replanning of transmission and generating facilities

If such termination results in a physical separation of the interconnected system within the SAPP, the existence of this Agreement in its original form shall come to an end. Any unfulfilled duties including financial obligations existing as a result of the interconnected operation of the Pool at the date of termination, shall still continue in full force until such items have been fulfilled or have expired

3.3 RESTORATION:

Any Member or group of Members shall then have the right to restore the interconnected operation of the Pool as governed by the documents listed in Article 1.2 by re-establishing one or more interconnections with another Member or Members.

ARTICLE 4 MEMBERSHIP

4.1 MEMBERSHIP:

An Electricity Supply Enterprise, as defined in Article 3.3 of the 'Inter-Utility Memorandum of Understanding

- (i) which is a Member of the SAPP,
- (ii) which is interconnected with other Member(s) of the SAPP
- (iii) which undertakes to comply with all the rules and requirements specified in this Agreement and in the Operating Guidelines,

may become an Operating Member of the Southern African Power Pool by signing this Agreement. Admission as full Operating Member shall require a two thirds majority by the Members of the Executive Committee who are already signatories of this Agreement

4.2 OBSERVER STATUS:

By consensus or failing this, by a two-third majority, the Executive Committee may grant, upon approval by the Council of SADC Ministers of Energy, observer status to an Electricity Supply Enterprise interested in the interconnected operation of the Pool. Electricity Supply Enterprises having obtained observer status shall all have the same rights and obligations as specified in advance by the Management Committee.

4.3 INDEPENDENT POWER PRODUCERS:

An Independent Power Producer may become an Operating Member of the SAPP and the procedure or criteria for acceptance shall be the same as for Electricity Supply Enterprises. This membership shall however be of a limited nature. Such Operating Member shall be entitled to participate in the Operating and Planning Sub-Committees, but not in the Management or the Executive Committees of the SAPP.

ARTICLE 5. RIGHTS AND OBLIGATIONS OF THE OPERATING MEMBERS

(See also Article 7 in the "Inter-Utility Memorandum of Understanding")

5.1 EMERGENCY ENERGY:

As soon as an Emergency Situation develops in the system of an Operating Member, the other Operating Members shall supply Emergency Energy up to the full amount of their Available Accredited Capacity provided the Operating Member experiencing the Emergency Situation complies with the provisions of Service Schedule A. In terms of priority Emergency Energy shall over-ride all non-firm types of transactions. Operating Members whose facilities are required to wheel Emergency Energy to the Operating Member experiencing an emergency, shall be obliged to

make these facilities available on a firm basis for the duration of the emergency (i.e. not exceeding six [6] hours), subject exclusively to technical limitations in terms of the Operating Guidelines

5.2 AUTOMATIC GENERATION CONTROL:

Every Operating Member shall provide in its own Control Area the Automatic Generation Control (AGC), telemetering and telecommunication facilities which are specified in the Operating Guidelines. If such AGC facilities are not in service, the Member shall contract with another Operating Member to become part of its Control Area (see Schedule M). As long as this is not done, the Operating Member's tie line(s) with the rest of the Pool shall remain open unless otherwise agreed by the Operating Sub-Committee

5.3 WHEELING:

Each Operating Member of the Pool undertakes to allow the wheeling of capacity or energy through its system where this is technically and economically feasible subject to the conditions specified in Schedule I. When such wheeling endangers the wheeler's facilities or interferes with its obligations towards its own customers or other Members this shall be brought to the attention of the Operating Sub-Committee

5.4 ACCREDITED CAPACITY OBLIGATION

Each Operating Member shall comply with its Accredited Capacity Obligation as specified in Article 8 and Appendix 1

5.5 MAINTENANCE SCHEDULES

Maintenance Schedules leading to Planned Outages of generation and transmission facilities shall be submitted to the other Operating Members and to the Operating Sub-Committee in the manner prescribed from time to time by the Operating Sub-Committee

YJB

5.6 DISCLOSURE OF COSTS AND OTHER PARAMETERS:

The Operating Members shall disclose all information and costs relating to their generating facilities in the manner prescribed by the Planning Sub-Committee. In particular, Members having thermal generation, shall provide details of their Average Production Cost and Short Run Marginal Cost of Generation at each of their thermal generating facilities.

ARTICLE 6: OPERATING SUB-COMMITTEE

(See also Article 14 of the "Inter-Utility Memorandum of Understanding")

The duties of the Operating Sub-Committee shall include, but shall not be limited to the following:

- 6.1 Approve the methods and standards used for testing generating units in order to establish their sent out generating capacity
- 6.2 Conduct short-term (maximum three years) system reliability studies as required using inter alia, the reliability antenna specified by the Planning Sub-Committee or in the Service Schedules
- 6.3 Establish and review the methods and standards (e.g. UNIPED) used to measure the performance (planned and forced outage rates, mean time to failure, etc.) of generating units and transmission facilities
- 6.4 Establish and review the formula to derive the Operating Reserve Obligations of the Operating Members (as specified in the Operating Guidelines) and ensure that these obligations are met
- 6.5 Determine annually the System Peak Obligation and the Accredited Capacity Obligation of each Operating Member for each month of the next twelve (12) months. Each Operating Member shall be required to provide plans for meeting its monthly Accredited Capacity Obligation for each of the next twelve (12) months

- 6 6 Establish and update the Operating Guidelines and resulting procedures for the operation of the Pool. Such procedures shall deal with but shall not be limited to transfer limits, frequency control voltage control, tie-line power control, Automatic Generation Control, data exchanges telecommunication switching, safety load shedding restoration of supply and the application of Service Schedules
- 6 7 Co-ordinate the generation and transmission maintenance schedules of the Operating Members so as to maintain at all times the required reserves and the agreed upon services
- 6 8 In co-operation with the Operating Members of the Planning Sub-Committee, establish and update standards and procedures applicable to the Service Schedules and review their order of priority submit proposals to the Operating Members of the Management Committee
- 6 9 Establish short-term transfer limits between the systems of the Operating Members (adjacent and non-adjacent systems)
- 6 10 Ensure that each Operating Member is equipped with or contracts for the required Automatic Generation Control (AGC) telemetering and telecommunication facilities in accordance with the Operating Guidelines
- 6 11 Determine the Nett Generating Capacity in the Member's systems
- 6 12 Evaluate software and other tools which will enhance the value of Pool operations in areas such as unit commitment, overall generation dispatch or reliability monitoring submit proposals to the Operating Members of the Management Committee
- 6 13 Review and submit the budget for the operation of the Co-ordination Centre to the Management Committee for approval
- 6 14 Determine payments of penalties for insufficient Accredited Capacity and administer the rules governing the accreditation of a Member's Nett Generating Capacity

*Functions appear to
exclude pricing*

ARTICLE 7: CO-ORDINATION CENTRE

7.1 FORMATION:

The Co-ordination Centre (CC) shall be implemented as an independent and neutral entity located at a permanent location and funded by the Members of the Pool. The Co-ordination Centre shall be implemented in stages as recommended by the Operating Sub-Committee and agreed upon by the Management Committee.

7.2 REPORTING STRUCTURE:

The Manager of the Co-ordination Centre shall be appointed on a contract basis by the Management Committee upon recommendation of the Operating Sub-Committee and shall report to the Operating Sub-Committee.

7.3 STAFFING

The Manager of the Co-ordination Centre shall recruit and appoint the staff required to operate the Centre.

7.4 FUNCTIONS.

The responsibilities of the CC shall include, but shall not be limited to the following:

- 7.4.1 Monitor continuously the operation of the Power Pool
- 7.4.2 Monitor transactions between Operating Members and between Members and non-Members
- 7.4.3 Monitor time correction procedures
- 7.4.4 Monitor the inadvertent power flows and the returns in kind between the Members

- 7.4.5 Provide routine daily reports, data and information relevant to the operation of the Power Pool to the Operating Sub Committee and to the Members;
- 7.4.6 Monitor and advise on the use of the Operating Guidelines
- 7.4.7 Monitor and report on the control performance criteria, as specified in the Operating Guidelines, to all the Operating Members,
- 7.4.8 Convene, following a disturbance affecting the parallel operation of the Pool a post disturbance committee,
- 7.4.9 Provide information and give technical advice/support to Members of the SAPP, in matters pertaining to parallel operation,
- 7.4.10 Evaluate the impact of future projects on the operation of the Pool and advise the Operating Sub-Committee accordingly
- 7.4.11 Perform various operational planning studies to highlight possible operating problems,
- 7.4.12 Give advice on short-term and long-term operating problems,
- 7.4.13 Perform studies to determine transfer limits on tie lines and inform Operating Members accordingly. Monitor adherence of Operating Members to these limits
- 7.4.14 Establish and update a data base containing historical and other data to be used in Planning and System Operation studies
- 7.4.15 Monitor the availability of the communication link between the Control Centres of the Operating Members and between these Control Centres and the Co-ordinating Centre

- 7.4.16 Advise on the feasibility of wheeling transactions
- 7.4.17 Gather and act as the official custodian of data pertaining to transactions between Operating Members and between Operating Members and non-Members;
- 7.4.18 Monitor the calculation and implementation of the various types of reserves;
- 7.4.19 Carry out projects and assignments as directed by the Operating Sub-Committee;
- 7.4.20 Monitor the protection performance on all tie lines;
- 7.4.21 Monitor the Co-ordination of protection on all tie lines,
- 7.4.22 Monitor adherence to the Agreement by the Operating Members, inter alia regarding Accredited Capacity Obligation and calculate the penalties for insufficient Accredited Capacity and their re-allocation among Members
- 7.4.23 Disseminate the generation and transmission maintenance schedules received from the Operating Members and advise on the adjustments that are required to maintain at all times the contractual Pool reserves and the agreed upon services
- 7.4.24 Co-ordinate the training of the Member's staff and if necessary, organize training seminars focusing on the operation of the interconnected system
- 7.4.25 Prepare and issue annually a control performance summary report for the benefit of the Operating Sub-Committee
- 7.4.26 Identify capital projects required by the Co-ordination Centre and make proposals to the Operating Sub-Committee

7 4 27 Endeavour to obtain funding for the capital projects of the Co-ordination Centre upon the approval by the Operating Sub-Committee,

7 4 28 Prepare and present an annual budget covering the Co-ordination Centre expenditure for approval by the Operating Sub-Committee;

7 4 29 Produce a monthly financial statement as specified by the Operating Sub-Committee

7.5 COSTS:

7 5 1 ANNUAL COSTS:

Members will pay their contributions up front for the Financial Year based on the approved budget of the Co-ordination Centre. The contributions shall be calculated in accordance with Article 7 5 3

7 5 2 ADDITIONAL COSTS:

If the Co-ordination Centre Manager foresees that a shortage of funds will arise before or at the end of the Financial Year, he must explain the variance to the Operating Sub-Committee and apply for additional funds. These additional funds shall be approved by the Management Committee upon recommendation by the Operating Sub-Committee. The additional contribution of each Member shall again be calculated in accordance with Article 7 5 3

7 5 3 ALLOCATION BETWEEN MEMBERS

The allocation between the Members of the costs budgeted by the Co-ordination Centre shall be as follows

- (1) 30 % (thirty per cent) shall be shared equally between all the Operating Members

- (2) 30 % (thirty per cent) shall be allocated between the Operating Members in proportion to the actual energy measured in MWh and imported from other Members or other Parties during the Financial Year.
- (3) 20 % (twenty per cent) shall be allocated between all SAPP Members in proportion to their Annual System Peak Demand in the Financial Year
- (4) 10 % (ten per cent) shall be allocated between Operating Members in proportion to the combined 75°C thermal rating of their interconnections with other Members.
- (5) 10 % (ten per cent) shall be deemed to constitute a benefit payable only by the host Member

The terms of Article 11.3 where applicable, shall apply to the monies due to the Co-ordination Centre

7.5 4 BUDGET AND FINANCIAL RECORDS.

- (1) the budget shall include all the Co-ordination Centre expenses, i.e. operating costs, staff salaries or capital expenditure etc ;
- (2) a record shall be kept of all expenses incurred by the Co-ordination Centre
- (3) financial statements shall be prepared and issued for each Financial Year, at the latest, six months after the end of the Financial Year
- (4) the remuneration package and salary adjustments of the staff shall be determined by market rates

ARTICLE 8 : ACCREDITED CAPACITY OBLIGATION

8.1 REQUIREMENTS:

The Accredited Capacity Obligation of each Operating Member shall be determined as follows and the penalties for not complying shall be calculated in accordance with Appendix 1

8 1 1 Over each calendar month every Operating Member of the Pool shall provide an Accredited Capacity at least equal to its Accredited Capacity Obligation in that month as specified in Appendix 1 The Accredited Capacity Obligation shall be equal to the Monthly System Peak Obligation plus the Reserve Capacity Obligation based on the Annual System Peak Obligation

8 1 2 The Reserve Capacity Obligation of a Member for any month shall be as specified in Appendix 1

8 1 3 In respect to commitments of power from or to an Electricity Supply Enterprise which are not covered by the Service Schedules of this Agreement but are under separate contracts now existing or hereafter created such commitments shall be reflected in a Member's System Peak Obligation (Annual and Monthly) as the case may be

8 1 4 Prior to the beginning of each calendar month an Operating Member which does not meet its Accredited Capacity Obligation under Article 8 1 1 shall acquire additional capacity or reduce its System Peak Obligation so as to meet it This can be done as follows

- (i) by advancing the completion date of new facilities
- (ii) by purchasing Firm Power (Service Schedules F and K) from Operating Members or non-Members of the Pool

(iii) by purchasing or leasing capacity from one or more generating units from outside its system such as with Participation Power (Service Schedules L and G),

(iv) by reducing its Monthly System Peak Obligation,

8.1.5 The System Peak Obligation and the Accredited Capacity Obligation of each Operating Member shall be determined annually by the Operating Sub-Committee for each of the next twelve (12) months, as specified in Article 6.5 and Appendix 1.

8.1.6 Nothing contained in this Agreement shall be interpreted to require a Member to install facilities or to restrict a Members' choice to install facilities or purchase power to maintain its Accredited Capacity

8.2 FAILURE TO COMPLY:

8.2.1 If in any month, the Accredited Capacity Obligation of an Operating Member is not fulfilled, such Member shall be charged for the number of megawatts required to fulfill the obligation multiplied by the penalty rate given in Appendix 1

8.2.2 The payments by deficient Operating Members under Article 8.2.1, shall be split among the Members having a surplus of Accredited Capacity following the method given in Appendix 1

8.2.3 If an Operating Member increases its Accredited Capacity or reduces its System Peak Obligation after the beginning of the month then the penalty to be paid by this Operating Member shall be proportionally adjusted to take into account the number of full days the Accredited Capacity was at the higher level or the System Peak Obligation was at the lower level

8.2.4 Any dissenting Operating Member may refer the matter to the Management Committee. This shall be done in writing within fourteen (14) days that the disagreement regarding Accredited Capacity has arisen.

ARTICLE 9 - SERVICE SCHEDULES

9.1 LIST OF SERVICES:

The services available under this Agreement are given in the Service Schedules of Appendix 2 and are as follows:

'A'	EMERGENCY ENERGY	'H'	OPERATING RESERVE
'B'	SYSTEM ENERGY	'I'	WHEELING
'C'	ECONOMY ENERGY	'J'	SCHEDULED OUTAGE ENERGY
'D'	SURPLUS ENERGY	'K'	FIRM POWER
'E'	ENERGY BANKING	'L'	PARTICIPATION POWER
'F'	SHORT-TERM FIRM POWER	'M'	CONTROL AREA SERVICES
'G'	SYSTEM PARTICIPATION POWER		

9.2 RATES APPLICABLE TO THE TRANSACTIONS:

For any transaction the relevant rate(s) or price(s) shall be that which has been quoted and agreed upon before the start of the transaction. The said rate(s) or price(s) shall remain as agreed for the whole duration of the transaction. Other issues relating to transactions are dealt with in Article 11 "Settlements" and in the "Schedules" of Appendix 2.

9.3 AMENDMENTS AND UPDATES.

Service Schedules for capacity, energy wheeling or any other service may be added, amended or updated from time to time. The new versions shall be prepared by the Operating Members of the Planning Sub-Committee in consultation with the Operating Sub-Committee, reviewed by the Management Committee and approved by the Executive Committee in accordance with the provisions of the inter-utility MOU.

9.4 CONTINUITY OF SUPPLY:

9.4.1 Capacity and Energy agreed upon under this Agreement shall be fully delivered at all times as scheduled except where interruptions or curtailments are caused by Force Majeure or by the operation of protection schemes or by the installation, maintenance repair and replacement of facilities where such events were unforeseeable and therefore notice could not be given. Such events shall not be a breach of this Agreement.

9.4.2 Where any of these events can be pre-planned, every Operating Member of the Pool shall give one (1) month notice to the other Operating Members and shall schedule such events so as to cause as little inconvenience as possible to the other Members. Failure to give such notice shall be a breach of this Agreement.

9.4.3 The provision of penalties or bonuses if any, shall be dealt with separately in the specific transactions or agreements between Operating Members.

9.5 ACTIVE AND REACTIVE POWER FLOWS.

The Operating Members recognise that the flows of power between their respective systems are governed by physical laws and that power delivered under this Agreement will flow through paths determined by the physical parameters of the network.

9.6 HARDSHIP CAUSED TO OTHER MEMBERS.

Each Operating Member shall at all times co-operate to ensure that

9.6.1 no overload or damage to equipment is caused to other Members or any other party by power flows of scheduled deliveries

9.6.2 no overload or damage to equipment is caused to other Members or any other party when abnormal conditions or Force Majeure arises

ARTICLE 10 METERING

10.1 METERING EQUIPMENT:

Metering equipment as well as telemetering and communication facilities shall be installed so as to determine the actual flows of active and reactive power at the Points of Interconnection

10.2 RECONCILIATION:

Where meters are temporarily not equipped with communication facilities as specified in Clause 10.1 the differences between locally metered figures and those quantities used in daily energy accounting shall be reconciled monthly.

10.3 TESTING:

Metering equipment shall be tested by the owner as recommended by the Operating Sub-Committee. In addition special tests shall be made on request by any other Operating Member. If the meter complies with the specified accuracy, then the Member who has requested the tests shall bear the costs thereof. Otherwise, the costs of such tests shall be borne by the owner of the meter. Representatives of any Member shall be given the opportunity to witness the tests.

10.4 ACCOUNT ADJUSTMENTS:

If the accuracy of the meter(s) is not as specified the account between the Operating Members shall be adjusted to correct for the full inaccuracy. Such adjustment shall be limited to the current month unless it is possible to determine the period over which such inaccuracy occurred. In that case the correction must be done for the full period of inaccuracy.

ARTICLE 11 - SETTLEMENTS

11.1 RECORDS AND ACCOUNTING.

Each Operating Member of the Pool shall maintain and keep for sixty (60) months, an accurate record of the Capacity and Energy scheduled and delivered. It shall disclose such information to the other Operating Members and to the Co-ordination Centre once it is established

11.2 INADVERTENT ENERGY FLOWS.

11.2.1 Inadvertent energy flows shall be returned during a time period when they have approximately the same value as when they occur. The implementation of this principle shall be as defined in the Operating Guidelines

11.2.2 Regular checks of inadvertent energy flows shall be carried out in accordance with the Operating Guidelines

11.3 ACCOUNTS.

11.3.1 Monthly accounts shall be prepared and sent by the Operating Members themselves, and shall be settled monthly in cash unless otherwise agreed. In this context, a month shall mean a calendar month unless otherwise approved by the Management Committee

11.3.2 For billing purposes, the amounts of energy delivered and the amounts of generation or transmission capacity involved in a transaction (including wheeling) shall be the amounts scheduled in advance at the Points of Interconnection

- 11.3.3 When Wheeling takes place, the purchasing Member shall be liable for the additional losses (positive or negative) incurred in the wheeler's system. Unless otherwise agreed between all the relevant parties, the payment for additional losses (positive or negative) in the wheeler's system shall be returned in kind in the form of hourly schedules for additional capacity determined in advance and purchased by the purchasing Member from the selling Member so as to make the transaction neutral from the point of view of losses in the wheeler's system. The amount of additional losses shall be determined in accordance with Service Schedule I*
- 11.3.4 To facilitate and simplify payment procedures, Operating Members may provide services in exchange for other services rather than for cash payments. These exchanges must be acceptable to the Pool as a whole or to the other Operating Member(s) involved, as appropriate.
- 11.3.5 Unless otherwise agreed, the bills shall be settled within forty-five (45) days without any deduction whatsoever and returns in kind shall take place as agreed between the relevant Members. Any unpaid amount shall bear interest from the date due until the date of payment and the annual interest rate shall be 150 % of the three (3) month United States Treasury Bill as published in the Wall Street Journal.
- 11.3.6 All bills under this Agreement shall be in US Dollars unless otherwise agreed between the relevant Members.
- 11.3.7 (i) If a bill is submitted by an Operating Member to another Operating Member for a service which is not Emergency Energy and the bill exceeds the amount resulting from scheduled transactions by more than 50 % the debtor Member shall have the right to pay only the amount resulting from scheduled transactions.

- (ii) With regards to the excess, the debtor Member shall give notification in writing to the other Member and to the Co-ordination Centre within fourteen (14) days from the date of receiving the bill, stating the reasons for the dispute and the amount in dispute
- (iii) If settlement of the dispute is in favour of the creditor Member, interests as calculated in Article 11.3.5 shall apply to the amount in dispute

11.3.8 If a Member wants to dispute all or any part of the charges submitted by another Member when these charges cover Emergency Energy or exceed scheduled transactions by less than 50 %, the Member shall nevertheless pay the full amount when due and give notification in writing to the other Member and to the Co-ordination Centre within fourteen (14) days from the date of receiving the bill, stating the grounds for the dispute and the amount in dispute. If settlement of the dispute results in a refund to the payee, interest as calculated in Article 11.3.5 above shall be added to the refund

- 11.3.9 (i) Failure to settle, inclusive of interest, a bill which is not in dispute within a period of three (3) months from the date due shall give the creditor Member the right to request the Management Committee to revoke from the debtor Member the privilege of buying or selling Economy Energy and Surplus Energy (as per Service Schedules) until the debt is settled
- (ii) If three (3) months after that date the debtor Member has still failed to settle his debt in full, inclusive of interest the creditor Member shall have the right to request the Management Committee to revoke the privilege of using any Service Schedule except Wheeling for future transactions from this debtor Member until its debt is settled.

- (iii) The Management Committee shall be obliged to comply with the request of the creditor Member for revoking the privileges of the debtor Member upon submission of proof that financial obligations have not been fulfilled for the specified periods.
- (iv) In all cases, the debtor Member shall continue to be under the obligation to wheel and shall be entitled to the proceeds of wheeling transactions in accordance with Service Schedule I

11.4 TAXES:

- 11.4.1 Any tax imposed by the Government or any other authority of the country of an Operating Member (the first Member) and levied upon or measured by capacity or energy exported to or imported from other Member(s), shall be borne and paid for by the first Member in such a way that transactions are settled by the other Operating Member(s) as if there had been no such tax.
- 11.4.2 The first Member indemnifies any other Member against any loss or damage which such other Member may suffer if, under Article 11.4.1 above the first Member fails to pay such tax timeously or at all

ARTICLE 12 FAILURE TO COMPLY WITH THIS AGREEMENT

12.1 DISPUTE RESOLUTION.

- 12.1.1 Disputes between Operating Members concerning the interpretation of this Agreement or arising out of the non-observance or non-performance of any portion of this Agreement shall be brought by the aggrieved Member to the attention of the Chairperson of the next meeting of the Management Committee who within thirty (30) days shall call a meeting of the Operating Members of the Management Committee. At this meeting the Member(s) claiming that the Agreement is not being complied with shall present material evidence to support its (their) claim

This evidence shall have been forwarded by the aggrieved Member at least two weeks before the meeting to the Member or Members against which the complaint is being lodged

- 12 1 2 The Operating Members of the Management Committee may choose by a simple majority to hear both sides to a dispute and render a judgment based on simple majority. In this case, the Members involved in the dispute may elect to abide by the decision of the Operating Members of the Management Committee, they shall refer the matter to the Executive Committee if any one Member in dispute feels that the decision of the Management Committee is not fair
- 12 1 3 Alternatively, the Operating Members of the Management Committee may by a simple majority decision refer the matter directly to the Executive Committee without hearing it themselves
- 12 1 4 If the Operating Members of the Management Committee cannot arrive at a decision either concerning the judgment in a dispute or whether the matter should be dealt with by the Committee itself or by the Executive Committee, the matter shall be referred to the Executive Committee
- 12 1 5 The Operating Members of the Executive Committee may choose by a simple majority to hear both sides to a dispute and render a judgment based on simple majority. In this case the Members involved in the dispute may elect to abide by the decision of the Operating Members of the Executive Committee, otherwise they shall refer the matter to Arbitration in accordance with Article 13 if at least one Member feels that it is disadvantaged by the decision of the Executive Committee
- 12 1 6 Alternatively the Operating Members of the Executive Committee may by a simple majority decision, refer the matter directly to Arbitration without hearing it themselves

12.1.7 If the Operating Members of the Executive Committee cannot arrive at a decision either concerning the judgment in a dispute or whether the matter should be dealt with by the Committee itself or by Arbitration, the matter shall be referred to Arbitration as provided in Article 13

12.1.8 In all cases the Arbitration ruling shall be final and not open to appeal. A Member not abiding by the ruling shall be in breach of this Agreement

12.2 FAILURE TO COMPLY:

12.2.1 An Operating Member which persistently fails to comply with the Agreement or with an Arbitration ruling shall be issued with a warning letter by the Operating Members of the Management Committee requesting the Member to submit plans for meeting reasonable levels of compliance. The non-complying Member shall acknowledge the letter within thirty (30) days and shall propose corrective action within three (3) calendar months to resolve the problem

12.2.2 If the non-complying Operating Member fails to make appropriate corrections a final warning letter will be sent at the discretion of the Operating Members of the Management Committee and the issue will be remanded to the Operating Members of the Executive Committee to take one of the following actions

Level 1* revoke the privilege to use Economy Energy and Surplus Energy (as per Service Schedules C and D) until compliance is restored,

Level 2 revoke the privilege of using any Service Schedule except Wheeling for future transactions until compliance is restored

Level 3 revoke Operating membership of the SAPP,

ARTICLE 13: ARBITRATION

13.1 PROCEDURE:

13.1.1 In the event of a disagreement or a dispute between Operating Members at the Executive Committee concerning the interpretation of this Agreement or arising out of the non-observance or non-performance of any portion of this Agreement or when a Member has elected not to abide by the decision of the Executive Committee as per Article 12.1.5 the dissenting Member or Members shall within thirty (30) days appoint one Arbitrator and the other Member(s) shall appoint another Arbitrator

13.1.2 The Arbitrators shall in turn, appoint within thirty (30) days of their appointment, a third Arbitrator by consensus. All Arbitrators shall be individuals known internationally for their expertise in the specific problem causing the dispute. The procedure by which the Arbitrators will reach a decision shall be laid down by the Arbitrators themselves without reference to statutory requirements applicable to arbitration

13.2 DECISIONS:

The decision(s) of the Arbitrators shall be by simple majority within ninety (90) days that they have all been appointed, unless a longer period is mutually agreed between the Members in dispute. The decisions of the Arbitrators shall be binding on all Members.

13.3 COSTS:

The costs of arbitration shall be equally spread between all the Members involved in the dispute unless the majority decision of the Arbitrators specifies otherwise

ARTICLE 14 : FORCE MAJEURE

14.1 SCOPE:

No Member shall be considered to be in default in respect of this Agreement, if prevented from fulfilling its obligations due to Force Majeure as defined in Article 2.17

14.2 DURATION:

Any Member unable to fulfill an obligation by reason of Force Majeure shall remove such inability within the shortest possible time

ARTICLE 15 : INDEMNITY

Each Member shall defend and indemnify other Members against any claim or liability against them for injury or damage to persons or property including any related loss or expense resulting from the damage caused to other Member's during the construction, commissioning operation and maintenance of any of the facilities owned, operated and maintained by the indemnifying Member or by act of negligence by other Member(s) employees or agents

ARTICLE 16 : WAIVERS

Waiver at any time by a Member, of some or all of its rights with respect to a default or with respect to any other matter arising in connection with this Agreement shall not be deemed a waiver of a Member's rights in any further default by the defaulting Member thereafter

ARTICLE 17 : AMENDMENTS

This Agreement may be reviewed from time to time but no modification shall be of any force or effect unless reduced to writing and approved by the Operating Members of the Management Committee

ARTICLE 18: ASSIGNMENT

Each Operating Member shall have the right to assign this Agreement between Operating Members to any successor to all or substantially all of its electric properties whether by merger, consolidation sale or otherwise, without the consent of the other Operating Members, provided such successor shall agree in writing to assume all the obligations of such Operating Member. The Member assigning this Agreement between Operating Members shall thereupon be released from all liability thereafter arising under this Agreement. This provision shall be applicable to assignees in succession.

ARTICLE 19: NOTICES AND DOMICILIUM

19.1 COMMUNICATION:

Any communication or documents given or sent by any Operating Member to any other Operating Member shall be in writing and shall be deemed to have been duly delivered to the Member to which it is addressed at its respective address namely

19.1.1 For BPC

Chief Executive Telephone +267-3603000
Botswana Power Telefax +267-373563
Corporation
Moflakase House
Macheng Way
P O Box 48
GABORONE, Botswana

19.1.2 For EdM

Director Geral Telephone 258-1-42-2071/2
Electricidade de Telefax 258-1-42-2074
Mocambique
Ave Agostinho Neto 70
Caixa Postal 2447
MAPUTO Mozambique

- 19 1 3 For ENE
- Director Geral Telephone +244-2-326582
Empresa Nacional Telefax +244-2-323433
de Electricidade
Predio Geominas- 6,7. Andores
LUANDA Angola
- 19 1 4 For ESCOM
- General Manager Telephone +265-622000
Electricity Supply Telefax +265-622008
Commission of Malawi
P O Box 2047
BLANTYRE Malawi
- 19 1 5 For ESKOM
- Chief Executive Telephone +27-11-800-5510
Eskom Telefax +27-11-800-5583
P O Box 1091
JOHANNESBURG, 2000
South Africa
- 19 1 6 For LEC
- Managing Director Telephone +266-312236
Lesotho Electricity Telefax +266-310093
Corporation
P O Box 423
MASERU 100 Lesotho
- 19 1 7 For SEB
- Chief Executive Tel. +268-42548/42521/4663
Swaziland Electricity Telefax +268-42335
Board +268-41931
P O Box 258 +268-48274
MBABANE Swaziland

19 1.8 For SNEL

Président Délégué Général
Société Nationale d'Electricité (SNEL)
B.P. 500
Avenue de la Justice 2381
KINSHASA, Zaire
Telex: 63400 RCNF
(Attn DMS Zaire SNEL 10)
Telephone +243-12-33736 +871-682622676
Telefax +243-12-33657 +871-682622677
+260-2-313835 (SNEL Shaba c/o Merzano)

19 1 9 For SWAWEK

Chairman & Managing Telephone 261-2-31830
Director Telefax 261-2-32805
SWAWEK
Swawek Centre
Corner Robert Mugabe
and Martin Luther Streets
P O Box 2864
WINDHOEK, Namibia

19 1 10 For TANESCO

Managing Director Telephone +255-51-46242
Tanzania Electricity Telefax +255-51-44668
Supply Company (Ltd) +255-51-36247
P O Box 9024 +255-51-26704
DAR ES SALAAM Tanzania

19 1 11 For ZESA

Chief Executive Telephone +263-4739033
Zimbabwe Electricity Telefax: +263-4739854/5
Supply Authority
Electricity Centre
25 Samora Machel Avenue
P O Box 377
HARARE Zimbabwe

19 1 12 For ZESCO

Managing Director Telephone +260-1-225074
Zambia Electricity Telefax: +260-1-222753
Supply Corporation
Stand 6949
Great East Road
P O Box 33304
LUSAKA Zambia

19 2 DELIVERY TIME:

- 19 2 1 If a communication is delivered by hand it shall be deemed to have been received by the addressee on the date of delivery.
- 19 2 2 If posted by pre-paid registered post it shall be deemed to have been received by the addressee on the fourteenth (14) day after postage
- 19 2 3 If sent by telex telegram or facsimile it shall be deemed to have been received by the addressee one (1) day after dispatch

19 3 CHANGE OF ADDRESS:

Any Member may by written notice to all of the other Member change the address to which any notice or request intended for the Member giving such notice shall be addressed

ARTICLE 20: SIGNATORIES

IN WITNESS whereof the said Operating Members have hereto set their hands

20 1 SIGNED ON BEHALF OF BPC AT _____ ON THIS
_____ DAY OF _____

SIGNED _____ WITNESS _____
NAME _____ NAME _____
CHIEF EXECUTIVE TITLE _____
BOTSWANA POWER CORPORATION

20 2 SIGNED ON BEHALF OF EdM AT _____ ON THIS
_____ DAY OF _____

SIGNED _____ WITNESS _____
NAME _____ NAME _____
DIRECTOR GERAL TITLE _____
ELECTRICIDADE DE MOCAMBIQUE

20 3 SIGNED ON BEHALF OF ENE AT _____ ON THIS
_____ DAY OF _____

SIGNED _____ WITNESS _____
NAME _____ NAME _____
DIRECTOR GERAL TITLE _____
EMPRESA NACIONAL
DE ELECTRICIDADE
ANGOLA

20 4 SIGNED ON BEHALF OF ESCOM AT _____ ON THIS

_____ DAY OF _____

SIGNED _____ WITNESS _____

NAME _____ NAME _____

GENERAL MANAGER TITLE _____

ELECTRICITY SUPPLY COMMISSION
MALAWI

20 5 SIGNED ON BEHALF OF ESKOM AT _____ ON THIS

_____ DAY OF _____

SIGNED _____ WITNESS _____

NAME _____ NAME _____

CHIEF EXECUTIVE TITLE _____

ESKOM OF SOUTH AFRICA

20 6 SIGNED ON BEHALF OF LEC AT _____ ON THIS

_____ DAY OF _____

SIGNED _____ WITNESS _____

NAME _____ NAME _____

MANAGING DIRECTOR TITLE _____

LESOTHO ELECTRICITY COMMISSION

20 7 SIGNED ON BEHALF OF SEB AT _____ ON THIS

_____ DAY OF _____

SIGNED _____ WITNESS _____

NAME _____ NAME _____

CHIEF EXECUTIVE TITLE _____

SWAZILAND ELECTRICITY BOARD

20.8 SIGNED ON BEHALF OF SNEL AT _____ ON THIS

_____ DAY OF _____

SIGNED _____ WITNESS _____

NAME _____ NAME _____

PRÉSIDENT DÉLÉGUÉ GÉNÉRAL TITLE: _____

SOCIÉTÉ NATIONALE D'ÉLECTRICITÉ
ZAIRE

20.9 SIGNED ON BEHALF OF SWAWEK AT _____ ON THIS

_____ DAY OF _____

SIGNED _____ WITNESS _____

NAME _____ NAME _____

CHAIRMAN & MANAGING TITLE _____

DIRECTOR

SWAWEK, NAMIBIA

20.10 SIGNED ON BEHALF OF TANESCO AT _____ ON THIS

_____ DAY OF _____

SIGNED _____ WITNESS _____

NAME _____ NAME _____

MANAGING DIRECTOR TITLE _____

TANZANIA ELECTRIC
SUPPLY COMPANY

20.11 SIGNED ON BEHALF OF ZESA AT _____ ON THIS

_____ DAY OF _____

SIGNED _____ WITNESS _____

NAME _____ NAME _____

CHIEF EXECUTIVE TITLE: _____

ZIMBABWE ELECTRICITY
SUPPLY AUTHORITY

20.12 SIGNED ON BEHALF OF ZESCO AT _____ ON THIS
_____ DAY OF _____

SIGNED: _____ WITNESS _____

NAME: _____ NAME: _____

MANAGING DIRECTOR
ZAMBIA ELECTRICITY SUPPLY
CORPORATION

TITLE: _____

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APPENDIX 1
CHARGES FOR INSUFFICIENT ACCREDITED CAPACITY

(See also Article 8 of this Agreement)

These charges shall become effective from the commencement date of the SAPP Agreement

1. ACCREDITED CAPACITY OBLIGATION

An Operating Member's Accredited Capacity Obligation in any month shall be no less than its Monthly System Peak Obligation forecasted by the Member plus its Reserve Capacity Obligation based upon the Annual System Peak Obligation

The Reserve Capacity Obligation of a Member for any month shall be equal to 19 % of the Annual System Peak Obligation of such Member when the generating plant is thermal and 10 % when the generating plant is hydro. A weighted average shall apply to Members who have a mixed system.

2. OBLIGATION ENFORCEMENT

2.1 BEFORE THE FACTS

The Accredited Capacity Obligation calculations shall be carried out for each of the twelve (12) months starting with the month of April of a year and ending with March of the following year. Input data shall be provided by the Member to the Operating Sub-Committee. The results shall then be circulated among the Operating Members for information.

2.2 AFTER THE FACTS.

At the end of the system peak month, the actual Accredited Capacity Obligation shall be calculated by the Operating Sub-Committee based on the actual transactions and the actual Monthly System Peak Demands. Should the calculation indicate a deficit, the Member shall then be subject to the penalty under Item 3.

2.3 DISTRIBUTION OF PENALTIES.

The payment by deficient Members shall be split among Operating Members having a surplus of Accredited Capacity in proportion to each Operating Members contribution to the total excess of Accredited Capacity in the Pool adjusted if necessary for Transmission restrictions to the deficient Member

3 PENALTY RATES

The penalty shall be based on Service Schedule "L" "Participation Power" and shall be equal to five (5) times the Participation Power Rate specified under Schedule "L", Paragraph 3.1. In January 1994, money value it shall be US\$ 36.15/kW.

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APPENDIX 1
ACCREDITED CAPACITY
ACTUAL LOAD - GENERATING CAPACITY DATA
YEAR:

Reporting System Member		Prepared By		Telephone							Date					
				APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	
Day Hour Ending																
1	Monthly System Peak Demand															
2	Annual System Peak Demand															
3	Monthly Firm Purchases - Total (See Table 2)															
4	Monthly Firm Sales Total (See Table 2)															
5	Monthly System Peak Obligation (1-3+4)															
6	Annual System Peak Obligation (2-3+4)															
7	Net Generating Capacity															
8	Participation Purchases - Total (See Table 3)															
9	Participation Sales - Total (See Table 3)															
10	Accredited Capacity (7+8-9)															
11	Reserve Capacity Obligation - Thermal 19% Hydro 10% or Weighted Aver (% of line 6)															
12	Accredited Capacity Obligation (5+11)															
13	Surplus or Deficit(-) Capacity (10-12)															
14	Planned Maintenance															
15	Monthly Net Energy Requirements (GWh)															
16	Did your system experience any hour during the month with a lesser surplus or greater deficit? YES or NO*															

* If YES provide a supplementary sheet with full load and capacity information for the hour of least surplus/greatest deficit

TABLE 1

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**APPENDIX 1 (CONTD.)
ACCREDITED CAPACITY
FIRM PURCHASES AND SALES
YEAR:**

Reporting System Member	Prepared By			Telephone						Date		
Purchases From	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
Total Firm Purchases												

Sales To	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR
Total Firm Sales												

TABLE 2

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APPENDIX 2 SERVICE SCHEDULES

SERVICE SCHEDULES - EMERGENCY ENERGY

Service Schedule A shall become effective from the commencement date of the SAPP Agreement.

1. EMERGENCY SERVICE

- 11 Emergency Energy shall mean energy supplied from other Operating Members to an Operating Member who experiences a loss of generation or transmission facilities as the result of an unscheduled outage (or outages) or any cause not reasonably foreseeable. Such energy shall be available for a period of six (6) hours starting from the occurrence of the emergency after which the Member must obtain other types of services or shed load should the shortage continue (Article 2.11)
- 12 The energy transfers (purchases and sales) are non-capacity transactions and shall not be credited towards a Member's Accredited Capacity.

2. SERVICE CONDITIONS

- 21 The provision of Emergency Energy shall be up to the full amount of the Operating Member's available Accredited Capacity but only if the Operating Member which experiences an Emergency Situation complies with its Accredited Capacity Obligation

- 2.2 Any Member, if so requested shall supply Emergency Energy unless the supply of Emergency Energy will overload or endanger its own system or the performance of its contractual obligations to others. Specifically, supplies of Emergency Energy shall not interfere with any service provided on a firm basis. However, an Operating Member who is simultaneously selling non-firm energy or any comparable service to another Member shall, if necessary, interrupt these non-firm services in order to supply Emergency Energy.
- 2.3 A Member which is selling non-firm energy or any comparable service to another system shall not be eligible to receive Emergency Energy unless such service is interrupted following the emergence of an Emergency Situation.
- 2.4 If the supplying and receiving Members are not directly interconnected, Wheeling shall take place in accordance with Service Schedule I and shall be firm.
- 2.5 Emergency Energy shall be converted as soon as possible into another type of transaction in accordance with the procedures specified in the Operating Guidelines. After six (6) hours there shall no longer be an obligation by the other Operating Members to continue the supply of Emergency Energy and the Member receiving this service shall then resort to load shedding if necessary.
- 2.6 Emergency Energy shall be purchased and sold at the Points of Interconnection.

RATES FOR EMERGENCY ENERGY

- 3.1 Unless otherwise agreed between the Members, Emergency Energy shall be charged at a rate which is the greater of 150 % of the total costs of owning and operating a new coal-fired station or 115 % of the Seller's Short Run Marginal Cost of Generation. In January 1994 money value, the rate shall be at least equal to US\$ 31.92/MWh. This rate shall be reviewed annually by the Planning Sub-Committee.

- 3.2 If, in a year, the Planning Sub-Committee fails to review the Dollar rate as per Item 3.1 above and if the Parties do not agree otherwise, the Dollar rate for Emergency Energy in Financial Year "n+1" shall be equal to the rate in Financial Year "n" multiplied by the ratio between the Production Price Index as issued by the Department of Commerce of the Federal Government of the United States of America for October of Year "n" divided by that of October of Year "n-1"
- 3.3 The supplier of Emergency Energy may, at his discretion, require the purchaser to return such energy at such times and under such conditions that the supplying Member will not experience a loss due to the transaction, or under conditions mutually agreeable to both Members
- 3.4 Wheeling charges if any shall be to the account of the receiving Member and shall comply with the provisions of Article 11.3.3 and Service Schedule I

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SERVICE SCHEDULE B - SYSTEM ENERGY

Service Schedule B shall become effective from the commencement date of the SAPP Agreement

1. SYSTEM ENERGY

- 1.1 System Energy shall mean energy purchased by one Operating Member from another Operating Member to defer the use of fuel or water, to reduce transmission losses, to improve environmental conditions or for any other reasons of a similar nature (Article 2.42).
- 1.2 The energy transfers (purchases and sales) are non-capacity transactions and shall not be credited towards Accredited Capacity

2. SERVICE CONDITIONS

- 2.1 Operating Members are qualified to purchase System Energy only to the extent that they have alternate and defined dependable capacity including purchased capacity that could otherwise be started up and used
- 2.2 The notice to be given for the interruption of System Energy shall influence the rates at which the transaction takes place
- 2.3 No System Energy transaction even when the ultimate purchaser is not an Operating Member of the SAPP can conflict or interfere with the purchase or sale of Emergency Energy and any System Energy shall be discontinued if necessary to prevent such conflict or interference from occurring

- 2.4 The Members shall mutually agree on the following:
- (a) The amount of such System Energy which the buyer desires to purchase and which can be delivered by the Seller
 - (b) The selling price of such System Energy;
 - (c) The schedule for delivery of such energy;
 - (d) The notice of interruption which shall typically be one (1) hour; eight (8) hours; sixteen (16) hours or twenty-four (24) hours
 - (e) Any other pertinent factor
- 2.5 The Seller may furnish at the agreed selling price, the requested System Energy from any available source it chooses including purchases from non-Members for resale to the Buyer.
- 2.6 If the Seller's and Buyer's systems are not directly interconnected Wheeling shall take place in accordance with Schedule I and the wheeling contract shall be of the same duration as the main contract.
- 2.7 The Wheeling required for such a service may be non-firm
- 2.8 System Energy shall be purchased and sold at the Points of Interconnection and the transaction shall not be scheduled in amounts that overload any transmission facility or endanger the operation of the interconnected systems

RATES FOR SYSTEM ENERGY

- 3.1 If the selling Member increases generation at thermal units or if the selling Member is importing System Energy and re-selling it, the rate shall be a function of the Seller's Short Run Marginal Cost of Generation (SRMC) and of the notice to be given before an interruption

Unless otherwise agreed between the Parties the rates shall not exceed

- 120 % of the Seller's SRMC if the notice is one (1) hour
- 125 % of the Seller's SRMC if the notice is eight (8) hours
- 130 % of the Seller's SRMC if the notice is sixteen (16) hours
- 135 % of the Seller's SRMC if the notice is twenty-four (24) hours

- 3.2 If the selling Member increases generation at hydro units and if the Buyer reduces its generation at thermal units, the rate shall be a function of the Buyer's Short Run Marginal Cost of Generation (SRMC) and of the notice to be given before an interruption

Unless otherwise agreed between the Parties the rates shall not exceed

- 85 % of the Buyer's SRMC if the notice is one (1) hour
- 88 % of the Buyer's SRMC if the notice is eight (8) hours
- 92 % of the Buyer's SRMC if the notice is sixteen (16) hours
- 95 % of the Buyer's SRMC if the notice is twenty-four (24) hours

- 3.3 If the selling Member increases generation at hydro units and if the Buyer reduces generation also at hydro units the selling price of System Energy shall be determined by mutual consent

- 3.4 The wheeling charges if any shall be to the account of the Buyer and shall comply with the provisions of Article 11.3.3 and Service Schedule I

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SERVICE SCHEDULE C - ECONOMY ENERGY

Service Schedule C shall become effective from the commencement date of the SAPP Agreement

ECONOMY ENERGY

- 1.1 Economy Energy shall mean energy produced at thermal power station(s) that one Operating Member purchases from another Operating Member to replace higher cost energy by lower cost energy. The savings resulting from such a transaction shall be split between the purchasing and the selling Members.
- 1.2 Economy Energy purchases and sales are non-capacity, non-firm transactions. They do not include a demand or capacity charge and shall not be included in the calculation of Accredited Capacity.

SERVICE CONDITIONS

- 2.1 Economy Energy may be interrupted at any time after notification at the sole discretion of the Seller.
- 2.2 An Operating Member may purchase Economy Energy only to the extent that such a Member has alternative capacity which is synchronised either in its own system or through contract in another system that could otherwise be used.
- 2.3 No Economy Energy transaction will conflict or interfere with the purchase or sale of Emergency Energy and any transfer of Economy Energy shall be curtailed or discontinued if necessary to prevent conflict or interference.
- 2.4 If the supplying and receiving Members are not directly interconnected, Wheeling shall take place in accordance with Schedule J and the wheeling contract shall be of the same duration as the main contract. The transmission required for such a service may be non-firm.

- 2.5 Economy Energy shall be purchased and sold at the Points of Interconnection and the transactions shall not be scheduled in amounts that overload any transmission facility or endanger the operation of the interconnected systems

3. RATES FOR ECONOMY ENERGY

- 3.1 The overall savings per MWh are equal to the difference between the Short Run Marginal Costs of Generation (SRMC) of the Seller and the Buyer. The billing rate shall be equal to one half of the overall savings per MWh added to the Short Run Marginal Cost of Generation of the Seller, unless otherwise agreed
- 3.2 If the Purchasing Member reduces its own hydro generation and if the selling Member increases its own thermal generation or imports Economy Energy for re-sale, the charge shall not exceed 115 % of the Seller's Short Run Marginal Cost of Generation unless otherwise agreed
- 3.3 Wheeling charges if any shall be to the account of the Buyer and comply with the provisions of Article 11.3.3 and Service Schedule I

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SERVICE SCHEDULE D - SURPLUS ENERGY

Service Schedule D shall become effective from the commencement date of the SAPP Agreement

1. SURPLUS ENERGY

- 1.1 Surplus Energy shall be energy from hydro power station(s) that one Operating Member purchases from another Operating Member to replace higher cost (or higher replacement cost) energy and which enables the purchasing and selling Members to share the savings through more efficient use of resources
- 1.2 The energy transfers (purchases and sales) are non-capacity non-firm transactions and shall not be included in Accredited Capacity calculations

2. SERVICE CONDITIONS

- 2.1 An Operating Member may purchase Surplus Energy only to the extent that such a Member has alternative capacity which is synchronised either in its own system or through contract in another system that could otherwise be used
- 2.2 No Surplus Energy transaction will conflict or interfere with the purchase or sale of Emergency Energy and any transfer of Surplus Energy shall be curtailed or discontinued if necessary to prevent such conflict or interference
- 2.3 If the supplying and receiving Members are not directly interconnected, Wheeling shall take place in accordance with Schedule I and the Wheeling Contract shall be of the same duration as the main contract. The transmission required for such a service may be non-firm

- 24 Surplus Energy shall be purchased and sold at the Points of Interconnection and the transactions shall not be scheduled in amounts that overload any transmission facility or endanger the operation of the interconnected system.
- 25 Surplus Energy may be interrupted at any time after notification at the sole discretion of the Seller

RATES FOR SURPLUS ENERGY

- 31 When the Selling Member increases its generation at hydro units and the Buyer reduces its generation at thermal units the rate shall not exceed 75 % of the Buyer's Short Run Marginal Cost of Generation unless otherwise agreed by the Parties.
- 32 When the Selling Member increases generation at hydro units and the Buyer reduces generation also at hydro units the selling price of Surplus Energy shall be determined by mutual consent
- 33 Wheeling charges, if any shall be to the account of the Buyer and shall comply with the provisions of Article 11.3.3 and Schedule I

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SERVICE SCHEDULE E ENERGY BANKING

Service Schedule E shall become effective from the commencement date of the SAPP Agreement.

1 ENERGY BANKING

- 1.1 This schedule provides for interchange of energy between Members
 - Energy Banking shall mean energy which a Member desires to sell from its own system that is in excess of its commitments and which the other Member desires to purchase to improve its electrical system operation. Energy Banking may include energy interchange for the purpose of pond storage control or to facilitate banking of thermal energy. Energy Banking may also include an agreement for the interchange of energy on a daily or weekly basis.
- 1.2 The Energy transfers (banking, purchases and sales) are non-capacity, non-firm transactions and shall not be credited towards Accredited Capacity.

2 SERVICE CONDITIONS

- 2.1 The Members shall agree on the following
 - * The period the transaction is effective
 - * The scheduling of energy
 - * The price of the transaction
 - * That the exchange may provide for the return of equivalent energy
 - * Other pertinent factors
- 2.2 If the two Members are not directly interconnected, Wheeling may take place in accordance with Schedule I and the wheeling contract shall be of the same duration as the main contract.

- 2.3 Wheeling may be non-firm
- 2.4 Banking Energy shall be purchased and sold at the Points of Interconnection and the transaction shall not be scheduled in amounts that overload any transmission facility or endanger the operation of the interconnected systems

3. RATES FOR ENERGY BANKING

- 3.1 The rates and terms for Energy Banking shall be negotiated by the Members and may include the return of equivalent energy
- 3.2 The savings resulting from an Energy Banking transaction that includes an agreed exchange of energy on a daily or weekly basis between the thermal units of a Member and the hydro units of another Member shall be shared equally between the Parties. Such savings shall be the difference between the "value of energy" and the "cost of energy" after Wheeling, transmission losses and spillage have been taken into account. In particular:
 - 3.2.1 Unless otherwise agreed the "cost of energy" shall be the thermal unit's Short Run Marginal Cost of Generation for energy delivered to the hydro system and the "value of energy" shall be the thermal unit's Short Run Marginal Cost of Generation when energy is delivered back to the thermal system
 - 3.2.2 Spillage shall be that energy lost if the hydro system must spill water from its reservoirs during the period that energy is stored in the hydro system. The quantities of energy lost in this manner shall be deducted from the energy to be returned to the thermal system
- 3.3 Unless otherwise agreed the following shall apply where the interval between the deposit and withdrawal of energy is more than one (1) week

3.3.1 If the Depositor is the requesting Party it shall be credited for each deposit it makes with an amount equal to the energy deposited multiplied by the "cost of energy" in 3.2.1 less a negotiated margin not exceeding 20 %. Where both the Depositor and Banker have hydro systems, the rate for deposited energy shall be by mutual consent

3.3.2 If the Banker is the requesting Party, the Depositor shall be credited for each deposit it makes with an amount equal to the energy deposited multiplied by the cost of energy in 3.2.1 plus a negotiated margin not exceeding 20 %. Where both the Depositor and Banker have hydro systems the rate for deposited energy shall be by mutual consent

3.3.3 The Depositor Member may withdraw energy from its account from time to time at a rate not exceeding that specified in advance until the account is depleted. The value of the energy withdrawn at any time will be the amount of energy multiplied by the "value of energy" in 3.2.1 or that agreed by mutual consent if both the Depositor and the Banker have hydro systems

3.3.4 The requesting Party shall pay for the wheeling charges if any. The Purchaser of banked energy (whether the Depositor or another Member) will pay the wheeling charges if any when energy withdrawal takes place. Wheeling shall comply with the provisions of Article 11.3.3 and of Schedule 1"

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SERVICE SCHEDULE F: SHORT-TERM FIRM POWER

Service Schedule F shall become effective from the commencement date of the SAPP Agreement

SHORT-TERM FIRM POWER

- 1.1 Short-Term Firm Power shall mean contracted capacity and associated energy intended to be available at all scheduled times for the duration of the transaction
- 1.2 Such power shall include the required reserve capacity

2 SERVICE CONDITIONS

- 2.1 This Schedule shall be available for the sale of Short-Term Firm Power for periods of seven (7) or more consecutive days and shall not exceed a period of six (6) consecutive months
- 2.2 Short-Term Firm Power shall be included in the Monthly System Peak Obligation of a Member only when a special condition applies such as
 - 2.2.1 when a significant new industrial customer's load is imposed upon a Member's system at a time different from the purchase period for which other schedules are applicable or
 - 2.2.2 when a generator or transmission line addition does not meet the scheduled in-service date or
 - 2.2.3 when it is being purchased for resale to a party which is not a Member
- 2.3 Wheeling for this type of transaction shall be firm and the duration of the wheeling contract shall be the same as that of the main transaction

3. RATES FOR SHORT-TERM FIRM POWER

- 3.1 The receiving Member shall pay to the supplying Member for Short-Term Firm Power supplied during any month, a capacity rate of US\$ 1.92/kW per week in January 1994 money values unless otherwise agreed. This rate shall be reviewed yearly by the Planning Sub-Committee.
- 3.2 Unless otherwise agreed, if the sale is from a predominantly thermal system, the energy charge shall not exceed 115 % of the Seller's Short Run Marginal Cost of Generation.
- 3.3 If a hydro system sells Short-Term Firm Power to a thermal system, the energy charge shall not exceed 80 % of the Buyer's Short Run Marginal Cost of Generation unless the Parties have agreed on other terms.
- 3.4 When a hydro system sells Short-Term Firm Power to another hydro system, the energy rate shall be determined by mutual consent.
- 3.5 The wheeling charges, if any, shall be to the account of the Buyer and shall comply with the provisions of Article 11.3.3 and of Schedule I.
- 3.6 If, in a year, the Planning Sub-Committee fails to review the rate as per Item 3.1 above and if the Parties do not otherwise agree, the rate in Financial Year "n+1" shall be equal to the rate in Financial Year "n" multiplied by the ratio between the Production Price Index in the United States in October of Year "n" divided by that in October of Year "n-1".

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SERVICE SCHEDULE G - SYSTEM PARTICIPATION POWER

Service schedule G shall become effective from the commencement date of the SAPP Agreement

1. SYSTEM PARTICIPATION POWER

- 1.1 System Participation Power provides for the sale of Firm Capacity and Energy by any Member to another Member for a specified period, not exceeding a six (6) month period
- 1.2 The Member purchasing the capacity shall be required to provide the reserve

2. SERVICE CONDITIONS

- 2.1 This Schedule shall be available for the sale of System Participation Power for periods of seven (7) or more consecutive days
- 2.2 System Participation Power is intended to be available at all times during the period covered by the commitment. However should problems occur the Seller's Firm Power sales and services to its own customers shall have priority if the transaction is for less than six consecutive months in which case the supplying Member shall have the right to notify the Buyer to reduce its schedule which shall be promptly complied with until such problems have been rectified
- 2.3 System Participation Power shall be included in the Accredited Capacity only when a special condition applies such as
 - 2.3.1 when the purchase is for resale to a party which is not a Member or
 - 2.3.2 when a Member purchases System Participation Power for a period of six (6) consecutive months

- 2.4 System Participation Power shall be purchased and sold at the Points of Interconnection and the transaction shall not be scheduled in amounts that overload any transmission facility or endanger the operation of the interconnected systems
- 2.5 Wheeling for this type of transaction shall be firm and the duration of the wheeling contract shall be the same as that of the main transaction

RATES FOR SYSTEM PARTICIPATION POWER

- 3.1 The rate for capacity shall be equal to US\$0.190/kW/day in January 1994 money values, unless otherwise agreed. This rate shall be reviewed annually by the Planning Sub-Committee
- 3.2 Unless otherwise agreed, if the sale is from a system which is predominantly thermal the energy rate shall not exceed 115 % of the Seller's Short Run Marginal Cost of Generation
- 3.3 If System Participation Power is obtained from a hydro unit and sold to a thermal system, the energy rate shall not exceed 80 % of the Buyer's Short Run Marginal Cost of Generation unless otherwise agreed
- 3.4 Wheeling charges if any shall be to the account of the Buyer and shall comply with the provisions of Article 11.3.3 and Service Schedule I
- 3.6 If in a year the Planning Sub-Committee fails to review the rate in Item 3.1 above and if the Parties do not otherwise agree the rate in Financial Year "n+1" shall be equal to the rate in Financial Year "n" multiplied by the ratio between the Production Price Index in the United States in October of Year "n" divided by that in October of Year "n-1"

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SERVICE SCHEDULE H: OPERATING RESERVE

Service Schedule H shall become effective from the commencement date of the SAPP Agreement

1 OPERATING RESERVE SERVICE

- 1.1 Operating Reserve under this Service Schedule shall mean unused capacity above System Demand which is required only to cater for Unplanned Outages (Article 2.44)
- 1.2 An Operating Member may purchase Operating Reserve from another Operating Member as part or all of its Operating Reserve Obligation
- 1.3 Operating Reserves purchased under this Service Schedule shall not be credited towards the Accredited Capacity of the receiving Member

2 SERVICE CONDITIONS

- 2.1 The Operating Reserve shall be capacity made available as scheduled unless in the opinion of the supplying party it is prevented or made inadvisable due to an Emergency Situation or another unforeseen condition
- 2.2 The energy flows resulting from the Operating Reserve contracted for, must be available within the time prescribed in the Operating Guidelines. As soon as Operating Reserve is taken up by the receiving Member who then starts to also receive energy the transaction shall be converted into System Energy (Schedule B)
- 2.3 Unless otherwise agreed the portion of Spinning Reserve and Quick Reserve making up the Operating Reserve purchased under this type of transaction shall be as specified in the Operating Guidelines

- 2.4 Operating Reserve shall be converted into System Energy interruptible at a one (1) hour notice rate unless otherwise agreed. This shall be for less than ten (10) occurrences in any calendar month. Energy deliveries beyond these limits shall be treated as Short-Term Firm Power.
- 2.5 The Wheeling required for such services may be non-firm. The wheeling contract shall be of the same duration as the main contract.
- 2.6 Operating Reserve shall be purchased and sold at the Points of Interconnection.
- 2.7 Operating Reserve transactions shall always be for complete days.

3. RATES FOR OPERATING RESERVE

- 3.1 Unless otherwise agreed by the parties, the rate for "Operating Reserve" shall be 20% of the total fixed costs per kW of owning and operating a large coal-fired station. In January 1994, money value, the rate shall be US\$47.5/MW per day. This rate shall be reviewed every year by the Planning Sub-Committee.
- 3.2 The Energy Rate shall be as per Item 2.4 above.
- 3.3 With short-term contracts (one month or less), the receiving Member may cancel all or part of a scheduled transaction with a minimum notice of twenty-four (24) hours and the cancellation fee shall be equal to the price to pay if the arrangement had continued for another twenty-four (24) hours.
- 3.4 If the Selling Member is unable to provide all or a portion of the required energy within the time specified in the Operating Guidelines, it shall not be entitled to the payment corresponding to the shortfall over a period of twenty-four (24) hours.
- 3.5 Wheeling charges shall be to the account of the Buyer and shall comply with the provisions of Article 11.3.3 and Service Schedule I.

- 3.6 If, in a year, the Planning Sub-Committee fails to review the rate in Item 3 1 above and if the Parties do not otherwise agree, the rate in Financial Year "n+1" shall be equal to the rate in Financial Year "n" multiplied by the ratio between the Production Price Index in the United States in October of Year "n" divided by that in October of Year "n-1"

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SERVICE SCHEDULE I - WHEELING

Service Schedule I shall become effective from the commencement date of the SAPP Agreement

1. WHEELING

Wheeling shall mean transmitting a contractual amount of power over specified time periods through the system of an Operating Member who is neither the Seller nor the Buyer of this power (Article 2.45)

2. SERVICE CONDITIONS

- 2.1 Firm Wheeling The Operating Member whose assets are engaged in Wheeling guarantees that the wheeled power will enjoy the same priority as any firm supply to its own customers. It should be able to provide such service for various conditions as specified in the Operating Guidelines
- 2.2 Non-Firm Wheeling The Operating Member whose assets are engaged in non-firm Wheeling may curtail or interrupt the flow of wheeled power based on technical and economic considerations for its system without any penalty
- 2.3 Whenever the service is interrupted the Buyer has the right to request justification of any curtailment or interruption. This information may be submitted to the Operating Sub-Committee for comments
- 2.4 A wheeling transaction in which the transmission facilities of more than one Operating Member are involved shall be categorised as non-firm if at least one Operating Member does not guarantee a firm wheeling transaction and more than 10 % of the total scheduled transaction goes through that system

- 2.5 For any Wheeling arranged under this Agreement the required transmission capacity of the wheeling Member shall be reserved for the same time period as the main transaction. For deals longer than three (3) months, the reservation of transmission capacity shall be contained in a written agreement between the purchasing Member and the wheeling Member.
- 2.6 Firm Wheeling shall always be applicable to Emergency Energy Firm Power and Participation Power (Service Schedules A F K G and L).
- 2.7 The capability to provide specific wheeling services and the determination of the charges for each transaction shall be determined in chronological order in which the wheeling contracts are signed.
- 2.8 Unless otherwise agreed between the parties reservation of transmission facilities for wheeling purposes shall be a "take or pay" transaction or alternatively the notice for cancellation shall be at least three (3) months.
- 2.9 If due to load growth in excess of the forecast submitted to the Planning Sub-Committee a wheeling transaction becomes detrimental to an Operating Member's obligations towards its own customers then such a situation shall be brought to the attention of the other parties and shall constitute sufficient ground for the re-negotiation of the wheeling arrangement, unless specified to the contrary in the wheeling transactions covering a period longer than three (3) years.
- 2.10 Wheeling shall cover the full distance between Points of Interconnection.

COSTS RECOVERED IN THE WHEELING CHARGE

- 3.1 The monies to be recovered by the wheeling Member shall include the following

- 3.1.1 Rent of Assets. this charge shall be derived from the levelised capital costs of the transmission facilities used for Wheeling in proportion to the use made of such facilities to implement the wheeling transaction
- 3.1.2 Where applicable for long-term deals the opportunity cost of foregone benefits as a direct consequence of the wheeling transaction must be taken into account. Conditions necessary to claim opportunity costs are as follows.
- 3.1.2.1 Demonstrate the financial loss of the wheeler due to a firm transaction replacing Firm Sale which the wheeler could otherwise have made
 - 3.1.2.2 Prove the loss of opportunity of connecting new large customers
 - 3.1.2.3 Prove foregone potential contributions to existing system costs by other potential transactions
 - 3.1.2.4 Prove foregone savings in distribution costs should cheaper energy be accessible from elsewhere
- 3.2 Unless otherwise agreed between the parties the extra transmission losses (positive or negative) in the wheeler's system shall be compensated by extra generation by the Seller of energy as specified in Article 11.3.3
- 3.3 If the wheeling transaction is firm full rent of transmission assets is to be recovered but if the wheeling transaction is non-firm only 50 % of the rent is to be recovered. Unless the wheeling transaction extends over more than three (3) years Operating Members shall not be allowed to include in wheeling charges any other cost than those given in 3.1 above

4. ASSETS INVOLVED IN WHEELING

An Operating Member making use of transmission facilities belonging to another Member for the purpose of Wheeling shall pay a rent for the assets used in accordance with the procedures determined by the Planning Sub-Committee. These procedures shall use the following guidelines:

- 4.1 Calculate the transmission losses caused by the wheeling transaction by comparing load flow studies with and without Wheeling. The increase (saving) in losses shall be supplied by the Seller of energy and purchased by the Buyer in accordance with Article 11.3.3. If several wheeling transactions occur at the same time they will be classified into firm and non-firm transactions and the magnitude of the losses will be determined, considering first the chronological order in which the firm wheeling transactions were agreed upon (last signature) and thereafter the chronological order in which the non-firm wheeling transactions were agreed upon (last signature).
- 4.2 Identify the cost of the assets used in the wheeling transaction. These shall either be transmission lines plus their feeder bays (at either end) or coupling transformers plus their switch bays on either side. Common equipment such as bus couplers, bus sections, reactors, capacitors, SVCs etc. and their switching equipment as well as control rooms shall be ignored when calculating the rent of assets in a wheeling transaction.
- 4.3 Determine the proportional usage of transmission assets for wheeling purposes by conducting load flow studies and assuming that plant is fully loaded (utilised) either at its name plate rating (switchgear, transformers etc.) or at the limits stipulated by the Planning Sub-Committee (transmission lines). System conditions may be modelled hourly post factum on the basis of metered data, alternatively typical system conditions and their duration as agreed upon between the Purchaser and the Seller of wheeling services are modeled ante factum.

- 4.4 Calculate the rent payable for the usage of assets engaged in Wheeling. This rent shall be based on the replacement costs of the assets updated from time to time by the Planning Sub-Committee, an economic life of twenty-five (25) years and a net discount rate not exceeding 6%. Until reviewed by the Planning Sub-Committee the net discount rate shall be 4%. The annual operation and maintenance costs on the facilities engaged in Wheeling, shall be 2% of the replacement costs of these assets and shall be added to the rent value of the assets.

5 RENT OF TRANSMISSION FACILITIES

5.1 FORMULA

The rent formula shall be as follows

$$R = r - [1 - (1+r)^{-n}]$$

where r is the net discount rate
 n is the economic life of the asset
 R is the rent per annum for an asset worth US\$1 00

If the net discount rate or required return on investment r (in constant money values) is 4% and the economic life is twenty-five (25) years $R = 6.40\%$ per annum

$$R = 0.04 - [1 - 1.04^{-25}] = 4\% \times 1.6003 = 6.40\%$$

For non-firm Wheeling half of this value shall apply

5.2 COSTS COVERED BY THE RENT FORMULA

The difference between R and the net discount rate r covers the generation of funds for the replacement of the plant at the end of its life. In other words the rent formula provides the wheeler with the means of replacing its assets after twenty-five (25) years plus in this example a real return on assets equal to 4%. The return on asset for this type of plant should be lower than for generating plant because the financial risk of building new transmission facilities is also less.

For simplification purposes, a relatively low return on the un-depreciated value of the assets has been assumed rather than taking a higher return on assets which have already been depreciated over a number of years.

5 3 IMPLEMENTATION

Bearing in mind that system conditions change in time, so does the proportional utilisation of the assets engaged in wheeling. In principle, the calculation should be repeated each time a change in system conditions occurs alternatively typical system conditions and their duration are agreed before the facts

Where power exchanges are monitored on an hourly basis it is appropriate to calculate the hourly wheeling charge for each hour. The hourly rent for using an asset in full can be taken as:

$$\text{Hourly rent} = \text{Annual rent} - 8760$$

5 4 STANDARD COSTS OF TRANSMISSION FACILITIES.

Until reviewed by the Planning Sub-Committee the value of the transmission assets used in wheeling shall be established using the standard replacement costs given in Tables 1, 2 and 3 attached. These costs are valid in the 1994-1995 Financial Year. Costs in Financial Year "n+1" shall be equal to the costs in Financial Year "n" multiplied by the ratio between the Production Price Index in the United States in October of Year "n" divided by that in October of Year "n-1".

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SERVICE SCHEDULE 1 - WHIRLING

TABLE 1
TRANSMISSION LINE REPLACEMENT COSTS
FINANCIAL YEAR 1994-1995

ITEM OF PLANT	COND. SQ. MM	REPLACEMENT COST (US\$10 ³ /KM)
400kV Quad Wolf	4/158	125
400kV Quad Zebra	4/427	188
400kV Triple Bersfort	3/687	175
400kV Twin Bersfort	2/687	153
400kV Triple Bison	3/382	156
400kV Triple Tern	3/404	155
330kV Triple Bison	3/382	146
330kV Twin Tern	2/404	112
330kV Twin Zebra	2/427	117
330kV Twin Bison	2/382	113
275kV Twin Zebra	2/427	93
275kV Twin Bear	2/265	84
275kV Quad Tern	4/404	144
220kV Single Zebra	1/427	81
220kV Single Tern	1/404	77
132kV Single Wolf	1/158	58

SERVICE SCHEDULE F - WHEELING

**TABLE 2
SWITCH BAY REPLACEMENT COSTS
THESE COSTS INCLUDE PROTECTION, CARRIERS
AND MEASUREMENTS, CIVIL WORK AND CABLING
FINANCIAL YEAR 1994-1995**

KV	ITEM OF PLANT	AMPS	FAULT KA	REPLACEMENT COSTS (US\$10 ³)
400	Line Bay	2500	31	1123
	Line Bay	3150	50	1205
	Transformer Bay	2500	31	757
	Transformer Bay	3150	50	805
330	Line Bay	2500	31	902
	Transformer Bay	2500	31	839
275	Line Bay	2500	31	852
	Line Bay	3150	50	861
	Transformer Bay	2500	31	573
	Transformer Bay	3150	50	557
220	Line Bay	2500	31	852
	Transformer Bay	2500	31	750
132	Line Bay	2500	25	343
	Line Bay	2500	40	366
	Transformer Bay	2500	25	277
	Transformer Bay	2500	40	282

SERVICE SCHEDULE 1 WHEELING

TABLE 3
 TRANSFORMER REPLACEMENT COSTS
 THESE COSTS INCLUDE CIVIL WORK,
 PROTECTION, MEASUREMENTS, CABLING, ETC.
 FINANCIAL YEAR 1994-1995

VOLTAGE			
HV SIDE	LV SIDE	RATING MVA	REPLACEMENT COSTS (US\$10 ³)
400	330	500	2435
400	275	800	3860
400	275	400	2760
400	220	630	3885
400	220	500	3690
400	220	315	2780
400	132	500	3720
400	132	250	2635
400	132	125	1890
275	132	500	3010
275	132	250	2130
275	132	180	1845
275	132	125	1530
220	132	500	2520
220	132	250	1780
220	132	125	1285
330	220	315	2450
330	220	160	1740
330	220	120	1490

SERVICE SCHEDULE J - SCHEDULED OUTAGE ENERGY

Service Schedule J shall become effective from the commencement date of the SAPP Agreement

1 - SCHEDULED OUTAGE ENERGY

- 1.1 This Schedule provides for the supply of energy from a Member to any other Member during Scheduled Outages for maintenance of generating or transmission facilities or both
- 1.2 The capacity transfers resulting from Scheduled Outage flows shall not be credited to the Accredited Capacity of the receiving Member

2 - SERVICE CONDITIONS

- 2.1 Scheduled Outage Energy is only to be purchased against Accredited Capacity out of service for maintenance or when that capacity is limited due to maintenance
- 2.2 If the Seller suffers a loss of generation but can still meet its firm load commitments, the Scheduled Outage Energy must continue unless the Buyer agrees to a reduction or termination
- 2.3 A Member shall sell Scheduled Outage Energy to a requesting Member only when this Member has fully utilised its available Accredited Capacity to meet its load commitments and Operating Reserve obligations
- 2.4 Scheduled Outage Energy may be scheduled from a Member not directly interconnected provided such energy is available at a lower delivered cost, including Wheeling. Wheeling for this type of transaction shall be firm

- 2.5 Scheduled Outage Energy shall be purchased and sold at the Points of Interconnection and the transaction should not be scheduled in amounts that overload any transmission facility or endanger the operation of the interconnected systems
- 2.6 Wheeling may be non-firm

RATES FOR SCHEDULED OUTAGE ENERGY

- 3.1 Unless otherwise agreed the Buyer shall pay to the Seller the greater of
- (a) 115 % of the Average Production Cost incurred by the Seller to produce such energy or
 - (b) 115 % of the Average Production Cost incurred by the Buyer if the Buyer had produced such energy with the generating unit that is out of service
- 3.2 Under 2.3 the Seller may require an additional payment for any financial loss that accrues to the Seller due to this transaction replacing a sale to another Party
- 3.3 The Seller may require the Buyer to return such energy at times and under conditions that the Seller will not experience a loss due to the transaction or under conditions acceptable to both Parties
- 3.4 Wheeling charges if any shall be to the account of the Buyer and shall comply with the provisions of Article 11.3.3 and Service Schedule I

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SERVICE SCHEDULE K - FIRM POWER

Service Schedule K shall become effective from the commencement date of the SAPP Agreement

1. FIRM POWER

- 1.1 Firm Power shall mean contracted capacity and associated energy intended to be available at all scheduled times for the duration of the transaction
- 1.2 Firm Power shall include the necessary Reserve Capacity
- 1.3 Firm Power purchases shall be credited to the Monthly System Peak Obligation of the receiving Member Firm Power sales shall be debited against the Monthly System Peak Obligation of the supplying Member

2. SERVICE CONDITIONS

- 2.1 Any transaction under this Schedule shall cover a period of six (6) months or longer
- 2.2 Firm Power can be base intermediate or peaking power; it can be continuous or intermittent as specified in the particular contracts
- 2.3 Adequate provision shall be made for transmitting the energy and when Wheeling through the system of another Operating Member is required the Wheeling shall be firm
- 2.4 When Wheeling is required the provisions under Service Schedule I shall apply The duration of the Wheeling arrangement shall be the same as that of the main transaction
- 2.5 Firm Capacity shall be purchased and sold at the Points of Interconnection and the transaction shall not be scheduled in amounts that overload any transmission facility or endanger the operation of the interconnected systems

3. RATES FOR FIRM POWER

- 31 The recommended capacity rate for Firm Power shall be 115 % of the total fixed costs of owning and operating a new coal-fired power station and shall be reviewed every year by the Planning Sub-Committee, taking into account new capacity either commissioned, under construction or planned in the Region. In January 1994 money values, the rate shall be US\$8.31/kW per month, unless otherwise agreed between the Parties. The terms for Firm Power shall be negotiated by the Members for each transaction.
- 32 If dedicated transmission lines must be built to transport the Firm Power to the Buyer's system, a rent of transmission facilities as calculated in Schedule I on Wheeling shall be levied upon the Buyer.
- 33 If the sale is from a predominantly thermal system, the energy rate shall not exceed 115 % of the Seller's Short Run Marginal Cost of Generation unless the Parties have agreed on other terms.
- 34 If a hydro system sells Firm Power to a predominantly thermal system, the energy charge shall not exceed 80 % of the Buyer's Short Run Marginal Cost of Generation unless the Parties have agreed on other terms.
- 35 When a hydro system sells Firm Power to another hydro system, the energy charge shall be determined by mutual consent.
- 36 The wheeling charges, if any, shall be to the account of the Buyer and shall comply with the provisions of Article 11.3.3 and of Schedule I.
- 37 The degree of firmness, the penalties and the amount of load shedding, if any, that must occur in the Seller's system before Firm Power may be curtailed or interrupted, must be clearly specified in the agreement covering the transaction and may command a premium.

- 3.8 If in a year, the Planning Sub-Committee fails to review the rate as per 3.1 above and if the Parties do not otherwise agree, the rate in Financial Year "n+1" shall be equal to the rate in Financial Year "n" multiplied by the ratio between the Production Price Index in the United States in October of Year "n" divided by that in October of Year "n-1"

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SERVICE SCHEDULE L - PARTICIPATION POWER

Service Schedule L shall become effective from the commencement date of the SAPP Agreement.

1 PARTICIPATION POWER

- 1.1 Participation Power shall mean the lease of a specific generating unit (or units) or a portion of such unit(s) and the sale of its production from one Operating Member to another Operating Member. This capacity and energy shall be continuously available except when such unit (or units) is out of service for maintenance or repair during which time the delivery of energy from other sources shall be at the Seller's discretion (see Article 2.26).
- 1.2 The Member purchasing the capacity shall be required to provide the reserve.
- 1.3 Participation Power shall be credited towards the "Accredited Capacity" of the receiving Member and debited against the "Accredited Capacity" of the supplying Member.

2 SERVICE CONDITIONS

- 2.1 This Schedule shall be available for the sale of Participation Power for a period of six (6) months or more.
- 2.2 Participation Power shall be purchased and sold at the Points of Interconnection and the transaction shall not be scheduled in amounts that overload any transmission facility or endanger the operation of the interconnected systems.
- 2.3 Wheeling for this type of transaction shall be firm.

35. RATES FOR PARTICIPATION POWER

- 3.1 The terms for Participation Power shall be negotiated by the Members for each transaction. Unless otherwise agreed the capacity rate shall not exceed the fixed costs per kW of owning and operating a large coal-fired station. In January 1994 money value, this cost equals US\$7.23/kW per month. The rate shall be reviewed by the Planning Sub-Committee every year.
- 3.2 In the event that services cannot be supplied on the effective date of an Agreement due to a delayed in-service date, the capacity rate to be paid by the purchasing Member shall not become effective until the date such facilities are certified as Accredited Capacity.
- 3.3 Unless otherwise agreed, if the Seller has a system which is predominantly thermal, the energy rate shall not exceed 115 % of the Seller's Short Run Marginal Cost of Generation.
- 3.4 If Participation Power is obtained from a hydro unit and sold to a thermal system, the energy rate shall not exceed 80 % of the Buyer's Short Run Marginal Cost of Generation, unless otherwise agreed.
- 3.5 Wheeling charges, if any, shall be to the account of the Buyer and shall comply with the provisions of Article 11.3.3 and Service Schedule I.
- 3.6 If in a year, the Planning Sub-Committee fails to review the rates as per 3.1 above and if the Parties do not otherwise agree, the rates in Financial Year "n+1" shall be equal to the charges in Financial Year "n" multiplied by the ratio between the Production Price Index in the United States in October of Year "n" divided by that in October of Year "n-1".

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SERVICE SCHEDULE M - CONTROL AREA SERVICES

Service Schedule M shall become effective from the commencement date of the SAPP Agreement.

CONTROL AREA SERVICES

Control Area Services is a contract one Operating Member (Member A) has with another Operating Member (Member B) to be part of its Control Area (Control Area of Member B). This Schedule is available to the Operating Members who have difficulty in meeting the control criteria as specified in the Operating Guidelines.

2. SERVICE CONDITIONS

- 2.1 A Member may purchase Control Area Services only from an Operating Member or non Pool Member to which it is directly connected.
- 2.2 Any transaction under this Schedule shall cover a period of at least three (3) months.
- 2.3 The energy flows resulting from this type of transaction shall be calculated as specified under 2.4 below and shall be returned in kind or contracted for separately, for example in the same way as for energy flows resulting from Operating Reserve Services.
- 2.4 The hourly energy flows shall be equal to
 - (i) the sum of all the actual energy flows in a clock hour through the Points of Interconnection linking Member A to all other Members where exports are positive and imports are negative
 - (ii) minus the sum of all the scheduled energy flows in the same clock hour through the Points of Interconnection linking Member A to all other Members where exports are positive and imports are negative

A negative value means that Member A shall return energy to other Members

3. AMOUNT OF CAPACITY REGULATED

The amount of capacity regulated by Member B on behalf of Member A in an hour shall be equal to the sum of:

- (i) the largest difference in that clock hour between the (actual) instantaneous power exports and the scheduled power flows at the same moment and
- (ii) the largest difference in the same clock hour between the (actual) instantaneous power imports and the scheduled power flows at the same moment

4. RATES

Unless otherwise agreed between the Parties the rates for Control Area Services shall be the same as for Operating Reserve (Item 3.1 Schedule H) and shall apply to the amount of capacity regulated as specified in Item 3 above

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APPENDIX 3 CALCULATION OF ENERGY AND CAPACITY RATES

1 CAPITAL AND PRODUCTION COSTS FOR A NEW COAL-FIRED STATION

1.1 INPUT DATA:

We assume as a benchmark, a new coal-fired power station, dry-cooled and equipped with six (6) units developing 635 MW-SO each

In January 1994 (US\$/Rand exchange rate of R3 30/US\$) the cost per kW after adjustment for construction time is about \$1010/kW (no SO₂ nor NO_x removal) and the fixed operation and maintenance (O & M) costs once the station is fully commissioned, are about \$4 25 million per month. The variable O & M costs are \$0 53/MWh-SO

The fuel costs are assumed to be proportional to the energy sent out and are equal to \$9 10/ton or \$5 51/MWh (33 % efficiency 18GJ/ton). The average load factor is in the vicinity of 65 % the energy produced every month is thus 1808 GWh (730 hours in a month)

1.2 LEVELISED COST OF CAPITAL AND FIXED O & M COSTS

Assuming an economic life of thirty (30) years and a nett discount rate of 6 % the levelised cost of capital or the rent value of the capital invested in the plant is \$6 11/kW per month

$$R = r - [1 - (1 + r)^{-n}] = 0.06 - (1 - 1.06^{-30}) = 7.26 \%$$

$$\$1010/\text{kW} \times 7.26 \% \times 12 = \$6.11/\text{kW per month}$$

With a 65 % load factor the levelised cost of capital is also equal to \$12 88/MWh

$$\$6110/\text{MW} - (730\text{h} \times 65 \%) = \$12.88/\text{MWh}$$

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The fixed O & M costs are \$4,25 million per month or \$1,12/kW per month, or \$2,36/MWh.

$$\begin{aligned} \$4,25 \text{ million} \div (6 \times 635 \text{ MW}) &= \$1,12/\text{kW per month} \\ \$1120/\text{MW} \div (730\text{h} \times 65\%) &= \$2,36/\text{MWh} \end{aligned}$$

1.3 TOTAL FIXED COSTS (JANUARY 1994):

The total fixed costs are therefore \$7 23/kW per month

$$\$6,11/\text{kW} + \$1,12/\text{kW} = \$7,23/\text{kW per month}$$

Expressed in energy terms, the total fixed costs are equal to US\$15,24/MWh

$$\$12,88/\text{MWh} + \$2,36/\text{MWh} = \$15,24/\text{MWh}$$

1.4 VARIABLE COSTS (JANUARY 1994).

With a load factor of 65 %, the energy delivered by the station is 1 808 GWh per month and the variable O & M plus fuel costs are \$6 04/MWh or \$10,92 million per month or \$2,86/kW per month

$$\begin{aligned} 6 \times 635 \text{ MW} \times 8760\text{h} \times 0,65 &= 1\,808 \text{ GWh per month} \\ \$5,51/\text{MWh} + \$0,53/\text{MWh} &= \$6,04/\text{MWh} \\ \$6,04/\text{GWh} \times 1\,808 \text{ GWh} &= \$10,92 \text{ million per month} \\ \$6,04/\text{MWh} \times 730 \text{ hours} \times 65\% &= \$2,866/\text{MW per month} \end{aligned}$$

higher due to variable O & M

1.5 TOTAL COSTS (JANUARY 1994):

Energy as a basis (fixed plus variable costs):

$$\text{US\$15.24/MWh} + \text{US\$6.04/MWh} = \text{US\$21.28/MWh}$$

Installed capacity basis (fixed plus variable costs):

$$\text{US\$7.23/kW} + \text{US\$2.86/kW} = \text{US\$10.09/kW per month}$$

LEVELISED COST OF A NEW COAL-FIRED STATION 65% LF							
JAN 1994	FIXED			VARIABLE			TOTAL
	CAPITAL	O & M	TOTAL	O & M	FUEL	TOTAL	
\$/kW pm	6.11	1.12	7.23	0.25	2.61	2.86	10.09
\$/MWh	12.89	2.35	15.24	0.53	5.51	6.04	21.28

2. RATES USES IN THE SCHEDULES

2.1 PARTICIPATION POWER AND SYSTEM PARTICIPATION POWER:

The capacity rate for Participation Power (Schedule L) is deemed not to exceed US\$7.23/kW per month (the fixed portion of the levelised cost of a new coal-fired station as determined above. The capacity rate for short-term or system Participation Power (Schedule G) should not exceed 80 % of US\$7.23/kW per month. This is equal to US\$5.78/kW per month or US\$0.190/kW per day or US\$1.33/kW per week.

The capacity rate for Participation Power in turn forms the basis for other capacity rates as given in the paragraphs which follow

The capacity rate for Short-Term Firm Power (Schedule F) is taken to be the same as the capacity rate for Firm Power converted to a weekly rate, i.e. $8,31 + 4,33 = \text{US\$}1.92/\text{kW}$ per week.

2.3 PENALTY FOR SHORTAGE OF ACCREDITED CAPACITY:

The penalty is equal to five times the monthly rate for Participation Power or $\text{US\$} 36,15/\text{kW}$ (see Appendix 1). The five times comes from the consideration that the annual peak can occur in any of the five coldest months of the year (May to September). The penalty is also set to make it unattractive to have insufficient Accredited Capacity compared to buying Participation Power or Firm Power.

2.4 EMERGENCY ENERGY:

The rate for Emergency Energy (Schedule A) is equal to $\text{US\$}31,92/\text{MWh}$, which is equal to 150 % of the total levelised cost in MWh of a new coal-fired station.

$$21,28 \times 1,5 = 31,92$$

2.5 OPERATING RESERVE AND CONTROL AREA SERVICES:

The rate for Operating Reserve (Schedule H) and for Control Area Services (Schedule M), is equal to 20 % of the capacity rate for Participation Power or $\text{US\$}47,5/\text{MW}$ per day.

$$20 \% \times \$7,23/\text{kW} \times 12 - 365 = 0,0475$$

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TABLE 1

SCHEDULED TRANSACTIONS (PART 1 : ENERGY EXCHANGES)

SCHEDULED TRANSACTION		DURATION [NOTICE]	ENERGY RATE (JAN. 1994)	CAPACITY RATE (JAN 1994)	WHEELING CHARGE (IF ANY)	TYPE OF WHEELING (IF ANY)
Emergency Energy	[A]	< 6 Hours	> \$31,9/MWh < 115% SRMC	-	To be added and paid by Buyer	Firm
Economy Energy (Thermal to Thermal or Hydro)	[C]	[0 Hours]	Th. Share savings Hy. < 115% SRMC	-	Included in savings calculation	Non firm
Surplus Energy (Hydro to Thermal or Hydro)	[D]	[0 Hours]	Th. < 75% SRMC Hy. Consent	-	Included in charge	Non firm
System Energy (from Thermal)	[B]	> [1 Hour] < [24 Hours]	< 120% SRMC < 135% SRMC	-	To be added and paid by Buyer	Non-firm
System Energy (from Hydro to Thermal)	[B]	> [1 Hour] < [24 Hours]	< 85% SRMC < 95% SRMC	-	Included in charge	Non-firm
Energy Banking (Short-term)	[E]	Max Weekly Cycles	Share savings	-	Included in savings calculation	Non-firm
Energy Banking (Long term)	[E]	Longer Cycles	< 120% SRMC > 80% SRMC	-	To be added and paid by Buyer	Non firm
Scheduled Outage Energy	[J]	Not Specified	< 115% SRMC (Seller) > 115% SRMC (Buyer)	-	To be added and paid by Buyer	Non-firm

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TABLE 2

SCHEDULED TRANSACTIONS (PART 2 : CAPACITY EXCHANGES)

SCHEDULED TRANSACTION		DURATION [NOTICE]	ENERGY RATE (JAN. 1994)	CAPACITY RATE (JAN 1994)	WHEELING CHARGE (IF ANY)	TYPE OF WHEELING (IF ANY)
Operating Reserve	[H]	> One Month > [24 Hours]	System Energy Short-Term Firm Power	\$ 47,5/MW per day	To be added and paid by Buyer	Non firm
System Participation power	[G]	7 days to 6 Months	Th < 115% SRMC Hy < 80% SRMC	\$ 1,33/kW per week	To be added and paid by Buyer	Firm
Participation Power	[L]	Longer than 6 Months	Th < 115% SRMC Hy < 80% SRMC	\$7,23/kW per month	To be added and paid by Buyer	Firm
Short-Term Firm Power	[F]	7 Days to 6 Months	Th < 115% SRMC Hy < 80% SRMC	\$ 1,92/kW per week	To be added and paid by Buyer	Firm
Firm Power	[K]	Longer than 6 Months	Th < 115% SRMC Hy < 80% SRMC	\$8,31/kW per month	To be added and paid by Buyer	Firm

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