The Southern African Power Pool

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About SAPP

• Created in 1995 with Inter-Governmental MOU

• 12 member countries, represented by their national electric power utilities, covering 294 million people

• 16 SAPP members in total: 12 national power utilities (of which 3 are non-operating members), 2 IPPs, & 2 independent transmission companies
SAPP Governing Documents

SAPP governed by 5 agreements:

1. **Inter-Governmental MOU**: established SAPP; signed in 1995; revision signed in 2006.

2. **Inter-Utility MOU**: established SAPP’s basic management and operating principles

3. **Agreement Between Operating Members**: established the specific rules of operation and pricing

4. **Operating Guidelines**: provides standards and operating guidelines (2014)

5. **Market Guidelines and Market Rules**: developed and approved in 2014 and 2016
The SAPP Grid
### SAPP Key Statistics: 2016

<table>
<thead>
<tr>
<th>Category</th>
<th>Value</th>
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<tr>
<td>Installed capacity:</td>
<td>57,641 MW</td>
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<td>Operating capacity:</td>
<td>46,522 MW</td>
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<td>Peak Demand &amp; Reserve:</td>
<td>53,036 MW</td>
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<td>Shortfall:</td>
<td>6,514 MW</td>
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Average Electricity Tariff: 2015-16
SAPP Installed Generation Capacity by Technology

- Coal: 62.05%
- Distillate: 4.38%
- OCGT: 1.51%
- Nuclear: 3.01%
- Solar CSP: 0.97%
- Biomass: 0.07%
- Wind: 4.03%
- Solar PV: 2.94%
- Hydro: 21.02%
- Landfill: 0.03%
Committed Generation Projects Planned 2016-2022

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<td>3,922</td>
<td>4,570</td>
<td>4,333</td>
<td>3,607</td>
<td>8,182</td>
<td>2,353</td>
<td>5,728</td>
<td>32,695</td>
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How the SAPP operates

• Effectively, 3 markets: Bilateral (Long), medium, and short term
• Electricity only product traded; balancing services are handled within each control zone and are not linked to electricity prices
• Market is open to all participants upon meeting a range of eligibility criteria
• SAPP acts as the market operator and also provides financial settlement services
Overview of SAPP Market Development

• SAPP started competitive day ahead market (DAM) using the Sapri IT system (developed by Nord Pool), operating in parallel with the bilateral market.

• SAPP specific trading platform (SAPP-MTP) developed in 2015 which included a new Physical Forwards Market and a new Intra-Day Market. It incorporates the following:
  ❖ Handling of bilateral scheduling;
  ❖ Day-ahead market – live from 1 April 2015;
  ❖ Forward Physical Monthly & Weekly Markets (FPM-M & FPM-W) – Operating from 1 April 2016;
  ❖ Intra-Day Market (IDM) – Operating from 1 March 2016
  ❖ Energy Imbalance calculations and Bilateral Wheeling & Losses Settlement – Operating from 1 April 2016
Bilateral Trading in SAPP - Key Features

- Trading arrangements mutually agreed between bilateral parties
  - Volumes and prices are the key parameters;
  - Transmission path to be secured in advance;
  - Bilateral parties directly invoice and settle each other.

- Can be firm or non-firm
  - Firm contracts – generally not interruptible, therefore they contain a reliability premium;
  - Non-firm contracts – Interruptible with notice
Forward Physical Market (FPM)  
Monthly (FPM_M) and Weekly FPM_W)

• The objective of the monthly market is to facilitate trading of longer term physical contracts; primarily base load. The weekly market is where the products are more designed to cover the participants’ weekly profiles.

• The Forward Physical Market is an auction-trading model just as the Day-Ahead Market. This means a single calculation based on the collection of all orders and determining a balance price between production and consumption. The balance price is valid for all trades and calculation of the participants’ schedules in the market.

• The auction model is run on a trading day for the participant’s physical delivery of the traded volume in the next delivery period. In the FPM the delivery period is the next month for the monthly product and next week for the weekly products and the trading period resolution is per hour.
Day Ahead Market (DAM) - Main Features

- Auction market for secure, effective, and non-discriminatory trade of electricity:
  - Trading to be concluded daily for delivery next day;
  - Forward bidding up to 10 days;
  - Participants submit bids (purchase) and (sale) offers;
  - Closed market – only market operator and participant know details of the bid/offer;

- Provides a neutral reference price
  - Open and competitive market;
  - Provides platform to manage demand and supply fluctuations;
  - Gives price signals to policy makers;
  - Stable and liquid market provides investor confidence.
Intra-day Market (IDM)

- Continuous trading up to one hour prior to delivery

- Automatic matching based upon following rules:
  - Seller’s price should be less than or equal to buyer’s price
  - Seller’s volume should be lower than or equal to buyer’s volume;
  - First come, first served, provided above conditions met.

- Participants can only see counter party offers which have an available transmission path
Volumes Traded in Each Market
December 2016
Historical Supply and Demand on the SAPP Competitive Market (MWh)
SAPP Bilateral Trade Market
SAPP Competitive Market Share

![Graph showing competitive market share over time](image)
Transmission Pricing in the SAPP

- At inception of the SAPP a postage stamp approach used
  - 7.5% of energy costs for one wheeler
  - 15% of energy costs for more than one wheeler

- From 2003, the MW/Km approach was adopted
  - All assets that wheel at least 1 MW are identified on the wheeler’s network and are compensated in proportion to the level of usage.

- Nodal pricing methodology: under trial.

- All operating members are obligated to wheel, except where technical limitations exist.
Transmission Constraints
Planned Transmission Projects
(map not to scale)

2016: 2nd DRC – Zambia 220 kV
2018: Morupule – Maun 400 kV
2019: ZIZABONA - 330 kV
2019: Zambia-Tanzania-Kenya 400 kV
2020: Phokoje – Pandamatenga 400 kV
2020: Mozambique – Malawi 400 kV
2022: MOZISA 400 kV
2022: Botswana-RSA (BOSA) 400 kV
2022: Namibia – Angola 400 kV
2024: Mozambique STE – HVDC/AC
2024: Grand Inga Transmission – HVDC/AC
How the Market will Evolve

PREVIOUSLY
- Bilateral contracts

FUTURE
- Bilateral contracts
- Day-ahead Market (DAM)
- Forward Physical Markets (MA & WA) - 2016
- Intra Day Market - 2016
- Balancing Market - 2018
- Financial Markets - 2019

CURRENT
- Bilateral contracts
- Short-Term Energy Market (STEM) - 2001
- Post STEM (Balancing Market) – 2002
- Day-ahead Market (DAM) – 2009
- Post Day Ahead Market (PDAM) – 2013
- Forward Physical Markets & IDM - 2016
Regional Trading: Key Issues

- Power Pool governance and Operational Rules: Critical because of sovereign countries, unlike regional trades

- Transmission Capacity Allocation and Pricing: Need clear and consistent rules on how to allocate and compensate network owners

- Handling of Energy Imbalances: Actual flows may not always equal scheduled flows

- Handling Outages and System Emergencies
Thank you!

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