ANNUAL REVIEW REPORT

28 August 1995 - March 1997

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It is with pride that we publish our first annual review, which covers the period between the inauguration of the Southern African Power Pool on 28 August 1 995 when the Intergovernmental Memorandum of Understanding was signed, and "March" 1997.

Two years on the Pool has developed from an embryonic organisation into a young fledgling organisation. This review reflects our first tentative efforts, sometimes faltering but increasingly stronger, to fly towards becoming c regional force which can do so much to bring Southern Africa into the global village.

To do this we must continue to strengthen our trading between utilities to ensure that as a region we have a reliable, adequate and accessible electricity supply. By providing the energy for the region we can assist the SADC countries to become competitors in world markets where forces dominate. As individual countries we are unlikely to make much impact in international commerce, but as collaboration between the utilities takes hold so SADC will be able to compete with the great economic consortia of the world.

Botswana Power Corporation

Electricidade de Mozambique

Electricity Supply Commission of Malawi

Empresa National de Electricidade

Eskom

Lesotho Electricity Corporation

Nam Power

Societe National d' Electricite

Swaziland Electricity Board

Tanzania Electric Supply Company Limited

Zambia Electricity Supply Corporation Limited

Zimbabwe Electricity Supply Authority

Forward

The last decades of this century have seen major political changes in Southern Africa which have strongly influenced the socio-economic aspects of the countries in the region and their relationship to one another. In 1980 the Lusaka Declaration saw the creation of the Southern African Development Co-ordination Conference (SADCC) which facilitated regional co-operation and co-ordination. This was later transformed into the Southern African Development Community (SADC) and has been the impetus for various initiatives to make Southern Africa a strong contender in global affairs, particularly in the sphere of economics.

Co-operation in the electricity sector is not a new phenomenon in the Southern African region; it has taken place at policy, planning and operational levels and involved governments, power utilities and financial agencies over a period of several decades. One of the first bilateral co-operative projects was the construction of a line between Nseke in the Democratic Republic of Congo (formerly Zaire) and Kitwe in Zambia in 1958, to supply electricity to the Zambian copper mines. The construction of the Kariba dam and associated hydroelectric power stations, one in Zambia, the other in Zimbabwe, is another example of regional co-operation; despite political problems this development paved the way for the interconnection of the two countries' power systems and continues to be a backbone for regional power exchanges.

SADCC recognising the importance of energy to the developing region, created an energy sector which established a Technical and Administrative Unit (TAU) in Angola to act as the co-ordinating agency for energy. The responsibilities of this unit in the 1980s and early 1990's were to assist the regional energy sector and the various donor agencies in identifying and ranking projects and to provide recipient countries with an enhanced capacity to articulate needs, thereby facilitating a rational and co-ordinated aid programme for the region.

In 1990 SADCC established the Electricity Sub-Committee (ESC), a forum for the regional power utilities to discuss and plan the improvement of regional electricity supply, yet another step towards co-operation and collaboration. The role of this sub-committee was crucial in ensuring power supply to those countries experiencing shortages during the 1992 drought.

Background

The creation of the Southern African Power Pool (hereafter referred to as SAPP) is a major achievement in the era of regional co-operation. It grew out of the power utilities' recognition of the vulnerability of the individual countries if each continued to pursue a policy of self-sufficiency; this had been demonstrated in the 1992 drought. At a meeting in Lusaka on 21st July 1993 support was given for the construction of the Motimba - Bulawayo line and the reinforcement of the Congo - Zambia interconnection. This was the first significant step towards regional co-operation in the 1990s.

There were compelling arguments for stronger regional collaboration. These included:

- demand / supply imbalances
- economies of scale
- security and quality of supply
- financial constraints, both of utilities and governments
- benefits from joint thermal / hydro system operations
- complementary demand curves
- better monitoring and control of environmental degradation and pollution in parts of the region.

Co-operation was therefore accepted as the way forward.

The Intergovernmental Memorandum of Understanding (MoU) signed on 28 August 1995 brought the SAPP into being. The agreements relating to the SAPP were required to take into account the institutions of SADC and to be interpreted in a manner consistent with the SADC Treaty. The SADC Energy Ministers' Committee is responsible for major policy issues within SAPP in accordance with the governance of the national utility in each country. The Inter-Utility Memorandum of Understanding (MoU) and the Agreement between Operating Members were signed by most utilities on 8 December 1995, the date of the first meeting of the Executive Committee. The other document governing SAPP is the Operating Guidelines. The validity and precedence of contracts and agreements signed before the Pool Agreement are recognised in the Inter-Utility MoU.

The immediate advantages of having the SAPP in place ore the enhancement of the exchange of power over regional interconnections and the facilitation of the further development of the regional electricity grid.

South African Power Pool

Objective

To provide a reliable and economical electricity supply to the consumers of each of the SAPP members, consistent with the reasonable utilisation of natural resources and the effect on the environment.

To meet this objective the members of the SAPP have undertaken to create a common market for electricity in the SADC region and to let their customers benefit from the advantages associated with this market, such as lower prices resulting from economies of scale and better reliability of supply.

All participating utilities have equal rights and obligations, act in solidarity and agree not to take advantage of one another. Members also undertake to share information and knowledge, be politically neutral, develop common planning and operating criteria and procedures and to accept wheeling on behalf of other members when this is technically feasible.

Membership

All participating electricity enterprises must be situated in a country which was a member of SADC in September 1 994. Full membership is for national utilities only and is restricted to one per country as designated by the country's government. Membership of non-SADC country utilities is subject to the approval by a two thirds majority of the SAPP Executive Committee before being forwarded to the SADC Energy Ministers' Committee for ratification.

Members

These have signed the Inter-Utility Memorandum of Understanding and are entitled to participate in the Planning and Environmental Sub-Committees only. A key objective of the Planning Sub-Committee is to conduct all relevant studies to allow for the construction of interconnections with members who are still isolated from the main network.

There are two categories of membership:

Operating Members:	Are members who are signatories of all principal documents governing SAPP and have their system interconnected internationally with at least one member. They are responsible for meeting all policy procedures and guidelines established by SAPP
Non-Operating Members:	There are members who ore signatories to only one SAPP Principal document Inter-Utility Memorandum of Understanding. They participate in all activities except those related to operation of the power pool.

The Inter-Utility Memorandum of Understanding specifies the rights and objectives of independent power producers, which may participate as observers in the Operating Sub-Committee, but not in the Management or Executive Committees of the SAPP

Governance of SAPP

SADC Energy Ministers' Committee

The government ministers are responsible for policy matters within the portfolio which they control, in terms of the national administrative and legislative mechanisms regulating the relations between the governments and their respective power utility.

SAPP Executive Committee

The chief executives of those utilities which have signed both the Intergovernmental and Inter-Utility Memorandum of Understanding constitute the Executive Committee and serve as the board of SAPP TAU fills the role of secretariat to the Executive Committee.

SAPP Management Committee

This committee oversees the administration of the Pool through the three sub-committees. It is composed of top officials nominated by their utilities, one per utility.

SAPP Sub-Committees

Planning:	The function of this Sub-Committee includes planning and other duties and it reports to the Management Committee.
Operating:	This Sub-Committee reports to the Management Committee and is responsible for operating matters and the co-ordination centre.
Environmental:	This committee reports to the Management Committee and is responsible for environmental matters.

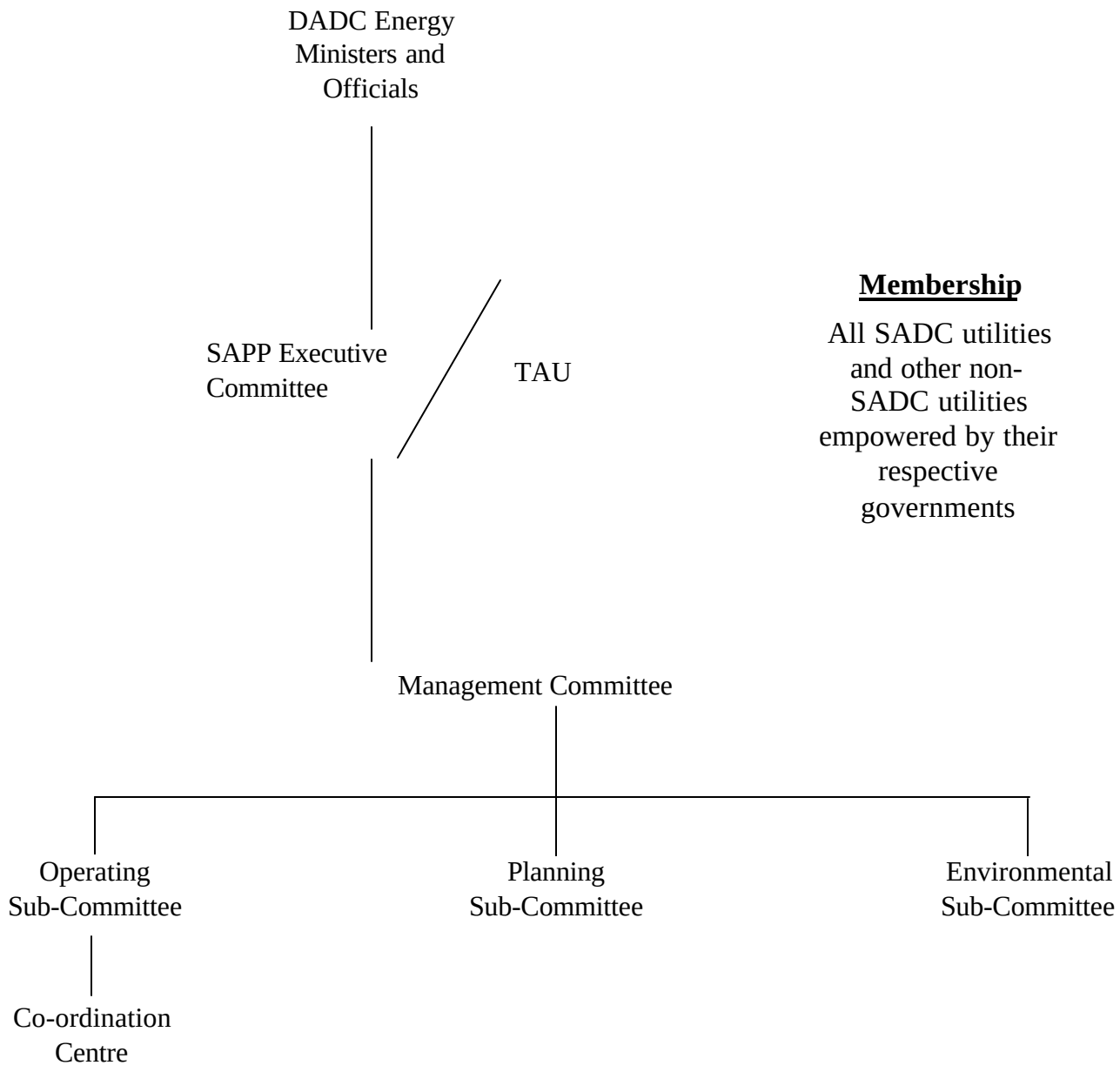

Figure 1: SAPP Management Structure

Sub-Committee Reports

Planning Sub-Committee

The activities of this Planning Sub-Committee (PSC) have included:

Data Collection

Gathering and collating information on future demand, capacity and new plant, to be used in the integrated Pool Plan

Standard Systems and Practices

The investigation of standardised software was undertaken.

Valoragua Software - TAU has negotiated with Electricidade de Portugal - EDP, the licensing and installation of the software in all the utilities whose representative finished the respective course. At this stage EdM, ESKOM, TANESCO and ZESA are in this situation and will benefit from the software installation in May 1998.

PSSIE Software - there were difficulties in obtaining this through TAU, so it has been decided to proceed with a bulk purchase from Power Technology Institute (PTI), each utility being separately invoiced. Finalisation of this purchase is expected by February 1998.

Generation Planning Software - a working group has been established to investigate the possibility of standardising the generation planning software, as was done for transmission planning.

Training and Development

Purdue University, USA - the University undertook a workshop, funded by United States Agency for International Development (USAID), to model electricity trade in Southern Africa. This was attended by the SAPP operating utilities.

Other Training - The Planning Sub-Committee delegates- attended courses on:

- power wheeling (presented in Zimbabwe)
- limited recourse financing (presented by the World Bank in Zimbabwe)

Wheeling

Consensus for interim wheeling charges was reached and the Management Committee accepted them. Subsequently a more permanent set of proposals was submitted to the Management Committee and is under review.

Accredited Capacity

A recommendation in this connection was submitted to, and subsequently approved by, the Management Committee.

Challenges and Opportunities

The production of c Pool Plan is one of the main deliverables from the Planning Sub-Committee and members have pledged to ensure the Pool Plan is given top priority it deserves.

Identification of tools and skills to enable members to achieve the objectives of SAPP

Determination of wheeling charges.

Possibility of exporting skills in integrated Planning in an environment where members operate in different legal framework and political systems.

Operating Sub-Committee

Problems which had been experienced in pre- pool co-operative projects gave impetus to the establishment of the SAPP The Operating Sub-Committee (OSC) formed working groups on various aspects, such as telecommunication; measurement and control (TMC) and operations.

Once established, the members of the OSC participated constructively to reach the standard of operation which has been attained. Early operating problems arose but most have been resolved amicably under the guidance of this sub-committee, with only a few still outstanding. The OSC believes that regional co-operation in the industry has improved greatly and is a source of pride for SAPP.

SAPP Operating Guidelines

A milestone for the OSC has been the preparation and submission of the SAPP Operating Guidelines, which have been accepted by the Management Committee and signed by all operating members.

Co-ordination Centre

The sub-committee implemented an interim co-ordinating centre to carry out limited functions, including the compilation of monthly reports. BPC was elected by the operating working group to be the pioneer co-ordinator, a function it carried out for sixteen months; the OSC, however, eventually recommended that the co-ordination centre should be located in Harare, Zimbabwe and would report to the OSC chairperson.

Trading

Some energy trading has been conducted by the member utilities during the period under review (August 1 995 - March 1 997). The trading transactions were

specified by the Agreement between Operating Members and the SAPP Operating Guidelines.

Figure 2: Import of Energy

Telecommunications

There is a communication network between all the member utilities except SNEL, but the quality and availability is not always acceptable and will require attention from the telecommunication experts in the region. The operating working group produced minimum requirements for telecommunications for implementation by the TMC. Some utilities have also installed Internet services.

Automatic Generation Control

Automatic generation control (AGC) has been successfully installed and operates in the 'tie line" bias mode under normal operating conditions by ZESCO, ZESA and Eskom. This has greatly improved system control and inadvertent energy management[1] on the Southern African grid.

The OSC is encouraging all members to either purchase AGC or affiliate to a control area so as to improve interconnections and manageability. It also stressed the importance of having all regional tie lines in service, wherever possible, to increase system reliability, stability and mutual support.

[1] Inadvertent energy flow is the difference between the nett scheduled energy delivered and the actual nett energy delivered in any specific hour

Frequency Control Performance

The power oscillation phenomenon was discussed in June 1 996; after taking into account financial implications and technical limitations, an agreement was reached on frequency control through a negotiated target of at least 90% within the frequency band of 49.95 and 50.05 Hz. Initially the se', target was achieved, however there were problems in achieving this.

Figure 3: Frequency Compliance

Figure 4: Frequency Distribution

Other OSC Achievements

- agreement on the calculation of the spinning reserve obligations for each utility
- agreement on the classification of planned and unplanned outages in the Operating Guidelines.
- convening the System Controllers Conference in South Africa in 1996.
- discussion on the power system oscillation phenomenon on the interconnection between ZESA and ESKOM culminating in the commissioning of a study funded by Danish International Development Agency (DANIDA). The sub-committee is grateful for funding of the study and also acknowledge NESATEAM.
- improvement of interconnection reliability through the Matimba - lnsukamini tie line, with good collaboration between north and south utilities when problems arose.

Major Interconnection Faults

BPC System - two blackouts occurred during 1 996, one arising from a busbar fault, the other from overloading, both on the Eskom system.

ZESA System - there were three incidents reported, all being the result of system oscillations on the Matimba - Insukamini line and a busbar fault in the Eskom system.

Eskom System - apart from the problems mentioned above there were two incidents affecting supplies to NamPower.

NamPower System - the two disturbances reported under Eskom. ZESCO System - one of those incidents reported under ZESA.

Challenges and Opportunities

The more interconnections there are the more trading opportunities and operational challenges and trading opportunities are likely to arise, for which the OSC will have to find solutions; some of those currently under consideration are:

- implementation of the SAPP training programme.
- dealing, under emergency, with power flows into a system operating on bilateral agreements with neighbouring utilities, where some of the power comes from a third party operating on SAPP Operating Guidelines
- finalisation of the study on power oscillations on the interconnections
- non-compliance with the Operating Guidelines or other agreed operating standards
- agreements on the recommendations of the completed studies for the protection of the BPC system (Phokoje substation)

- the difficulties of arranging meetings and their venues, particularly urgent ad hoc meetings to deal with interconnector problems, given cross-border travel documentation
- implementation of the SAPP training program.

Environmental Sub-Committee

The SAPP Environmental Sub-Committee (EnvSC) held its inaugural meeting in Johannesburg, South Africa in August 1 996. There have been problems with consistency in the membership of the sub-committee which has tended to slow down the work of the EnvSC.

Environmental Impact Assessment Guidelines

An environmental impact assessment working group was formed to investigate and review various existing guidelines, with a view to drafting appropriate documents for the SAPP To make progress the assignment was broken into guidelines for transmission lines, thermal plants and hydro schemes.

The EnvSC also decided to revert to the Management committee on the sensitive nature of the hydro guidelines and seek their support for an independent consultant to draft this document.

Liaison and Workshops

World Bank Presentations - the EnvSC were invited to attend a workshop held by the World Bank. The Bank's presentations included the environment as a factor to be considered in applying for funds from the institution.

E7 Environment Workshop - the purpose of this workshop was to establish a relationship between the E7, give an overview of environmental management in a utility based industry and seek support for future collaboration. The E7 is a consortium of the G7 eight top utilities. The workshop was made possible by a grant from the Canadian International Development Agency (CIDA) with assistance from SADELEC. It was agreed to draft a strategy to address the issues which had surfaced during the workshop, and it is hoped this and the proposals on its implementation will be ready in early 1 998. Further collaboration between the two consortia is envisaged.

Future Outlook

There are a number of issues which will have to be addressed. It is generally recognised that the focus must be on the building of new interconnections in preference to new power stations, as there is presently an excess of generating capacity in the Southern African region; any additional generating capacity built will in any event require transmission lines to distribute power.

Angola, Malawi and Tanzania are not interconnected to the main network of the SAPP Projects to interconnect them to the grid are in the planning stage, but the challenge facing these countries will be to find the financial backing for these projects. In this regard the governments and utilities are learning that co-operation and reliance on one another is a more attractive option than self-sufficiency. It is also more evident that potential donor agencies will consider funding new projects at concessionary rates only if the projects have a truly regional impact with more than one country benefiting.

In light of the excess generating capacity prevailing the emphasis is to attract large new loads such as iron plants, copper mines or aluminium smelters and to build utility interconnectors.

The establishment of joint venture companies is an attractive and flexible mechanism for the realisation of SAPP However within the SAPP there is a need to rationalise the governance of the electricity supply industry to ensure that the structures of the utilities that make up SAPP are conducive to investor funding.

Within the SAPP there is also a need to rationalise the governance to ensure that SAPP structures are conducive to investor/donor funding; this has been entrusted to the Planning/Operating Sub-Committees to take further.

SOUTHERN AFRICAN POWER POOL

Table I - Annual Maximum Internal Demand (MW)

Country	utility	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Angola	ENE	181	219	241	265	291	322	354	389	427	468	502	5.11	581	624	669
Botswana	BPC	222	238	266	290	300	313	330	343	356	370	387	107	423	441	463
Lesotho	LEC	76	79	89	101	112	124	136	147	159	171	183	195	207	219	232
Malawi	ESCOM	164	180	193	203	214	223	236	252	267	284	302	321	342	365	389
Mozambique	EdM	192	230	259	811	820	829	841	848	854	1310	1317	1.323	1330	1338	1345
Namibia	NamPower	321	331	342	562	626	644	753	767	781	794	810	825	842	859	877
South Africa	ESKOM	27967	28329	28705	29723	30405	31403	31917	32701	33486	34354	35292	36215	37153	37991	38929
Swaziland	SEB	128	134	141	144	151	159	168	178	188	198	209	220	231	243	255
Tanzania	TANESCO	412	445	478	520	568	624	684	746	805	874	950	1.032	1120	1214	1315
Zaire	SNEL															
Zambia	ZESCO	1028	1048	1100	1161	1200	1230	1270	1275	1272	1292	1326	1 311/	1390	1363	1392
Zimbabwe	ZESA	1752	1841	1874	1906	1978	2052	2129	2210	2294	2382	2473	2.569	2669	2773	2882
TOTAL		32443	33074	33688	35686	36665	37923	38818	39856	40889	42497	43 /51	44.995	46288	47457	48748

Notes

(i) The period considered is beginning April of the year indicated until end March of the following year.

(ii) The values given relate only to the internal consumption in each country

SOUTHERN AFRICAN POWER POOL

Table II - Annual Firm (Import/Export) Demand (MW)

Country	Utility	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Angola	ENE															
Botswana	BPC	(105)	(122)	(148)	(162)	(182)	(195)	(212)	(225)	(238)	(251)	(269)	(289)	(305)	(323)	(346)
Lesotho	LEC	(76)	(79)	(89)	(53)	(64)	(76@	(88)	(99)	(111)	(123)	(135)	(47)	(159)	(171)	(109)
Malawi	ESCOM	.5	5	2.5	2.5	25	2.5	3	3	4	4	4	4	4,5	4,5	4.5
Mozambique	EdM	(100)	-	-	(450)	(450)	(450)	(450)	(450)	(450)	60	700	700	700	700	700
Namibia	NamPower	(50)	(60)	(71)	(291)	(355)	(373)	(446)	(460)	(474)	(487)	(618)	(633)	(650)	(667)	(685)
South Africa	ESKOM	(350)	(1300)	(1300)	(1300)	(1300)	(1300)	(1300)	(1300)	(1800)	(1800)	(1800)	(1800)	(1800)	(1800)	(1800)
Swaziland	SEB	(95)	(101)	(108)	(111)	(118)	(114)	(123)	(133)	(143)	(155)	(164)	(175)	(186)	(198)	(210)
Tanzania	TANESCO	-	-	100	100	100	150	150	150	150	150	150	150	150	150	150
Zaire	SNEL															
Zambia	ZESCO															
Zimbabwe	ZESA	(163)	(214)	(215)	(303)	(394)	(179)	(263)	(46)	669	580	638	543	595	792	*687*
TOTAL		(939)	(1876)	(1829)	(2.568)	(2761)	(2.535)	(2729)	(2560)	(2393)	(2022)	(1494)	(1647)	0651)	(1513)	(1609)

Notes:

(i) The period considered is beginning April of the year indicated until end March of the following year

(ii) Only show contracted imports or exports at time that countries system peak.

SOUTHERN AFRICAN POWER POOL

Table III - Annual Internal Sent Out Energy (GWh)

Country	Utility	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Angola	ENE	1133	1252	1378	1516	1660	1840	2025	2225	2438	2675	2870	3090	3320	3565	3820
Botswana	BPC	736	800	800	800	800	800	800	800	800	800	800	800	800	800	800
Lesotho	LEC	256	257	293	342	390	430	468	502	548	575	61C	642	672	705	740
Malawi	ESCOM	876	958	1023	1082	1143	1206	1280	1363	1449	1542	1643	1750	1867	1992	2127
Mozambique	EdM	1036	1329	1542	6101	6148	6193	6256	6292	6324	10102	10136	10172	10208	10246	10285
Namibia	NamPower	1756	1812	1871	3089	3456	3535	4181	4253	4328	4406	4488	4572	4660	4753	4899
South Africa	ESKOM	173015	177543	182643	189130	194107	199246	204124	208759	214416	218796	224286	229977	235826	241733	247826
Swaziland	SEB	289	289	289	289	289	394	394	394	394	394	394	394	394	394	394
Tanzania	TANESCO	1791	2512	2697	2936	3202	3517	3858	4205	4554	4928	5357	5818	6312	6842	7410
Zaire	SNEL	5379														
Zambia	ZESCO	6863	6996	7344	7751	8011	8212	8479	8512	8492	8626	8853	8993	9280	9100	9293
Zimbabwe	ZESA	10412	10976	11529	11937	12388	12852	13335	13840	14366	14917	15491	16088	16714	17368	18051
TOTAL		203542	204728	211409	224973	231594	238225	24520	251145	258109	267761	274928	282296	290053	297498	305645

Notes:

(i) Values given above are for billed consumption plus system losses but excludes generation auxiliaries

(ii) Values given exclude any imports

Table IV - Monthly Demand (MW) - Including (Imports) Excluding Exports April 1995 to March 1996

Country	Utility	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Angola	ENE												
Botswana	BPC	191	189	191	205	202	189	190	200	185	194	189	188
Lesotho	LEC	56	67	74	76	72	64	55	49	49	44	47	47
Malawi	ESCOM	139	146	149	149	143	145	143	141	138	132	131	136
Mozambique	EdM												
Namibia	NamPower	269	262	275	282	292	277	265	272	260	245	259	266
South Africa	ESKOM	21523	23381	24583	25133	23529	22665	22305	21953	22013	21961	22914	22710
Swaziland	SEB	126	127	129	138	139	128	135	125	126	135	138	135
Tanzania	TANESCO	312	209	306	283	290	296	314	331	332	323	327	338
Zaire	SNEL												
Zambia	ZESCO	932	971	1003	998	1010	978	929	949	905	931	933	930
Zimbabwe	ZESA	568	1626	1744	1793	1707	1684	1655	1644	1655	1583	1583	1635
TOTAL		25116	26978	28454	29057	27384	26426	25991	25664	25663	25548	26521	26385

Notes:

(i) Swaziland from April 1996 to March 1997

(ii) The values given relate only to the internal consumption in each country

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Table V - Available Net Installed Capacity (MW)

Country	Utility	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Angola	ENE	326	326	326	326	586	586	586	586	8,16	846	846	8.16	846	846	846
Botswana	BPC	118	118	118	118	118	118	118	118	118	118	118	118	118	118	118
Lesotho	LEC	2	2	2	74	74	74	74	74	74	74	74	74	74	74	184
Malawi	ESCOM	214	214	214	214	278	278	278	342	387	432	432	432	432	432	432
Mozambique	EdM	186	186	186	245	245	245	245	245	198	198	198	198	198	198	198
Mozambique	HCB	2000	2000	2000	2000	2000	2000	2000	2000	2,000	2000	2000	2.000	2000	2000	2000
Mozambique	MepUncuo										1200	2000	2.000	2000	2000	2000
Namibia	NamPower	384	384	384	384	384	384	384	384	384	384	240	240	240	240	240
Namibia	KUDU							650	650	1,300	1300	1300	1.300	1300	1300	1300
South Africa	ESKOM	31972	32914	33856	34853	35520	36187	36187	36187	36187	36187	36187	36187	37051	38209	39112
Swaziland	SEB	41	41	41	41	56	56	56	56	56	56	56	56	56	56	56
Tanzania	TANESCO	514	644	644	783	783	783	833	833	1,037	1037	1197	1197	1197	1197	1197
Zaire	SNEL	2480														
Zambia	ZESCO	1774	1774	1774	1774	1774	1854	2054	2454	2,454	2454	2454	2.454	2454	2454	2,454
Zimbabwe	ZESA	1593	1624	1708	1708	1708	2008	2008	2308	3,108	3258	3258	3.708	3708	3708	4008
TOTAL		41604	40227	41253	42520	43526	44573	45473	46237	48,149	49544	50360	50.510	51674	52832	54145

Notes:

(i) Available generating plant to meet annual peak load.

(ii) Excludes any installed generating plant high is currently mothballed.

(iii) Excludes demand side management initiatives **(e.g.** interruptible loads)

SOUTHERN AFRICAN POWER POOL

Table VI - Firm Net Internal Capacity (MW)

Country	Utility	Availability Factor	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Angola	ENE	80%	261	261	261	261	469	469	469	469	677	677	677	677	677	677	677
Botswana	BPC	80%	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94
Lesotho	LEC	68%	1	1	1	50	50	50	50	50	50	50	50	50	50	50	124
Malawi	ESCOM	80%	171	171	171	171	222	222	222	274	310	346	346	346	346	346	346
Mozambique	EdM	84%	156	156	156	206	206	206	206	206	166	166	166	166	166	166	166
Mozambique	FICB	95%	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Mozambique	MepUncuo	80%										960	1600	1600	1600	1600	1600
Namibia	NamPower	80%	307	307	301	307	307	307	307	307	307	307	192	192	192	192	192
Namibia	KUD(J	80%							520	520	1040	1040	1040	1040	1040	1040	1040
South Africa	ESKOM	85%	27112	27911	28710	29555	30121	30687	30687	30687	30687	30687	30687	30687	31419	32401	33167
Swaziland	SEB	80%	33	33	33	33	45	45	45	45	45	45	45	45	45	45	45
Tanzania	TANESCO	80%	411	515	515	626	626	626	666	666	830	830	958	958	958	958	958
Zaire	SNEL	80%	1984	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zambia	ZESCO	92%	1632	1632	1632	1632	1632	1706	1890	2258	2258	2258	2258	2258	2258	2258	2258
Zimbabwe	ZESA	8 0'/.	1274	1299	1366	1366	1366	1606	1606	1846	2486	2606	2606	2726	2966	2966	3206
TOTAL			35337	34281	35147	36202	37039	37919	38663	39322	40849	41965	42618	42738	43710	44692	45772

Standard Availability factor used 80%

Where the factor as supplied it replaces the standard factor

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Table VII - Firm (Imports)/Exports Capacity (MW)

Country	Utility	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Angola	ENE															
Botswana	BPC	(210)	*(210)*	*(410)*	(410)	(410)	(410)	*(410)*	(410)	(410)	*(410)*	*(410)*	(410)	(410)	*(410)*	*(410)*
Lesotho	LEC	*(76)*	*(79)*	(89)	(53)	(64)	*(76)*	(88)	(99)	(111)	(123)	(135)	*(147)*	(159)	*(171)*	(109)
Malawi	ESCOM	1.0	1.0	5.0	5.0	5.0	5.0	55	5.5	65	6,5	6.5	65	70	*7.0*	7.0
Mozambique	EdM	300	200	200	650	650	650	650	650	650	1100	1100	1100	1100	1100	1100
Mozambique	FICB	*(1700)*	*(1700)*	*(1700)*	(1700)	1700)	1.700)	1700)	1700)	(1700)	(1700)	(1700)	(1700)	(1700)	(1700)	(1700)
Mozambique	MepUncuo										(960)	(1600)	(1600)	(1600)	(1600)	(1600)
Namibia	NamPower															
Namibia	KUD(J							(520)	(520)	(1040)	(1040)	(1040)	(1040)	(040)	(1040)	(1040)
South Africa	ESKOM	Under Review														
Swaziland	SEB	(95)	(101)	0 08)	(111)	(118)	(114)	(123)	(133)	(143)	0 55)	(164)	(175)	(186)	(198)	(210)
Tanzania	TANESCO			100	100	100	150	150	150	150	150	150	150	150	150	150
Zaire	SNEL															
Zambia	ZESCO															
Zimbabwe	ZESA	(300)	(650)	(650)	(650)	(650)	(650)	(650)								
TOTAL		(2 080)	(2539)	(2 652)	(2169)	(2187)	(2145)	(2685)	(2057)	(2598)	(3132)	(3793)	(3816)	(3838)	(3862)	(3812)

Notes: (i) Contracted agreements only

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Table VIII - Internal Generation Capacity - Surplus/ (Shortage)

After Demand Side Management Initiatives (e.g. Interruptible loads)

Country	Utility	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Angola	ENE	145	107	85	61	295	264	232	197	419	378	344	305	265	222	177
Botswana	BPC	(128)	(144)	(159)	(171)	(190)	(203)	(218)	(230)	(243)	(255)	(272)	(290)	(306)	(322)	(343)
Lesotho	LEC	(76)	(78)	(88)	(53)	(64)	(76)	(88)	(99)	(111)	(123)	(135)	(147)	(159)	(171)	1109)
Malawi	ESCOM	7	(9)	(22)	(32)	8	(1)	(4)	22	43	62	44	25	4	(19)	(43)
Mozambique	EdM	(36)	(74)	(103)	(605)	(614)	(623)	(635)	(642)	(687)	(I 144)	(1150)	(1157)	(1164)	171)	179)
Mozambique	FICB															
Mozambique	MepUncuo															
Namibia	NamPower	(14)	(24)	(35)	(255)	(319)	(337)	(446)	(460)	(474)	(487)	(618)	(633)	(650)	(667)	(685)
Namibia	KUDU															
South Africa	ESKOM	2160	2648	3037	3302	3542	3322	2551	1798	1034	20,3	(682)	1559)	1742)	681)	832)
Swaziland	SEB	(75)	(81)	(88)	(91)	(98)	(94)	(103)	(113)	(123)	(135)	(144)	(155)	(166)	(178)	(190)
Tanzania	TANESCO	(1)	70	37	106	58	2	(81)	(80)	25	(44)	8	(74)	(162)	(256)	(357)
Zaire	SNEL	1984	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Zambia	ZESCO	604	584	532	471	432	476	620	983	986	966	932	911	868	895	866
Zimbabwe	ZESA	(388)	(453)	(475)	(540)	(612)	(446)	(523)	(364)	192	224	133	157	297	193	324
TOTAL		4183	2547	2722	2195	2440	2285	1359	1013	1061	(355)	(1504)	(2617)	(2915)	(3155)	(3371)

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Table IX - Generation Capacity - Surplus/(Shortage)

Following Inclusion of Import/Export Contracts

Country	Utility	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Angola	ENE															
Botswana	BPC															
Lesotho	LEC	76	79	89	101	112	124	136	147	159	171	183	195	207	219	232
Malawi	ESCOM	7	(9)	(24)	(34)	6	(3)	(17)	19	39	58	40	21	(1)	(24)	(48)
Mozambique	EdM	264	126	97	45	36	27	15	8	(37)	(44)	(50)	(57)	(64)	(71)	(79)
Mozambique	FICB	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Mozambique	MepUncuo															
Namibia	NamPower	36	36	36	36	36	36	74	60	566	553	422	407	390	373	355
Namibia	KUDU															
South Africa	ESKOM	2510	3948	4337	4602	4842	4622	3851	3098	2834	2003	1118	241	58	119	(32)
Swaziland	SEB	(95)	(101)	(108)	(111)	(118)	(114)	(123)	(133)	(143)	(155)	(64)	(175)	(186)	(198)	(210)
Tanzania	TANESCO	(1)	70	137	206	158	152	132	70	175	106	158	76	(12)	(106)	(207)
Zaire	SNEL															
Zambia	ZESCO															
Zimbabwe	ZESA															
TOTAL		2997	4349	4764	5045	5272	5044	4268	3469	3793	2892	1907	908	592	512	211

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Table X - New Generating Plants

Year	Country	PowerStation	Number of Units	UnitSize (MW)	Total Added (MW)	Cost US Million	Type T/H
1996	South Africa	Majubc I		1	612	612	T
1996	South Africa	Arnot 3 Recommission	1	330	330		T
1997	Zimbabwe	Hwange Upgrade	1	84	*84*	130	T
1997	South Africa	Majuba 2		1	612	612	T
1997	South Africa	Amot 4 Recommission	1	330	330		T
1997	Tanzania	Ubungo	1	30	30	18	T
1997	Tanzania	IPTL	*4*	25	100	90	T
1998	Lesotho	Muela	3	24	72		H
1998	South Africa	Moiubc 3	1	612	612		T
1998	South Africa	Amot 5 Recommission	1	330	330		T
1999	Tanzania	Kihonsi	3	60	180	237	H
1999	South Africa	Majuba 4	1	667	667		T
1999	South Africa	Arnot 6 Recommission	1	330	330		T
1999	*Malawi*	Kaphichira Phase 1	2	.32	64	129	H
2000	Angola	Capando	2	130	260		H
2000	South Africa	Majubc 5	1	667	667		T
2002	Zimbabwe	Hwange 7	1	330	330	277	T
2001	South Africa	Majubo 6	1	*667*	667		T
2001	Zambia	ltezhi-Te@hi	1	50	50	63	H
2002	Zambia	Kafue Lower	1	-200	200	520	H
2002	Tanzania	Dar-es-Soloom	1	50	50	24	T
2002	Malawi	Kophichira Phase 2	2	32	64	38	H
2002	Namibia	Kudu	1	650	650		T
2003	Zambia	Kafue Lower	2	200	400		H
2003	*Malawi*	Lower Fufu	1	45	45	59	H
2003	Zimbabwe	Hwange 8	2	330	660	277	T
2003	Mozambique	Mepondo Uncuo	5	400	2000	1500	H
2004	Angola	Capondo	2	130	260		H
2004	Tanzania	Rumakoli	*4*	51	204	405	H
2004	Malawi	Lower Fufu	1	45	45	59	H
2004	Namibia	Kudu	1	650	650		T
2004	Zimbabwe	Botoka Hydra	1	800	800	1101	H
2003	Zimbabwe	Gokwe North	2	350	700		T
20()4	Zimbabwe	Gokwe North	1	350	350		T
2005	Zimbabwe	Gokwe North	1	350	350		T
2006	Tanzania	Mpongo	*4*	40	160	300	H
2008	South Africa	Komati 1, 2 & 6 Recommission	3	2x90, 1x114	294		T
2008	South Africa	GrooNlei 1-3 Recommission	3	190	570		T
2009	South Africa	Komati 3,4,7 & 8 Recommission	4	2x90, 2x 11 4	4C)8		T
2009	South Africa	Grootylei 4-6 Recommission	3	lxl80,2x190	560		T
2009	South Africa	Camden I Recommission	1	190	190		T
2009	Zimbabwe	Botoka South	1	200	200		H
2010	Zimbabwe	Botoka South	1	200	200		H
2010	South Africa	Camden 2-4 Recommission	3	190	570		T
2010	South Africa	Broomhoek 1	1	333	333		H
2011	Zimbabwe	Botoka South	1	200	200		H
2012	Zimbabwe	Botoka South	1	200	200		H

Table XI - New International Transmission Lines

Year	Country from	Country to	Substation from	Substation to	Voltage (kV)	Route Length (Kms)	Transfer (MW)	Cost US$ Million
1997	Mozambique	Zimbabwe	Songo	Bindura/Demo	400	250	500	
1998	South Africa	Swaziland	Prairie	Zoinbodze	275	150		
1998	Zambia	Tanzania	Pensulo	Mbeya	330	650	230	150
1998	Mozambique	South Africa	Songo	Apollo	533 DC	1420	2000	
1999	Mozambique	Swaziland	Mololo	Zombodze	275	180	200	25
1999	South Africa	Mozambique	Arnot	Maputo	400	220	900	
1999	South Africa	Mozambique	Camden	Maputo	400	220	900	
1999	South Africa	Namibia	Mes	Kokerboom	400	420		
1999	Zambia	Zaire	Luano	Korovia	200	144	375	
2000	Mozambique	Malawi	Motambo	Blantyre West	220	200	300	40
2003	South Africa	Swaziland	Prairie	Zombodze	275	150		

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Table XII - Internal Transmission Strengthening

Year	Country	Substation from	Substation to	Voltage (kV)	Length (km's)	Thermal Rating (MVA)	Cost US$ Million
1995	Swaziland	Magwaboyi	Manzini	132	3	43	
1995	Swaziland	Manzini	Thompson	132	7	43	
1997	Lesotho	Mozenod	Mohole	132	60	92	3
1997	Malawi	Chintheche	Chikongawo	132	72	72	3
1997	South Africa	Bighorn	Spitskop	400	90	110	10
1997	Tanzania	Kihonsi	Kidatu	220	181	200	1.2
1999	Botswana	Segoditshone	Thomago	220	40	200	
1998	Lesotho	Moputsoe	Muelo	132	60	180	5
1998	Lesotho	Mazenod	Mcieteng	132	55	92	4
1998	South Africa	Spencer	Witkop	2x275	125	470	12
1999	Swaziland	Lozitho (turn ins)	Mnkinkomo	132	10	8-cl	500
1999	Swaziland	Mnkinkomo	Lozitho (turn ins)	132	10	85	500
1999	Swaziland	Mnkinkomo	Lusekwone	132	10	a5	500
1999	Swaziland	Lusekwone	Helehele	132	20	85	1000
1999	Swaziland	Lusekwone	Helehele	132	20	85	1000
1999	Swaziland	Helehele	Kolongo	132	55	85	2750
1999	Botswana	Thomago	Juaneng	132	85	90	
1998	Botswana	Segoditshone	Airport	132	8	90	
1999	South Africa	Bighorn	Phoebus	400	75	1100	10
1999	South Africa	Pelly	Phoebus	2x275	1	470	0.2
1999	Tanzania	Kihonsi	lringo	220	97	200	7
1999	Tanzania	Singido	Arusho	220	313	200	38
2000	South Africa	Bighorn	Trident	2x275	5	470	
2000	South Africa	Everest	Merapi	275	110	470	9
2000	Namibia	Kokerboom	Aucs	400	470	1800	55
2001	Malawi	Nkula 'B'	Lilongwe 'B'	132	250	106	5
'.002	Malawi	Bwengu	Chikongawo	132	120	72	7
2002	Zimbabwe	Gokwe North	Chokori	400	198	1750	
2003	Malawi	Chikongowo	Lilongwe	132	273	84	15
2003	Mozambique	Mepanda Uncuo	Moputo	533 DC	1500	2000	350
2003	South Africa	Amot	Mozambique	2x400	10	3100	58
2003	South Africa	Marathon	Prairie	2x275	5	470	
2004	South Africa	Phoebus	Vulcan	400	110	1100	14
2004	Malawi	Bwengu	Chikongowo	132	120	84M	8
2004	Malawi	Lower Fufu	Bwengu	132	45	106	6
2004	South Africa	Spencer	Tabor	2x275	65	470	5
2004	South Africa	Bighorn	Phoebus	2x400	1	1100	
2004	Zimbabwe	Gokwe Noth	Sherwood	400	225	1750	
2004	Zimbabwe	Chokori	Demo	400	148	1750	
2005	South Africa	Foskor	Spencer	275	110	470	
2005	Botswana	Segoditshone	Morupuie	220	275	200	
2006	South Africa	Beta	Bloemdustria	2x400	95	1100	28

Notes:

(i) * are double circuit lines

(ii) Substations interconnecting transmission systems con be included