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SOUTHERN AFRICA POWER POOL – ITS BENEFITS TO THE BOTSWANA POWER CORPORATION

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ABSTRACT

The Botswana Power Corporation (BPC) has traditionally been meeting the national electricity demand through generation at Morupule power Station (120MW s.o.) and importing from neighbouring utilities, especially Eskom.of South Africa

Imported power has for a long time been based on long-term bilateral contracts. The contracts themselves have evolved in nature from customer captive, to co-operative and now to competitive ones.

In this paper, electricity trade in Southern Africa Power Pool (SAPP) is considered, and that includes a portion of highly competitive short - term energy market (STEM). ESKOM has only freed BPC to trade 25% of its requirements in this market, because of an agreement that runs until 2007.

The paper gives details of bidding and delivery at STEM and at the Bulleting Board. Savings against bilateral costs are also presented. A 25 % of import power is applied to trade at STEM for the first hour of 25 January 2002. The savings stand at ZAR 1498.95 / hr. The same procedure is applied to obtain STEM total savings for the month of December which equal ZAR 1 223 257 .20

The paper proposes that the bilateral agreement with ESKOM should be renegotiated with the view to requesting ESKOM to free more of BPC power imports to be traded at STEM. Such an agreement will allow BPC to boost its profit margin considerably.

Key Words: SAPP/ STEM benefits to BPC

1. INTRODUCTION

1.1 Evolution of Import Contract

In the early eighties, when the BPC maximum demand was in the region of 90 MW, only one 132kV inter-connector existed between BPC and ESKOM. At this stage the inter-connector, together with a diesel Power Station that was located in the Gaborone area, was supplying the Gaborone and Jwaneng loads. The import agreement at this time was of the Distribution type with take or pay portions in the tariff agreement.

When a national grid was established in the mid eighties, with an interconnected internal system and the new Power Station at Morupule, the BPC load had increased to around 120MW peak. An inter utility agreement was signed between ESKOM and BPC to import power at the Transmission level. Reduced electricity tariffs were agreed with provisions for penalties if BPC failed to forecast demand accurately or if BPC generators tripped on faults. A one level import schedule for the whole day but charged at time of use rates, was applicable. Morupule power station did the load following for BPC [1].

As the BPC load increased further to about 180MW in the early nineties, two more 132kV inter-connectors to ESKOM were added to increase the transfer capability and strengthen the interconnected system. A take or pay portion was included in the power purchase agreement, to allow ESKOM to recover its capital investment. Power could be imported under peak and off peak tariffs, but only two import levels were permitted per day. Up to this time it was only ESKOM who could supply BPC with external power.

In 1995 a 400kV line between ESKOM and ZESA in Zimbabwe was commissioned for the purpose of transferring power to the drought-stricken Zimbabwe. This line passed through Botswana and in 1997 BPC tapped into the 400kV supply. At that point generation sources to the north of BPC became available, and these provided cheap hydro-electric power. ESKOM was now in competition with other suppliers. The supply agreement was reviewed to permit BPC limited flexibility to source power from other entities. The ESKOM tariffs were reduced in order to retain a large portion of the BPC import requirements. However, the contract still maintained some captive clauses which did not give BPC complete freedom to source power elsewhere.

As the import levels reached above 50% of BPC requirements, the contract was renegotiated to allow

Morupule to run as a base load station because it provided cheaper power compared to imports. The agreement resulted in BPC paying for control area services to ESKOM up to date.

In the meantime BPC would import part of its requirements from ZESCo in Zambia and ZESA under short-term different agreements. These moves forced ESKOM prices downwards on a few occasions until these reduced for a long time.

The southern African Power Pool, which was formed in 1994 by all SADC power utilities, decided in November of 1999 that a competitive electricity market be set up in Southern Africa. This resulted in the operation of the SAPP short-term energy market (STEM) from April 2001.

1.2 Current Trading

Electricity trade in SAPP now includes a portion of highly competitive STEM. For this portion of trade, electricity prices have reduced compared to the bilateral long-term agreement prices. All surplus power is traded in this market and participants bid for it. The Co-ordination Centre (CC) in Harare performs the matching of bids and offers, and they handle the billing system.

From STEM has developed a derivative market from the unmatched bids and offers, and participants now engage in daily or hourly negotiations for power supply. Observations so far are that power in this market is normally cheaper than that available through long-term bilateral contracts.

ESKOM has only freed BPC to trade 25% of its requirements in this market, because of an agreement that runs until 2003. It is any body's guess as to what will happen at the expiry of the contract.

The low prices in STEM have resulted in cheaper energy, even though only a few SAPP members are participating in the market. Exciting times will follow when more members participate.

2. ADVANTAGES OF STEM

- The reduction of electricity prices due to competition.
- The freedom STEM offers from being captive customers to one supplier.
- The increase in the flexibility of electricity trade, and the emergence of closer business ties between members

The more members join in the competitive market, the more efficient the market becomes, and the more the benefits will increase, through lower prices.

3. BIDDING AND COST ESTIMATES

3.1 Bidding

A bidder indicates to STEM its power requirement on an hourly basis. If STEM is not able to supply the total requirement, the bidder could purchase the deficit from a Bulleting Board – STEM Bilateral Market Derivative. The Marketing board publishes all available surplus power in the Southern Africa region on hourly and daily basis. A copy of the Bulleting Board report is presented in table 3.1[2].

Table 3.1 Bulleting Board Report for 21 August 2001

		Offer	**Offer**		**Bids**	**Bids**	
Hour	Participant	MW	Currency	Price	MW	Currency	Price
1 to 5	ZESA	300	USc/kWh	0.3			
1 to 5	ESKOM	50	Rc/kWh	4.11			
1 to 5	ZESA	100	USc/kWh	0.55			
1 to 5	ESKOM				100	Rc/kWh	2.5
1 to 5	NAM				150	Rc/kWh	2.59
6	ZESA	200	USc/kWh	0.5			
6	ZESA	100	USc/kWh	0.55			
6	ESKOM				100	Rc/kWh	4
6	NAM				150	Rc/kWh	4.12
7	ZESA	100	USc/kWh	0.6			
7	ZESA	100	USc/kWh	0.8			
7	ESKOM	50	Rc/kWh	7.1			
7	ESKOM				100	Rc/kWh	4
7	NAM				38	Rc/kWh	6.04
8	ZESA	100	USc/kWh	0.8			
8	ESKOM	50	Rc/kWh	7.1			
8	ESKOM				100	Rc/kWh	6
9	ZESA	100	USc/kWh	0.8			
9	ESKOM	50	Rc/kWh	8			
9	ESKOM				100	Rc/kWh	6
9	NAM				28	Rc/kWh	7.3
10	ZESA	100	USc/kWh	0.8			
10	ESKOM	50	Rc/kWh	8			

10	ESKOM				100	Rc/kWh	6
10	NAM				52	Rc/kWh	7.3
11	ZESA	100	USc/kWh	0.8			
11	ESKOM	50	Rc/kWh	8			
11	ESKOM				100	Rc/kWh	6
11	NAM				52	Rc/kWh	6.21
12	ZESA	100	USc/kWh	0.8			
12	ESKOM	50	7.1				
12	ESKOM				100	Rc/kWh	4
12	NAM				52	Rc/kWh	6.21
13	ZESA	100	USc/kWh	0.8			
13	ZESA	100	USc/kWh	0.8			
13	ESKOM	50	Rc/kWh	7.1			
13	ESKOM				100	Rc/kWh	4
13	NAM				38	Rc/kWh	6.21
14	ZESA	100	USc/kWh	0.55			
14	ZESA	100	USc/kWh	0.8			
14	ESKOM	50	Rc/kWh	7.1			
14	ESKOM				100	Rc/kWh	4
14	NAM				40	Rc/kWh	6.21
15	ZESA	100	USc/kWh	0.55			
15	ZESA	100	USc/kWh	0.8			
15	ESKOM	50	Rc/kWh	7.1			
15	ESKOM				100	Rc/kWh	4
15	NAM				24	Rc/kWh	6.21
16	ZESA	100	USc/kWh	0.55			
16	ZESA	100	USc/kWh	0.8			
16	ESKOM	50	Rc/kWh	7.1			
16	ESKOM				100	Rc/kWh	4
16	NAM				22	Rc/kWh	6.1
17	ZESA	50	USc/kWh	0.7			
17	ZESA	100	USc/kWh	0.8			
17	ESKOM	50	Rc/kWh	7.1			
17	ESKOM				100	Rc/kWh	5
17	NAM				22	Rc/kWh	6.1
18	ESKOM	50	Rc/kWh	7.1			
18	ESKOM				100	Rc/kWh	7
18	NAM				28	Rc/kWh	7.3
19	ESKOM	50	Rc/kWh	7.1			
19	ESKOM				100	Rc/kWh	7
19	NAM				40	Rc/kWh	7.3
20	ESKOM	50	Rc/kWh	8			
20	ESKOM				100	Rc/kWh	7
20	NAM				40	Rc/kWh	7.3
21	ZESA	USc/kWh	0.6				
21	ESKOM	Rc/kWh	7.1				
21	ESKOM				100	Rc/kWh	4.5
21	NAM				66	Rc/kWh	6.04
22	ZESA	200	USc/kWh	0.3			
22	ZESA	100	USc/kWh	0.55			
22	ESKOM	50	Rc/kWh	7.1			
22	ESKOM				100	Rc/kWh	2.5
22	NAM				40	Rc/kWh	5.92
23	ZESA	200	USc/kWh	0.3			
23	ESKOM	50	Rc/kWh	4.11			
23	ZESA	100	USc/kWh	0.55			
23	ESKOM				100	Rc/kWh	2.5
23	NAM				200	Rc/kWh	2.59
24	ZESA	300	USc/kWh	0.3			
24	ESKOM	50	Rc/kWh	4.11			
24	ZESA	100	USc/kWh	0.55			
24	ESKOM				100	Rc/kWh	2.5
24	NAM				200	Rc/kWh	2.59

Until December 2001 BPC was not participating in STEM, because of a long tem agreement with ESKOM of South Africa. Zimbabwe (ZESA), Namibia (NAM), and South Africa (ESKOM) were participants. After several years of negotiations, ESKOM has freed 25 % of BPC imports, to be purchase from STEM and the Bulleting Board. Details of the BPC imports and the profits made by purchasing 25 % from STEM and 75 % from ESKOM

as compared with the import of 100 % the import power requirement from ESKOM is presented in table 3.2 [3, 4].

STEM total savings for the month of December is presented in table 3.3.

Table 3.2 – STEM Against Bilateral
Saturday 15 December 2001

Hour	BPC T rqs, M	25% o schedu impor	STEM MW	STEM hourly MW	STEM daily	Stem p hourly	ESK OM price	Daily total price	Hour ly total price	STE M total price	ESK OM total daily	ESK OM total ho urly	Savin gs daily	Savi ngs hourly	Savi ngs total
1	90	23	23		3..32		7.0017	763.6	0.00	763.60	1610.3	0.00	846.79	0.00	846.79
2	80	20	20		3.32		7.0017	66.40	0.00	66.40	1400.3	0.00	1333.9	0.00	1333.9
3	80	20	20		3.32		7.0017	66.40	0.00	66.40	1400.3	0.00	1333.9	0.00	1333.9
4	70	18	18		3.32		7.0017	59.76	0.00	59.76	1260..1	0.00	1200.5	0.00	1200.5
5	70	18	18		3.32		7.0017	59.76	0.00	59.76	1260.3	0.00	1200.5	0.00	1200.5
6	85	21	21		3.32		7.0017	69.72	0.00	69.72	1470 .36	0.00	1400. 64	0.00	1400. 64
7	90	23	23		5.925		7.0017	13.62	0.00	136.28	1610.3	0.00	1474.1	0.00	1474.1
8	105	26	0	26		5.925	11.3 405	0.00	1540. 50	1540. 50	0.00	294 8.53	0.00	1408 .03	1408 .03
9	120	30	0	30		8.295	11.340	0.00	2488.5	2488.5	0.00	3402.1	0.00	913.65	913.65
10	130	33	0	33		8.295	11.340	0.00	2737. 35	2737. 35	0.00	3742. 37	0.00	1005 .02	1005 .02
11	130	33	0	33		8.295	11.340	0.00	2737. 35	2737. 35	0.00	3742. 37	0.00	1005 .02	1005 .02
12	125	31	0	31		7.11	11.3 405	0.00	2204.1	2204 .1	0.00	3515 .16	0.00	1311 .46	1311 .46
13	120	30	30		3.32		11.3 405	99.6	0.00	99.6	3502 .15	0.00	3302 .55	0.00	3302 .55
14	110	28	28		3.32		7.00 17	92.96	0.00	92.96	1960 .48	0.00	1867. 52	0.00	1867. 52
15	100	25	25		3.32		7.00 17	83.00	0.00	83.00	1750 .43	0.00	1667 .43	0.00	1667 .43
16	100	25	25		3.32		7.00 17	83.00	0.00	83.00	1750 .43	0.00	1667 .43	0.00	1667 .43
17	90	23	23		3.32		7.00 17	76.36	0.00	76.36	1610 .39	0.00	1534 .03	0.00	1534 .03
18	90	23	23		3.32		7.00 17	76.36	0.00	76.36	1610 .39	0.00	1534 .03	0.00	1534 .03
19	100	25	25		3.32		7.00 17	83.00	0.00	83.00	1750 .43	0.00	1667 .43	0.00	1667 .43
20	130	33	33		3.32		7.00 17	109.5 6	0.00	109.5 6	2310. 56	0.00	2201 .00	0.00	2201 .00
21	130	33	33		3.32		7.00 17	109.5 6	0.00	109.5 6	2310. 56	0.00	2201 .00	0.00	2201 .00
22	110	28	28		3.32		7.00 17	92.96	0.00	92.96	1960 .48	0.00	1867. 52	0.00	1867. 52
23	105	26	26		3.32		7.00 17	86.32	0.00	86.32	1820 .44	0.00	1734. 12	0.00	1734. 12
24	85	21	21		3.32		7.0017	69.72	0.00	69.72	1470 .36	0.00	1400. 64	0.00	1400. 64
Total	2445	611	463	153				2284 .32	11707 .80	13992 .12	**33719 .51**	**17350 .97**	**3143 5.20**	**5643 .17**	**37078 .36**

Table 3.2 also indicates the BPC daily demand pattern, as indicated in column 2.

3.2 Cost Estimate

ESKOM prices are escalated each year. The new prices for ESKOM imports in 2002 are as follows:

Peak 12.8969 Rc/kWh
Off Peak 7.6481 Rc/kWh

Exchange Rate = ZAR 11.86 to 1 US $

The following example is based on the first hour of 25 January 2002.

On that date, in one hour, the BPC total import requirements were 130 MW.

Under the agreement, BPC should import 75% of that power from ESKOM and 25% from STEM and other suppliers. i.e., 98 MW and 32 MW respectively.

Of the 32 MW STEM could sell 16 MW at 0.25 USc/kWh or 2.965 Rc/kWh
Therefore cost of 16 MW = (16*1000*2.965)/100 =
R 474.40

The remaining 16 MW was purchased from the Bulleting Board at 0.25 USc/kWh = **R 474.40**

Because this period is an off peak hour the cost of 98 MW is (98*1000*7.6481)/100 = **R 7495.14**

The total cost to BPC for procuring its import requirements of 130 MW in that hour was,
R (7495.14 + 474.40 + 474.40) = **R 8443.94**

Had all the imports requirement of 130 MW for that hour been purchased from ESKOM of South Africa, the total cost would have been, (130*1000*7.6481)/100 = **R 9942.53**
Savings made in that hour by importing 25 % of BPC imports from STEM and the Bulleting Board is
R (9942.53 – 8443.94) = **R 1498.59**

The same computation procedure was applied to obtain the STEM total savings for the month of December 2001 that is presented in table 3.3

Table 3.3 STEM TOTAL SAVINGS FOR THE MONTH OF DECEMBER 2001

Currency = ZAR

Trading Week 1	
Day	Savings
1	**0.00**
	0.00

Trading Week 2	
Day	Savings
2	**0.00**
3	**0.00**
4	**21,394.09**
5	**44,309.12**
6	**44,709.48**
7	**42,629.25**
8	**31,258.35**
	184,300.28

Trading Week 3	
Day	Savings
9	**30,393.48**
10	**51,885.27**
11	**74,001.52**
12	**65,023.90**
13	**206,010.41**
14	**58,936.92**
15	**37,078.36**
	523,329.85

Trading Week 4	
Day	Savings
16	**27,810.92**
17	**31,349.01**
18	**16,565.14**
19	**16,539.50**
20	**21,168.62**
21	**28,063.94**
22	**32,451.90**
	173,949.03

Trading Week 5	
Day	Savings
23	**28,745.06**
24	**67,505.65**
25	**16,296.25**
26	**19,190.73**
27	**48,099.26**
28	**57,287.03**
29	**33,496.04**
	270,620.02

Trading Week 6	
Day	Savings
30	**34,525.84**
31	**36,532.17**
	71,058.01

TOTAL MONTHLY SAVING		
Trading Week 1		**0.00**
Trading Week 2		**184,300.28**
Trading Week 3		**523,329.85**
Trading Week 4		**173,949.03**
Trading Week 5		**270,620.02**
Trading Week 6		**71,058.01**
		1,223,257.20

4. DISCUSSIONS AND CONCLUSION

Short - term energy market (STEM) offers a good opportunity for the reduction of the cost of importation of energy by BPC. However the long-term agreement for the importation of energy from ESKOM of South Africa prevents the BPC from maximum utilization of STEM. Further more the ESKOM rates are fixed yearly for peak and off peak periods. These rates are escalated every year. In 2001 the rate for peak period was 11.3405 Rc/kWh. In 2002 the figure has gone up to 12.8965 Rc/kWh. It is therefore in the interest of Botswana to purchase more energy from STEM. This has not been possible because of long-term contract agreement with ESKOM.

For a period of one hour off peak, a savings of ZAR 1498.59 was made. The total savings for the month of December 2001 was ZAR 1 223 257.20 A computation for a year will yield millions of dollars on the basis of the purchase of only 25% of the imports from STEM. It is hoped that by persistent negotiations, ESKOM will eventually agree to free more percent of the power imports of Botswana. Such an agreement will considerably increase the profit margin of the Botswana Power Corporation.

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