



# SOUTHERN AFRICAN POWER POOL

**ANNUAL REVIEW REPORT  
APRIL 1997 - MARCH 1999**

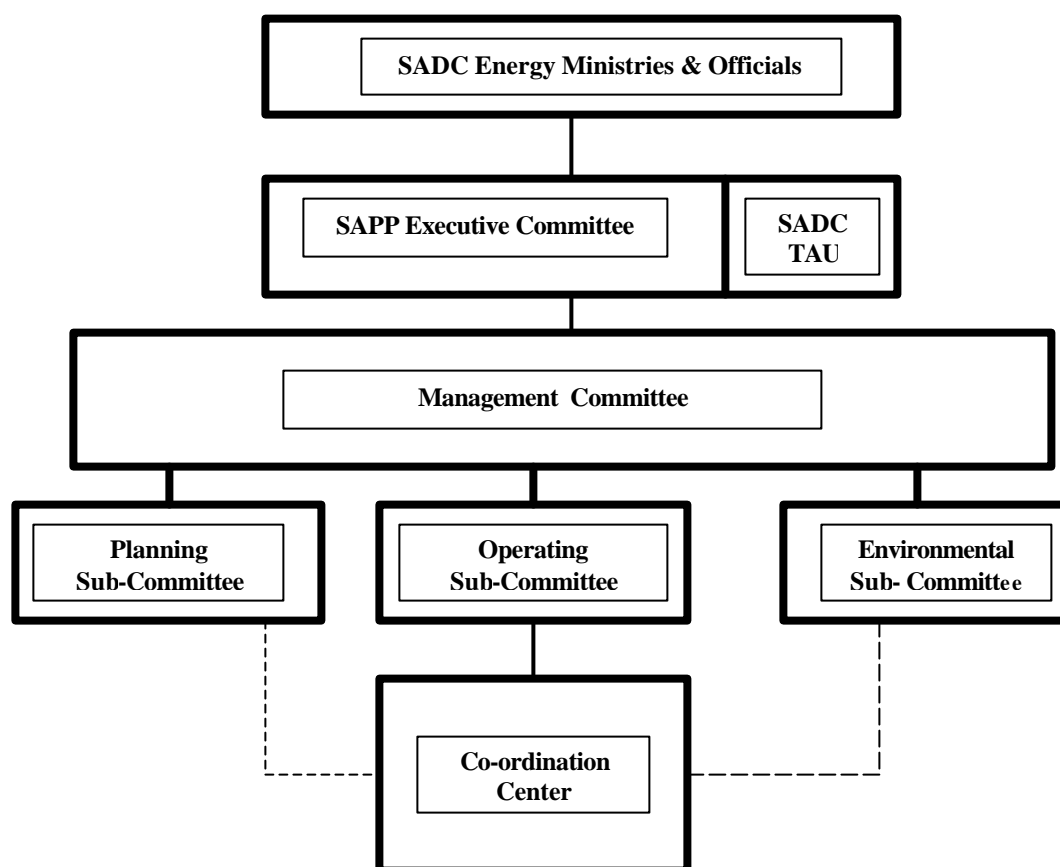


## MEMBERS

<b>Full Name of Utility</b>	<b>Status</b>	<b>Abbreviation</b>	<b>Country</b>
Botswana Power Corporation	OP	BPC	Botswana
Electricidade de Mocambique	OP	EDM	Mozambique
Electricity Supply Commission of Malawi	-	ESCOM	Malawi
Empresa Nacional de Electricidade	-	ENE	Angola
ESKOM	OP	ESKOM	Republic of South Africa
Lesotho Electricity Corporation	-	LEC	Lesotho
NAMPOWER	OP	NAMPOWER	Namibia
Societe Nationale d'Electricite	OP	SNEL	Democratic Republic of the Congo
Swaziland Electricity Board	-	SEB	Swaziland
Tanzania Electricity Supply Company Limited	-	TANESCO	Tanzania
ZESCO Limited	OP	ZESCO	Zambia
Zimbabwe Electricity Supply Authority	OP	ZESA	Zimbabwe

OP = Operating Member

## SAPP ORGANOGRAM



# ***SAPP VISION & OBJECTIVES***

## **The Vision**

A competitive Southern African wholesale market in which the production, delivery and exchange of bulk electrical energy is coordinated, operated and developed at world class standards and with minimum impact on the environment.

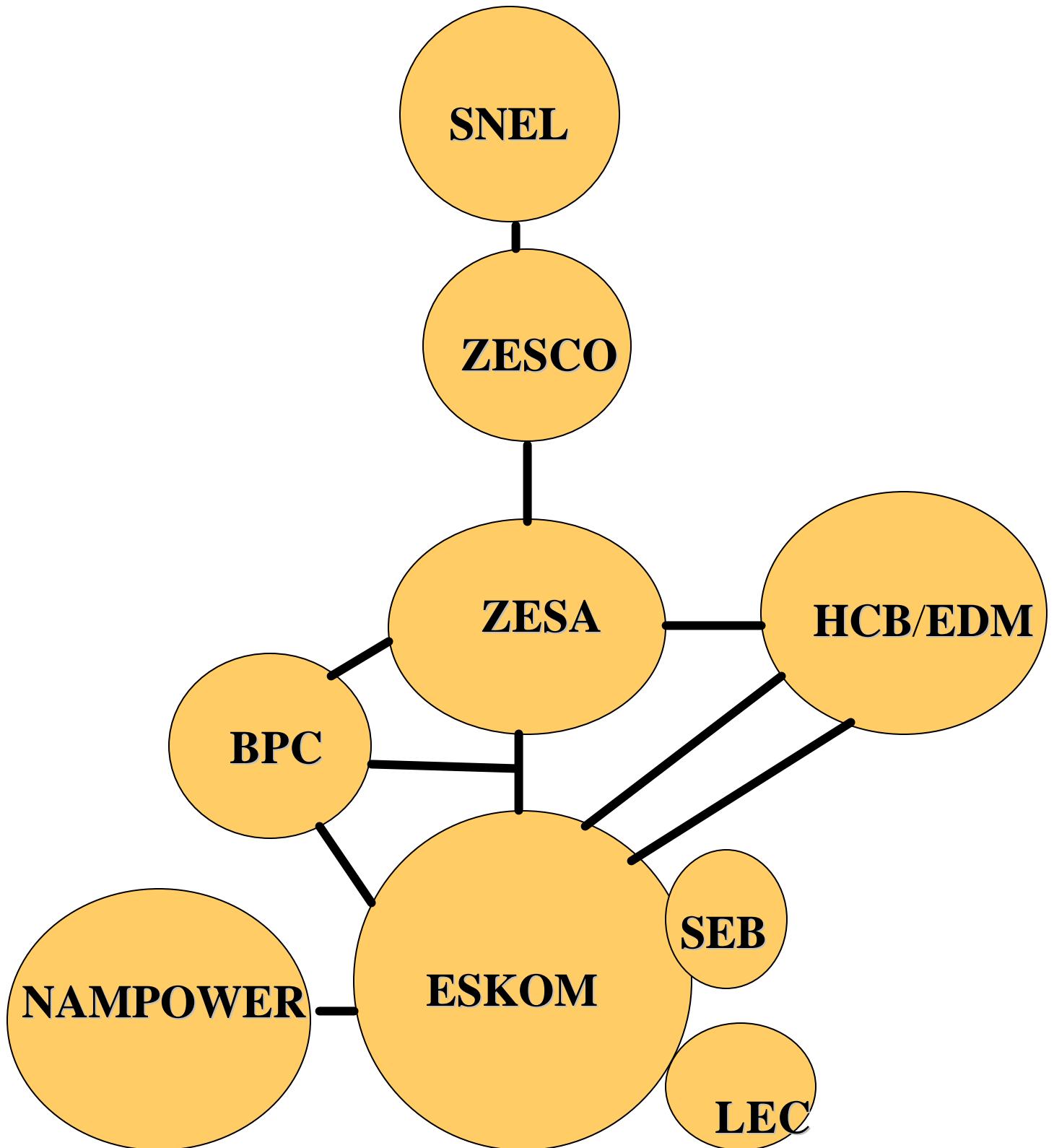
## **The Objectives**

- To co-ordinate the planning and development of interconnections between members' respective networks to expand the Interconnected Power System and electricity trading in the region.
- To reduce investments and operating costs, enhance reliability of supply and share in the benefits resulting from coordinated planning and operation of the interconnected power system.
- To co-ordinate the planning, development and operation of generation and transmission facilities in their respective networks with minimum impact on the environment.
- To co-operate and seek mutually beneficial arrangements wherever possible and to refrain from arrangements that would be detrimental to any member.
- The relationship between members is to be based on a spirit of co-operation, friendliness, openness and trust with members having equal rights and equitable obligations, acting in solidarity and refraining from taking advantage of each other.
- Members are cognisant of the changing electricity supply business environment in member countries and will continually adapt the Southern African Power Pool for change, growth and progress.

# SAPP MISSION

- ❖ To provide a reliable and economical electrical supply to the customers of each of the SAPP Members consistent with efficient utilization of natural resources and minimum impact on the environment.

# THE SAPP INTERCONNECTIONS



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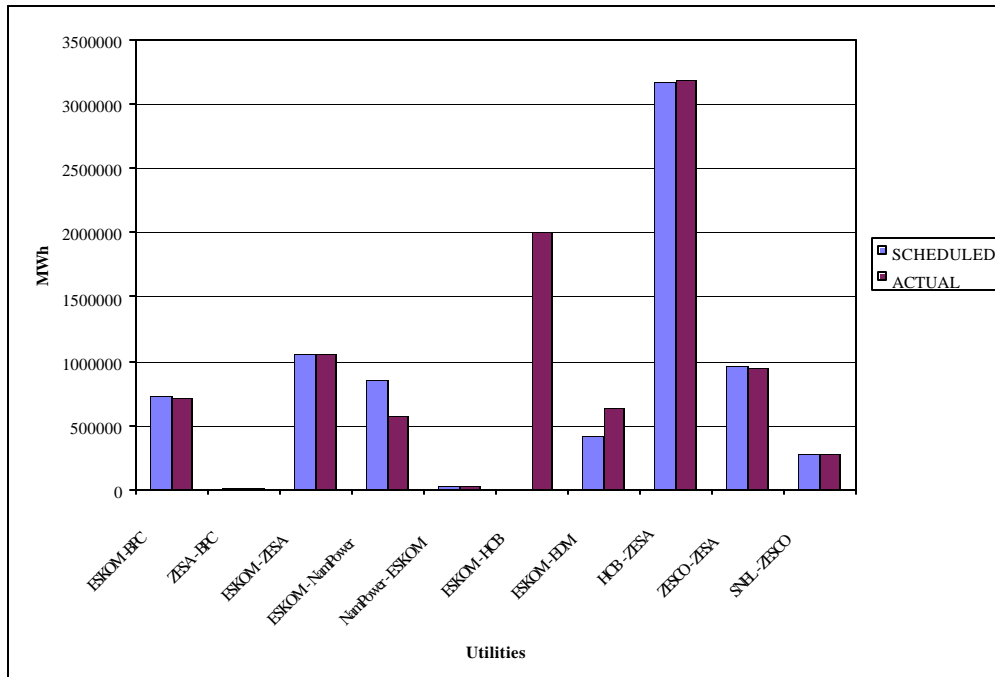
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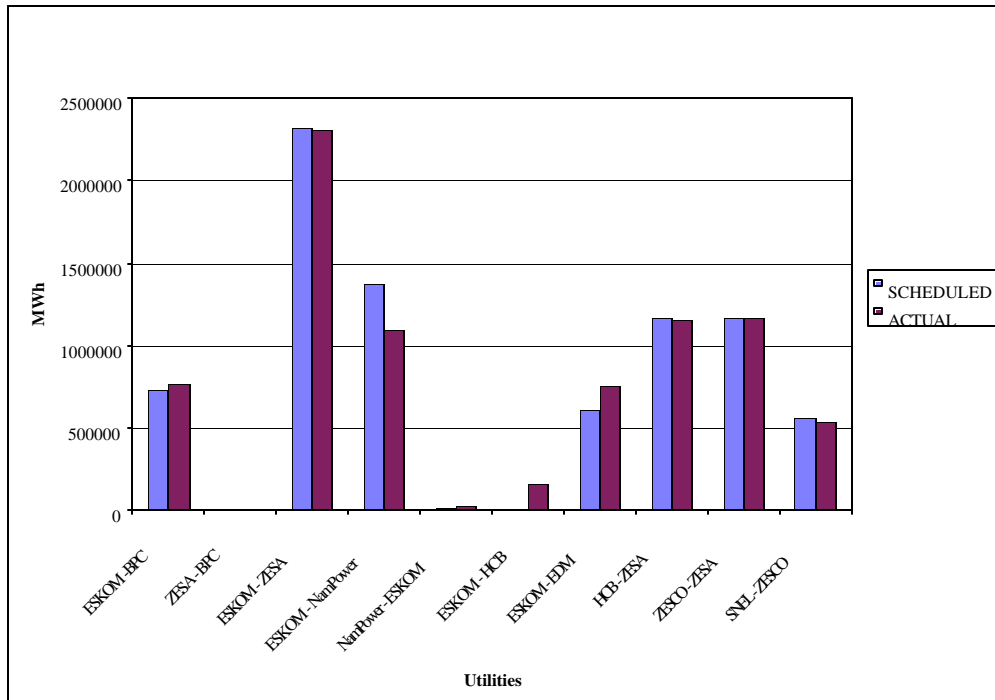
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# Highlights At A Glance

Energy Transactions (April 1998 – March 1999)



Energy Transactions (April 1997 – March 1998)



## Joint Chairmen's Statement



**Dr. V. M. Veloso ---EDM**  
Executive Chairman 1997/98



**Dr. L.S. Hangala---NamPower**  
Executive Chairman 1998/99

The Period April 97 to March 99 was exciting for the Southern African Power Pool with many challenges facing the pool and individual utilities. Some utilities were striving with the process of internal re-organization, there was a huge demand for the rehabilitation of power infrastructure alongside rural electrification, time was scarce and resources limited. Despite all these constraints, the regional partners trusted one another and continued to co-operate hence the pool coped with the challenges posed by the changing and increasingly complex regional and global environment of electricity trade.

Some of the major challenges and achievements of the power pool are:-

- The new Co-ordination Center to be established in Harare, Zimbabwe, will be operational very soon and active trading between members will be stimulated.

- The interim wheeling charges are being utilized to support energy transactions and therefore exchange of electrical energy between members of the SAPP is on the increase.
- HCB is operating again and exporting power to South Africa, Mozambique and Zimbabwe.
- Enhancing of operator skills is taking place to increase the reliability of the interconnected power system.

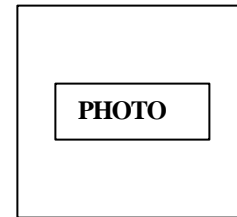
A very important issue for the future is the increase of interconnections between SADC countries, the most urgent being:-

- Re-enforcement of the Zambia – Democratic Republic of Congo 220kV interconnector.
- Mozambique – Malawi 220kV interconnector
- Zambia – Tanzania 330kV interconnector
- Republic of South Africa – Namibia 400 kV interconnector.

The journey is still long, however our desire to develop a sustained improvement in the standard of living of the people of SADC has, and will continue to compel us to take further decisions aimed at developing electrical power infrastructure in the region, which today is becoming a reality.

We would like to pay special tribute to all other Chief Executives, their Utilities and staff for their assistance during our terms of office.

# Management Committee Report



**Mr. F. Masawi – ZESA**  
**Management Committee Chairman 1997/99**

The SAPP has been in operation for four years and a lot of ground has been covered in improving the operational aspects of the Interconnected Power System (IPS). After the tuning of the various power system components that improved power system stability there has been a marked reduction in power blackouts due to system oscillations as had been experienced in the first three years of operations.

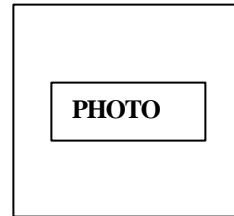
The establishment of the Co-ordination Center in Harare, the completion of the Pool Plan and the finalization of the SAPP wheeling formula should result in an improvement in electricity trading in the region. There will be added benefits to all members with the completion of priority projects that would see the inclusion of the power networks of Malawi and Tanzania in the SAPP IPS.

The changes in the legal and institutional frameworks taking place within the SAPP utilities, the privatisation of electricity networks and the poor economic performance within the region are some of the challenges facing the SAPP and need to be addressed. The SAPP, acting as a role model for regional integration and co-operation, is capable of rising to the challenge and charting the way forward in these turbulent times.

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# Sub-Committee Reports

## Operating Sub-Committee



**Mr. M. Lindunda - ZESCO**  
**OSC Chairman 1997/99**

The Operating Sub-Committee (OSC), whose responsibility is to look after the day to day operational aspects of the interconnected power system concentrated on the following aspects of Power Pool operations during the year.

### ❑ **Co-ordination Centre Establishment**

A working group to draft a suitable constitution for the SAPP Co-ordination Centre was established resulting in a constitution of the co-ordination centre based on a 'universitas' format. This format enabled the establishment of a legal entity under the Zimbabwean Law where the centre will be located and has a provision of transforming the centre into a company if desired by the members. The constitution was concluded on the 14<sup>th</sup> of August 1998 and submitted to the Southern African Development Community's (SADC) energy sector through its Technical and Administrative Unit (TAU).

The recruitment of the Centre Manager was initiated, however the first and second attempt did not attract suitable candidates. It was therefore decided to recruit an experienced candidate from outside the region to assist the SAPP in setting up the Co-ordination Centre and running it for a period of two years. Two Understudies would be attached to work with the expert and gain skills transfer to enable the SAPP to operate the center with staff from within the region. Consultations with various donor agencies including the USAID and the World Bank are in progress for the SAPP to get the required assistance.

### ❑ **SAPP Dynamic Stability Study**

A power system Dynamic Stability Study funded by the Danish International Development Agency (DANIDA) was commissioned to determine the causes of oscillations and methods of improving the stability and hence reliability of the interconnected power system. Severe system disturbances had been

encountered during the initial operation of the interconnected power system due to inter area oscillations hence the need for the study. The study was conducted by a team of Danish consulting engineers, NESATEAM, and SAPP Engineers who identified various modes of inter area oscillations in the SAPP and made recommendations on settings and tuning of Automatic Voltage Regulating equipment (AVR), Power System Stabilizers (PSS), Static Var Compensators (SVC) and Primary frequency control.

The studies were concluded by practical tuning of power system stabilizers at Kariba North, a hydro power plant in Zambia and Hwange, a thermal power plant in Zimbabwe. This tuning exercise together with the installation and commissioning of stabilizers at Songo (Cahora Bassa), a hydro power plant in Mozambique greatly improved system stability of the SAPP interconnected power system. Technology transfer was successfully effected during the studies and tuning exercise.

#### □ **Implementation of SAPP Minimum Operational Technical Requirements**

SAPP utilities continued with their endeavors to implement the agreed minimum technical requirements for the efficient operation of the interconnected power system. These requirements cover SCADA/EMS systems, Telecommunications, Measurements and Metering systems. Significant achievements in this area include the commissioning of a new SCADA system by NAMPOWER. A lot is still outstanding in the field of telecommunications services as neither data links nor hot line facilities exist between most control centres in the region. The situation is expected to improve by the year 2000 as some utilities are focusing on telecommunication refurbishment projects such as the use of Optical Ground Wire Cable (OPGW) and other modern technologies in telecommunications systems. The increasing usage of the Internet opened a number of avenues in enhancing communication between members.

#### □ **Working Groups**

The Telecommunications, Measurements and Control (TMC) working group was restructured by the creation of three working groups with specific tasks to look at Metering standards, Quality of Supply and Telecommunications. The working groups concentrated on research work on standards in order to come up with SAPP standards in Metering and Quality of Supply.

The Operating Working Group (OWG) looked at various system operation aspects including inadvertent energy management, major system disturbances and contingency planning for the Year 2000 Problem.

### ❑ **Operator Training**

The OSC noted the urgent need to enhance operator skills in the region in order to improve system reliability. The OSC is therefore making arrangements for operator courses to be conducted by appropriate institutions as from the last quarter of 1999.

### ❑ **The Millenium Bug ( Year 2000)**

A Year 2000 (Y2K) workshop for SAPP members was held in Johannesburg in May 1998 and was well attended by utilities. Utilities have formed Taskforces and Working Groups at various levels to address the Y2K problem. Two special SAPP Operations Working Group meetings were held to draw up contingency plans covering system restoration of the Interconnected Power System following various blackout scenarios. All utilities have reported that they are addressing the Y2K problem with urgency and expect that all critical systems will have been checked for compliance before the end of 1999.

### ❑ **Other Activities**

In its endeavor to improve the operations of the power pool, the operating sub-committee considered to conduct a technical audit on National Control Centres (NCCs) and Generator output tests which is essential in the determination of each utility's accredited capacity. The terms of reference for the audit of the NCCs and the procedures for the generator output tests are in place and awaits implementation by the members.

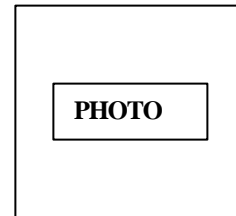
### **Challenges and Opportunities**

- Establishment of Phase 1 of the co-ordination centre and its subsequent development to the desired fully fledged SAPP Co-ordination Centre is the major task ahead of the OSC.
- Development of SAPP Standards in Measurements, Control, and Quality of Supply.
- Carrying out of Generator Output Tests in order to have more meaningful Accredited Capacity and Operating Reserve obligations for each utility.
- Implementation of the SAPP minimum technical requirements especially in Telecommunications.
- Training of SAPP operators to enable efficient operation of the Power Pool.

- Improvement in the adequacy, availability and reliability of supply.
  - Improvement in the efficiency and effectiveness of the bulk electrical energy market.
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## Sub-Committee Reports

### Planning Sub-Committee



**Mr. D D Madzikanda – ZESA  
Chairman PSC 1997/99**

The Planning Sub-Committee (PSC) whose major duty among others is to establish and update common planning and reliability standards which have an impact on the Southern African Power Pool concentrated on the following aspects:-

#### □ **Pool Plan**

Gathering and collecting information on future demand, capacity and new plant to be used in the development of a Pool Plan continued. The SAPP members showed their support for the exercise through their willingness to share information and data. A Generation Planning Working Group was formed and tasked to come up with terms of reference (TOR) for a Pool Plan study. The Generation Planning Working Group did a sterling job in coming up with a work schedule and the objective of the study.

A draft Pool Plan will be available in August 1999 as a result of the work done so far using available models in the Pool for Generation and Transmission planning. The PSC is working with Purdue University to produce a tailor made SAPP Generation Planning model. The basic model is now available and is being polished up with improvements in the interface to have a windows based human interface. Further tests of the model are being carried out to ensure correct functionality of all modules in the model as well as the integrity of the data.

### □ **Accredited Capacity Obligation**

The PSC succeeded in securing a Management Committee resolution on maintaining the Accredited Capacity obligation as defined in the Agreement Between Operating Members (ABOM) until the results of a reliability study are available when the matter would be re-looked at. The penalties as stipulated in the ABOM remain in force until such time an alternative proposal is put forward. The alternative to change Accredited Capacity obligation into a guideline was therefore not supported as utilities felt that this would result in no discipline on members failing to carry their fair share of the Pool Plan Reserve.

### □ **SAPP Wheeling Charges**

The issue of unanimously agreed wheeling rates in the SAPP continued to be a major task for the planning sub-committee who had to escalate the matter to the Management Committee for resolution of the impasse. In order to enable energy trading in the region, interim wheeling rates were considered and approved by the Executive Committee of the SAPP.

The interim-wheeling rate of 7.5% of the energy price although not unanimously accepted by all utilities has enabled remarkable trade in the region. A consensus on the issue is desirable hence Terms of Reference for a Wheeling Rates Study aimed at arriving at wheeling charges acceptable to all utilities have been drawn up. These studies will be funded by DFID and the PSC is processing bids for the study. Two bids were received from a consortia of British companies. The task will be done by London Economics in association with Power Planning Associates.

### □ **Planning Tools and Skills**

The procurement of PSS/E software packages is a significant achievement by the sub-committee with most utilities now having expertise in the use of PSS/E for various Transmission studies and analysis.

Six utilities (EDM, ESKOM, ENE, TANESCO, ZESCO and ZESA) had Valorigua software licensing and installation following a course in Portugal by Electricidade de Portugal. The exercise to model electricity trade in Southern Africa continued with the co-operation between SAPP engineers and Purdue University.

### □ **Priority Projects**

The following Projects will be presented to TAU for funding consideration.

- Democratic Republic of Congo – Zambia 220kV line
- Zambia – Tanzania 330kV line
- Mozambique – Malawi 220kV line

The last two projects will expand the Interconnected Power System and electricity trading in the region and will enable TANESCO and ESCOM to become Operating Members.

#### □ **SAPP Conference 2000**

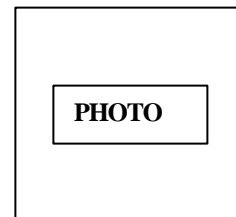
In order to give an accurate portrayal of the SAPP on issues covering energy policies, market, regulatory and institutional reforms in SADC and SAPP achievements, experiences, opportunities and future challenges, a SAPP Conference is being planned for February 2000.

#### **Challenges and Opportunities**

- The production of a Pool Plan still remains one of the main deliverables from the PSC and members will have to ensure that adequate resources are committed towards this exercise.
  - The production of the Transmission expansion plan that complements the Pool Plan.
  - Determination of Wheeling Charges which are unanimously accepted by all utilities.
  - Identification of tools and development of skills to enable members to achieve the objectives of the SAPP.
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# Sub-Committee Reports

## Environmental Sub-Committee



**Ms C. Fedorsky – ESKOM**  
**Chairperson EnvSC 1997/99**

The Environmental Sub-Committee (EnvSC) which is responsible for Environmental matters in the SAPP endeavored to keep abreast of world and regional matters relating to air quality, water quality, land use and other environmental issues. The EnvSC developed a set of Guiding Principles, Key Performance Indicators and Environmental Impact Assessment Guidelines as outlined below:-

❑ **SAPP Environmental Vision**

“The SAPP will achieve sustainable electrical energy development through sound environmental management practices and regional co-operation.”

❑ **SAPP Environmental Guiding Principles**

- ✓ To reduce the environmental impacts of our business

- ✓ To use our resources wisely
- ✓ To be accountable to our stakeholders and customers
- ✓ To monitor and report our performance
- ✓ To integrate environmental and social factors into our planning, decision-making, and business practice.
- ✓ To promote environmental awareness and training of our employees (including senior managers).
- ✓ To strive to continually improve our environmental performance through the adoption and implementation of an Environmental Management System based on ISO 14001 and 14004.
- ✓ To meet the SAPP-developed environmental guidelines, where applicable.

#### □ **Environmental Key Performance Indicators**

As a method of monitoring progress and commitment to environmental aspects by each member, the EnvSC developed the following Key Performance Indicators for each utility to report on.

- ◆ Implementation of an Environmental Management System (EMS)? **y/n?**
- ◆ SAPP Utility has an environmental management department/section and/or person? **y/n?**
- ◆ Environmental awareness programs, events, and/or activities? **y/n?**
- ◆ Incidents (pre-legal or non-legal) **y/n?**
- ◆ Legal contraventions (impacts a 3<sup>rd</sup> party; implication to a law, regulation, and/or permit) **y/n?**

#### □ **Environmental Impact Assessment (EIA) Guidelines For Transmission Lines**

The sub-committee's working group, the environmental impact assessment working group, with a task to draw up appropriate EIA guidelines for the SAPP produced a draft EIA guidelines for Transmission Lines which has been submitted to the E7, a consortium of the top vertically integrated utilities of the G7 countries, for review and comments before production of the final document for the SAPP.

#### □ **Environmental Impact Assessment (EIA) Guidelines For Hydro Schemes**

A draft outline for the new EIA Guideline for Hydro Schemes has been submitted by the E7 and reviewed by the SAPP EnvSC. A small SAPP EnvSC Working Group has been formed to liaise with the E7 and the World Bank on this

document. The EnvSC noted and highlighted the need for external assistance on Hydro Scheme EIA guidelines due to the complexity of hydro projects.

The major drawbacks encountered by the EnvSC in its endeavors to come up with SAPP EIA guidelines during the year under review has been ever-changing membership of the sub-committee, lack of a full time specialist in each of the SAPP utilities devoting full time to SAPP environmental issues and lack of financial resources.

#### □ **Liaison and Workshops**

The Environmental Sub-Committee managed to broaden its contacts and knowledge on Environmental issues through workshops and liaison with other organizations as follows:-

- In May 1997, the EnvSC attended a workshop in Harare, Zimbabwe by the World Bank. It was noted that the environment is a major factor to be considered when applying for funding by the Bank.
- Ties were established in September 1997 with the Southern African Development Community – Environment and Land Management Sector (SADC-ELMS) based in Maseru. The two groups would continue to communicate in order to share information on environmental issues.
- An E7 Environmental Awareness Workshop was held in Johannesburg, South Africa during November 1997. The E7 is a consortium of the top vertically integrated utilities of the G7 countries.

The workshop aimed at achieving the following:-

- Establishment of a relationship between the SAPP and the E7
- Giving overview of environmental management in a utility –based industry
- Support for future collaboration between the two member organizations (SAPP and the E7)

A proposal was made at the end of the workshop that a SAPP – E7 strategy be drafted to assist the SAPP attain some of its environmental goals and objectives. Further collaboration between SAPP and the E7 was envisaged.

#### **Challenges and Opportunities**

- Production of EIA Guidelines for the SAPP in Transmission Lines, Generation Plant and Hydro Schemes
- Training (EIA, EMS and Auditing)

- Attainment of ISO 14000 accreditation



