

Activity Completion Report

**Course on Advanced Electricity Market
Southern Africa Power Pool**
(28 October – 01 November 2002
and
4 November - 8 November 2002)

**A Course Sponsored Under
USAID Energy and Environment Program**

Course Developed and Conducted By

**CORE International, Inc.
Washington, D.C.**

December, 2002

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I. OVERVIEW

Under the Task Order – Private Participation in Clean Energy Development, Management and Operations -- CORE International designed and delivered twice a course on “Advanced Electricity Market - Southern African Power Pool” during the period 28 October – 1 November & 4 November – 8 November, in Durban, South Africa. The following are the highlights of the two activities:

- The first course was opened and welcomed by Mr. Lovemore Bingandadi, Infrastructure Advisor, USAID Regional Center for Southern Africa Gaborone, Botswana, and Dr. Donald I. Hertzmark, Senior Energy Market Development Expert and COP, SAPP Energy Market Services Training, CORE International, Inc.
- The second course was opened and welcomed by Dr. Kevin War, Program Analyst, Energy Division, EGAT, U.S. Agency for International Development, and Dr. Donald I. Hertzmark.
- In the first course there were a total of 18 participants from all SAPP member countries, coming mainly from the regulatory authorities, SAPP itself, and member utilities. In the second were another 19 participants from SAPP member power utilities. The attending participants were very active and there was considerable discussion among the participants on various issues involved in electricity trading, short and long term markets, market clearing, as well as trading costs and integration of trading financial results.
- Each of the participants made valuable contributions during the discussions of various course modules. Not only were the participants expected to work through the notebooks and other course materials; they were also required to engage in the three exercises discussed below.
- During each course the participants were engaged in three "Exercises" that were designed by CORE Team. The first exercise focused on 'Spot Market Clearing'. The participants were given a role as one of the participants in a power pool system, complete with a set of power generation assets (using different fuels) and sales contracts. Using data given to them regarding the “next day’s demand for electricity” the participants were required to buy and sell electricity so as to meet their contractual requirements while covering costs of generation and trading. This exercise was intended to demonstrate (i) what is a spot market, (ii) how are wholesale prices established, and (iii) what contract instruments exist for spot market trading.

The second exercise focused on 'Long-term Market Clearing'. In this exercise the participants were again put into the role of one of the pool electricity suppliers discussed above. However, this time each teams was required to establish a plan for meeting future spot and contractual demands for electricity by using existing assets. The lessons of this exercise centered on (i) what is the long term market, (ii) how are future prices established, (iii) how can a mixture of investment and trading produce a least-cost supply mix, and (iv) what contract instruments exist for long-term market trading.

A third exercise focused on 'P&L-Driven Trading'. In this exercise the participants experienced (i) trading rules for transaction control, and (ii) Impact of rules on profitability of generation assets. This exercise was based on the results of exercise 2.

The participants were actively engaged during all these exercises. Participants presented exercise summaries at the end of each exercise.

The two courses generated a considerable amount of discussion among the participants. First, the participants enhanced their knowledge about the complexities inherent in exploiting electricity trading and markets. Second, the participants were given examples of how other countries had attempted to address some of the very issues faced by SAPP. Third, the participants were given access to materials detailing the strengths and weaknesses of various approaches to setting prices and clearing markets. Fourth, the participants were able to see for themselves the intricacies involved in combining trading and investment strategies in the context of limited resources and time. Through the exercises, the participants gained hands-on experience in the process of making bids and trading off current and future incomes and costs. The three exercises were designed based on a SAPP market situation which is developing progressively.

II. KEY INSIGHTS AND ISSUES

The SAPP system is a dynamic and evolving one. While the current trading arrangements occur largely outside the formal SAPP mechanisms, an increasing volume of trade has been brought into the formal trading process of the SAPP Control Centre in Harare, Zimbabwe. In order for these efforts to deepen the SAPP trading arrangements to succeed, the members will need to understand and participate in spot and short term markets that trade capacity as well as energy.

The SAPP Course on Advanced Electricity markets was intended to furnish participants with an understanding of the basic elements of a transition from occasional energy trades to a more fully developed market in both energy and capacity. Along the way, it is essential to show the link between trading activities and system expansion or investment activities.

Many of the participants in the two courses have had relatively little experience in system planning and investment policy. In a trade-dependent organization, the traders will need to be integrated in their approaches and goals with other investment activities in generation and transmission.

Three issues for near term consideration have emerged from the exercises used in this course. These are:

1. Provision of a framework for trading activities;
2. Need for a consistent way to evaluate future investment options; and
3. Inclusion of dispatch and transmission system management in SAPP training and TA activities.

Some issues emerged relative to the conduct of the course itself and should SAPP wish to conduct further iterations of this course, the following changes might be expected:

1. Less history of SAPP trading and institutions (needed for only a subset of participants and implemented in second Course);
2. More time spent on spot market trading and bulletin board for tracking trades;
3. “Keeping Score” of gains and losses in trading;
4. Better project evaluation framework for investments (probably a distinct course in the future, rather than an element of the trading course) with more explicit links to least cost expansion programs, and more specific consideration of financial and other constraints on investment activities.

III. POTENTIAL FOLLOW UP RECOMMENDATIONS

In both lectures and exercises, this Course emphasized the interconnectedness of trading and investment in SAPP. This message will now need to be carried to a policy-making level, given the control over investment activities exercised by regulatory and political officials in each country.

With this link in mind, a suggested next step for SAPP is a short version of this Course, one aimed at senior executives, regulators and policy-makers. This activity was requested by SAPP Control Centre personnel during the first course in Durban. The short course, intended to be completed over a two-day period, will stress the key issues and lessons-learned in the Advanced Markets Courses just completed. The proposed outline of the short course is as follows:

Proposed Outline for Executive Course on Advanced Electricity Market

1. Electricity pool trading – quarter day
 - Evolution
 - Current status
 - Successes and failures
 - Role of SAPP
2. Essentials of trading – quarter day
3. Trading exercise – full day
 - Bulletin boards
 - Keeping score
4. Trading and investing – quarter day
 - Linking long and short term markets
 - Constraints on optimal policies
5. Role of regulation and policy in trading and investment activities – quarter day

Other findings and observations regarding the status of SAPP short term trading include the following issues:

1. SAPP trading software – are there adaptations of existing commercial software that can work for SAPP? e.g., Internet Explorer “Auction manager” functions, combined with bulletin board notifications from SAPP Control Centre.
2. Long term investment planning – there is a clear need to integrate financial, trading, resource and other considerations into system expansion plans – is there a plan for SAPP to address this matter?

3. Communications and trading efficacy – what is the status of improved communications links among the SAPP members?

With regard to future TA and other activities, the consultants have found that hands-on activities continue to be the best complement to well-designed lecture courses. To that end, CORE recommends the following additional activities for SAPP Operations and Trading Professionals:

1. TA to create bulletin board front end at SAPP side for short term market trades – this would involve a bit of programming, using existing internet auction and trading software as a basis. CORE recommends that SAPP Control Centre personnel meet with managers at successful internet-based trading and auction businesses to obtain ideas for a software and business model. The customer-side software already exists as a component of the Microsoft Internet Explorer program.
2. A course that will integrate trading and planning activities to demonstrate the potential gains of new types and tenors of trades. One option is to make use of current planning software (probably WASP III or WASP IV) and integrate such existing programs with new system dispatch and management software (e.g., GT Max), that will enable operations and trading people to see trading, contracts and investments in one integrated view, that could include transmission system considerations. Using this approach CORE would propose a course based on teaching the SAPP members the essentials of investment analysis in the context of an open trading system. This course could also serve to implement the ancillary services pricing proposals created under an existing TA/training activity.
3. A short TA and training course on how to use improved communications links and trading software (developed in (1)). This course would assist SAPP in developing trading rules and conventions appropriate to a real-time operational awareness and control and would prepare the members for implementation of new trading options and alternatives within the SAPP system.

IV. RESULTS OF COURSE EVALUATION BY THE PARTICIPANTS

CORE International distributed a Course Evaluation Survey to the participants for each course. The review of the survey results indicates that the participants rated the course almost very useful.

The review of the survey results is sent to you on late November 2002.

ANNEX A: AGENDA

Advanced Electricity Market Southern Africa Power Pool (October 28, 2002 - November 1, 2002) and (November 4 - 8 November 2002)

Monday, October 28, 2002

- | | |
|--------------------------------|---|
| 9:00 a.m. - 9:45 a.m. | Welcome

Lovemore Bingandadi, Infrastructure Advisor,
USAID Regional Center for Southern Africa
Gaborone, Botswana

Donald I. Hertzmark, Senior Energy Market
Development Expert and COP, SAPP Energy
Market Services Training, CORE International |
| 9:45 a.m. - 10:30 a.m. | Introduction of Course Participants

Course Introduction

Donald I. Hertzmark, Senior Energy Market
Development Expert and COP, SAPP Energy
Market Services Training, CORE International

Barry Schaeffer, Senior Energy Economist,
CORE International |
| 10:30 a.m. - 11:00 a.m. | Break |
| 11:00 a.m. - 12:30 p.m. | Module I. Electricity Trading <ul style="list-style-type: none">• Purposes• Relation to Restructuring |
| 12:30 p.m. - 1:00 p.m. | Module I. Electricity Trading (Continued)
Trading Models <ul style="list-style-type: none">• Discussion of various trading systems in
use world wide |
| 1:00 p.m. - 2:00 p.m. | Lunch Break |

	Module I. Electricity Trading (Continued) <ul style="list-style-type: none">• Trading Models• Gains and Costs of Trade• Open Discussion
2:00 p.m. - 3:30 p.m.	Module II. Elements of Trading Strategy <ul style="list-style-type: none">• Spot Markets – Definitions & Roles• Long-term Markets – Definitions & importance for investment & financial decision
5:00 p.m. - 5:30 p.m.	Review of the First Day Review of the Next Day Course Program

Tuesday, October 29, 2002

9:00 a.m. - 10:30 a.m.	Module II. Elements of Trading Strategy (Continued) Factors Contributing to Particular Strategies <ul style="list-style-type: none">• Profitability• Generation mix• Demand patterns
10:30 a.m. - 11:00 a.m.	Break
11:00 a.m. - 12:30 p.m.	Module II. Elements of Trading Strategy (Continued) Factors Contributing to Particular Strategies <ul style="list-style-type: none">• Profitability• Generation mix• Demand patterns Open Discussion
12:30 p.m. - 1:30 p.m.	Lunch Break
1:30 p.m. - 3:30 p.m.	Module III. Role Playing/Gaming Exercise No. 1 Spot Market Clearing

- **What is the spot market**
- **How are retail prices established**
- **What contract instruments exist for spot market trading**

3:30 p.m. - 4:00 p.m.	Break
4:00 p.m. - 5:00 p.m.	Module III. Role Playing/Gaming Exercise No. 1 (Continued)
5:00 p.m. - 5:30 p.m.	Review of the Second Day Review of the Next Day Course Program

Wednesday, October 30, 2001

9:00 a.m. - 10:30 a.m.	Module III. Role Playing/Gaming Exercise No. 1 (Continued) Presentations of trading results and explanations by group leaders
10:30 a.m. - 11:00 a.m.	Break
11:00 a.m. - 12:30 p.m.	Module IV: Exercise 2 – Long-Term Market Clearing <ul style="list-style-type: none">• What is the long-term market• How are future prices established • What contract instruments exist for long-term market trading
12:30 p.m. - 1:30 p.m.	Lunch Break
1:30 p.m. - 3:30 p.m.	Module IV: Exercise 2 – Long-Term Market Clearing (Continued) Different Types of Trades
3:30 p.m. - 4:00 p.m.	Break
4:00 p.m. - 5:00 p.m.	Module IV: Exercise 2 – Long-Term Market Clearing (Continued)

5:00 p.m. - 5:30 p.m. **Review of the Third Day**
Review of the Next Day Course Program

Thursday, October 31, 2002

9:00 a.m. - 10:30 a.m. **Module IV: Exercise 2 – Long-Term Market Clearing (Continued)**
Final Trading Positions
Financial Summary and Evaluation

10:30 a.m. - 11:00 a.m. **Break**

11:00 a.m. - 12:30 p.m. **Module V: Financial Results in The Trading Model**

- **Integrating results into a financial format**
- **Transactional costs**

12:30 p.m. - 1:30 p.m. **Lunch Break**

1:30 p.m. - 3:30 p.m. **Module VI: Exercise 3: P&L-Driven Trading**

- **Trading rules for transaction control**
- **Impact of rules on profitability of generation assets**

3:30 p.m. - 4:00 p.m. **Break**

4:00 p.m. - 5:00 p.m. **Module VI: Exercise 3: (continued)**
P&L-Driven Trading

- **Trading rules for transaction control**
- **Impact of rules on profitability of generation assets**

5:00 p.m. - 5:30 p.m. **Review of the Fourth Day**
Review of the Next Day Course Program

Friday, November 1, 2002

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|--------------------------------|---|
| 9:00 a.m. - 10:30 a.m. | Module VII: Summary: <ul style="list-style-type: none">• Trading and Management of State-Owned Electricity Companies Organization |
| 10:30 a.m. - 11:00 a.m. | Break |
| 11:00 a.m. - 12:30 p.m. | Module VII: Summary: (continued) <ul style="list-style-type: none">• Trading and Management of State-Owned Electricity Companies Organization |
| 12:30 p.m. - 1:30 p.m. | Lunch Break |
| 1:30 p.m. - 2:30 p.m. | Presentation of Certificates to Participants
General Questions and Answers
Closing Remarks and Adjournment |

ANNEX B: FINAL LIST OF PARTICIPANTS

Advanced Electricity Market Southern Africa Power Pool Durban, South Africa (October 28, 2002 - November 1, 2002)

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**Advanced Electricity Market
Southern Africa Power Pool
Durban, South Africa
November 4 – November 8, 2002**

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List of participants are alphabetical order, by name