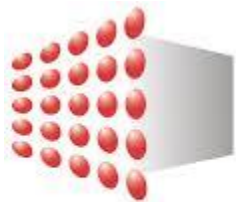


The Southern African Power Pool

HAPUA-UNESCAP Workshop
17-19 April 2017, Jakarta



ENERGY
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*Professor Anthony D Owen
Principal Fellow & Head, Energy Economics Division*

About SAPP

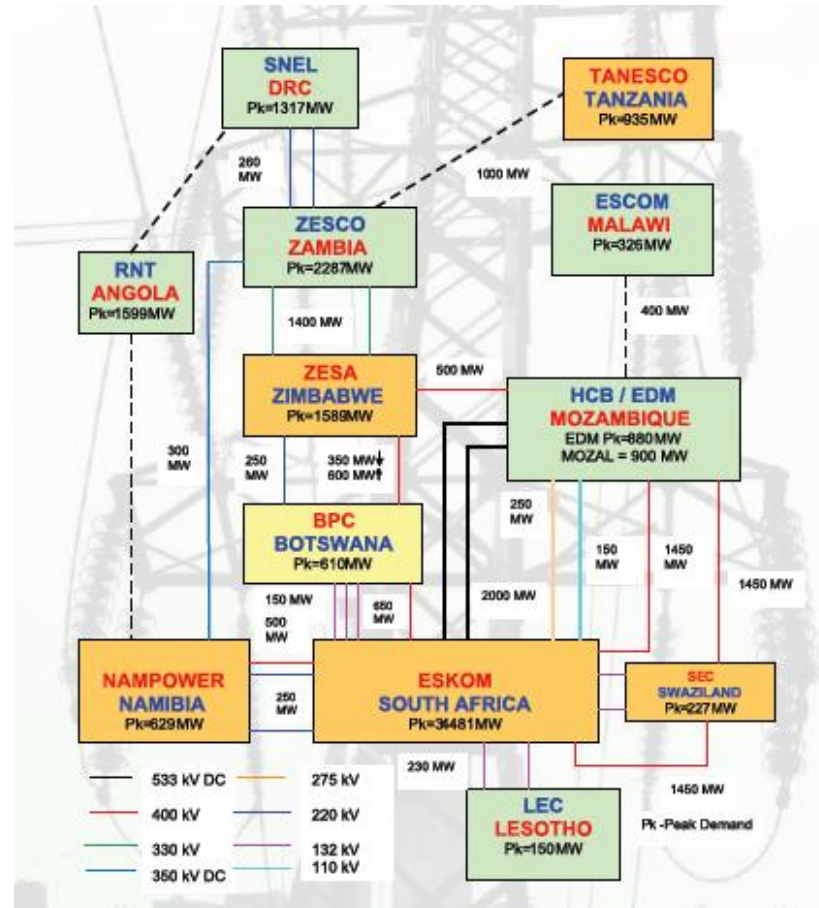
- Created in 1995 with Inter-Governmental MOU
- 12 member countries, represented by their national electric power utilities, covering 294 million people
- 16 SAPP members in total: 12 national power utilities (of which 3 are non-operating members), 2 IPPs, & 2 independent transmission companies

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

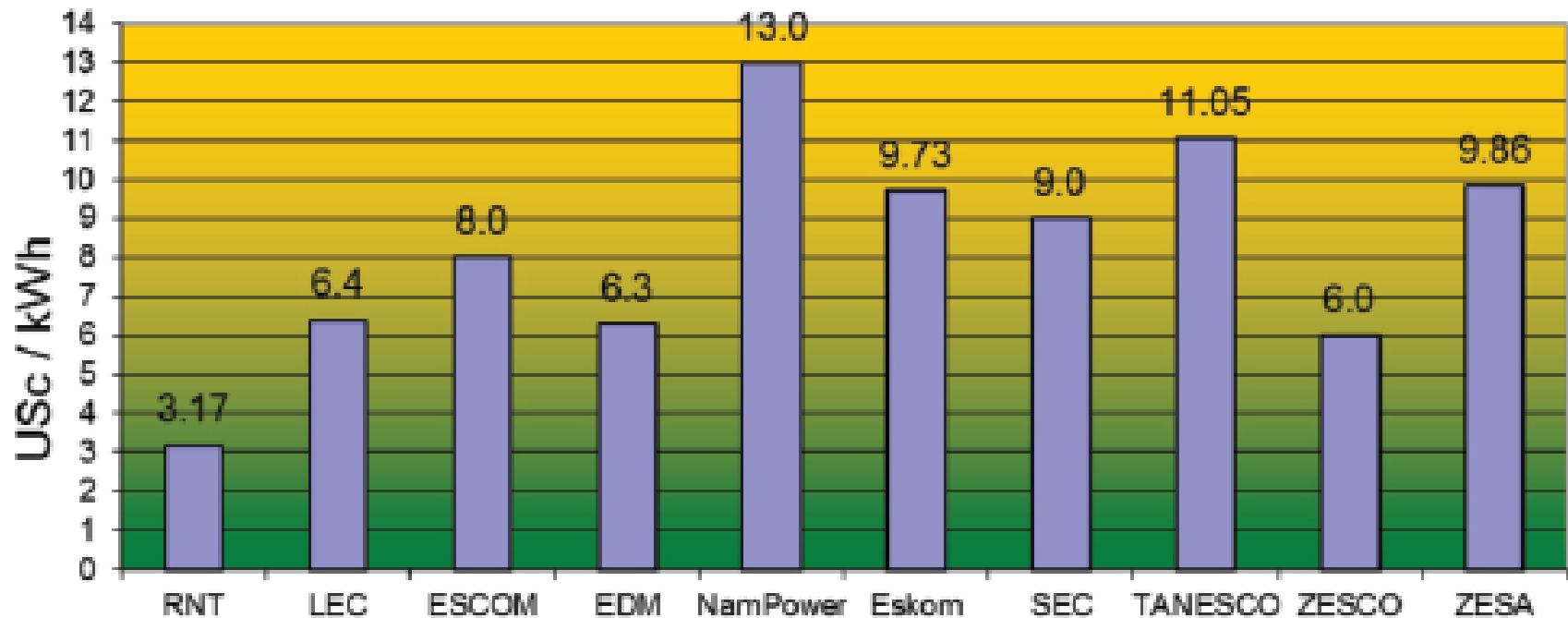
The SAPP Grid



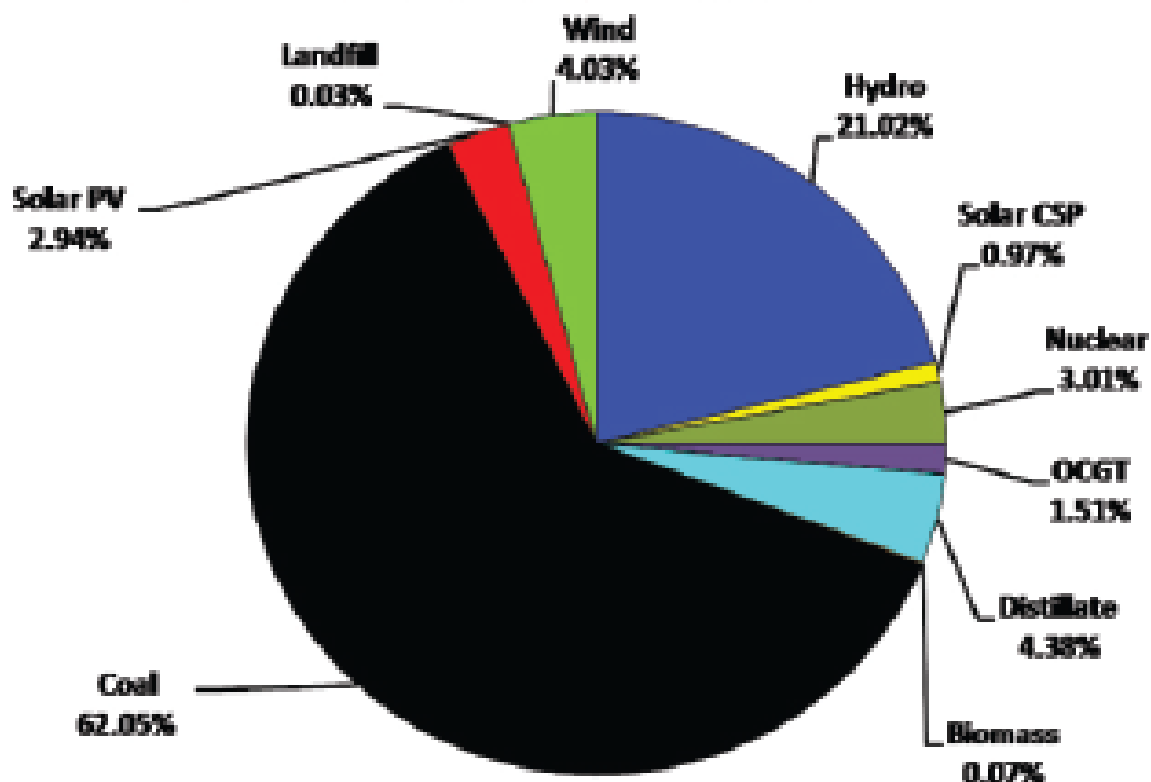
SAPP Key Statistics: 2016

Installed capacity:	57,641 MW
Operating capacity:	46,522 MW
Peak Demand & Reserve:	53,036 MW
Shortfall:	6,514 MW

Average Electricity Tariff: 2015-16



SAPP Installed Generation Capacity by Technology



Committed Generation Projects Planned 2016-2022

No	Country	Committed Generation Capacity, MW							Total
		2016	2017	2018	2019	2020	2021	2022	
1	Angola	930	2544.8	267	0	0	0	0	3,742
2	Botswana	-	120	-	-	300	-	-	420
3	DRC	458	-	150	-	-	-	-	608
4	Lesotho	-	-	-	-	-	-	-	-
5	Malawi	10	6	72	22	1,005	-	-	1,115
6	Mozambique	360	-	-	600	400	600	1,500	3,460
7	Namibia	40	-	190	-	-	800	-	1,030
8	RSA	1,624	999	2,167	1,446	2,167	723	1,528	10,653
9	Swaziland	-	-	-	12	-	-	300	312
10	Tanzania	-	900	1,040	250	1,000	-	-	3,190
11	Zambia	300	-	27	441	1,450	230	1,200	3,648
12	Zimbabwe	200	-	420	837	1,860	-	1,200	4,517
TOTAL		3,922	4,570	4,333	3,607	8,182	2,363	5,728	32,696

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

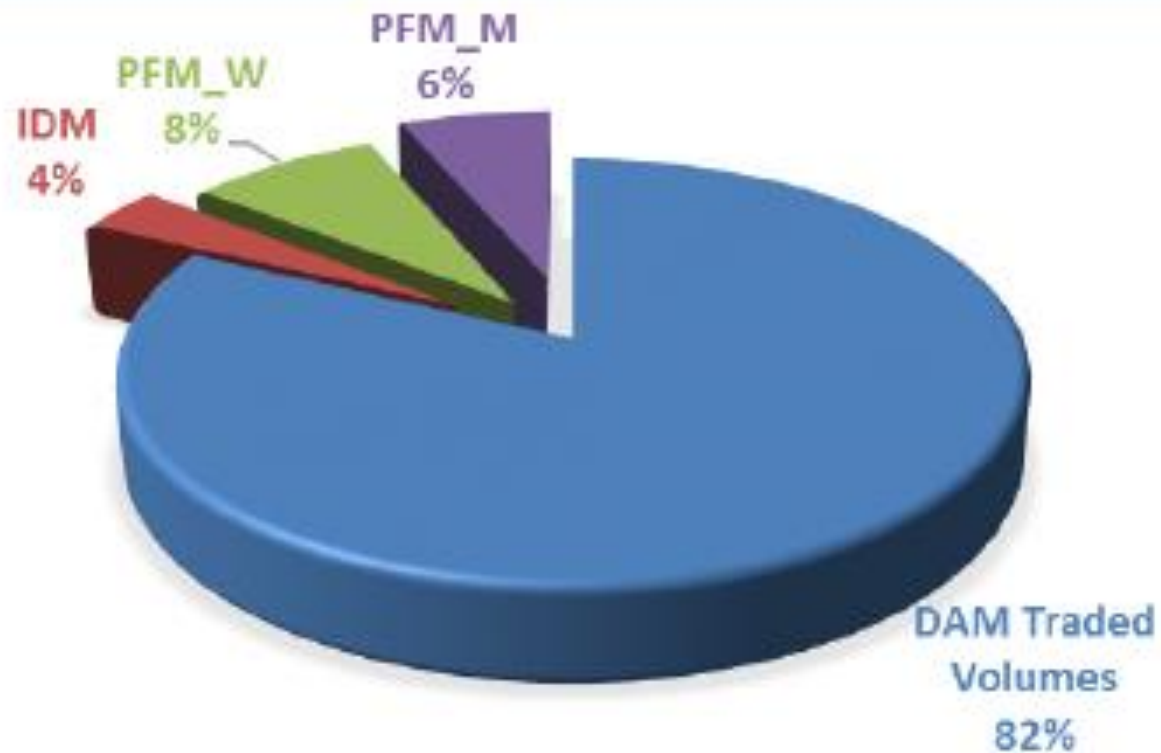
- Auction market for secure, effective, and non-discriminatory trade of electricity:
 - ❖ Trading to be concluded daily for delivery next day;
 - ❖ Forward bidding up to 10 days;
 - ❖ Participants submit bids (purchase) and (sale) offers;
 - ❖ Closed market – only market operator and participant know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

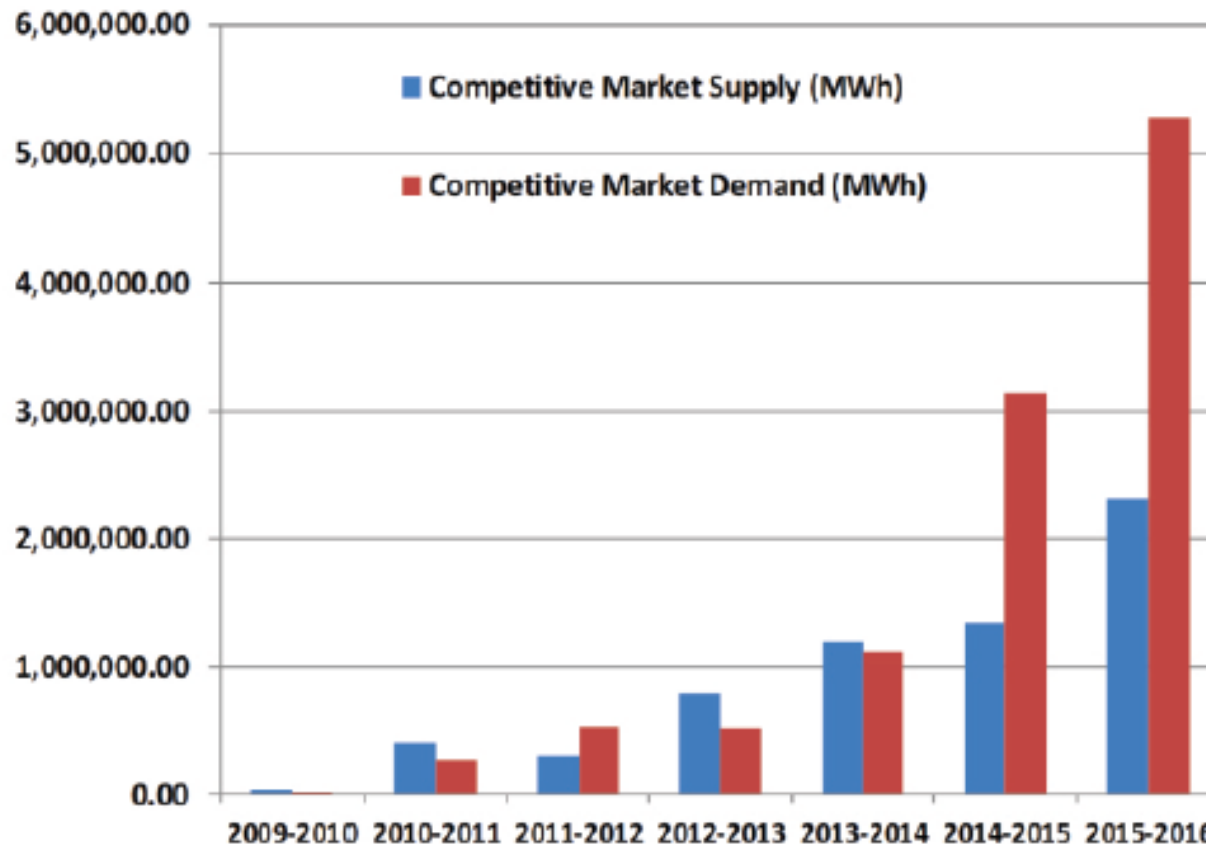
- Continuous trading up to one hour prior to delivery
- Automatic matching based upon following rules:
 - ❖ Seller's price should be less than or equal to buyer's price
 - ❖ Seller's volume should be lower than or equal to buyer's volume;
 - ❖ First come, first served, provided above conditions met.
- Participants can only see counter party offers which have an available transmission path

Volumes Traded in Each Market

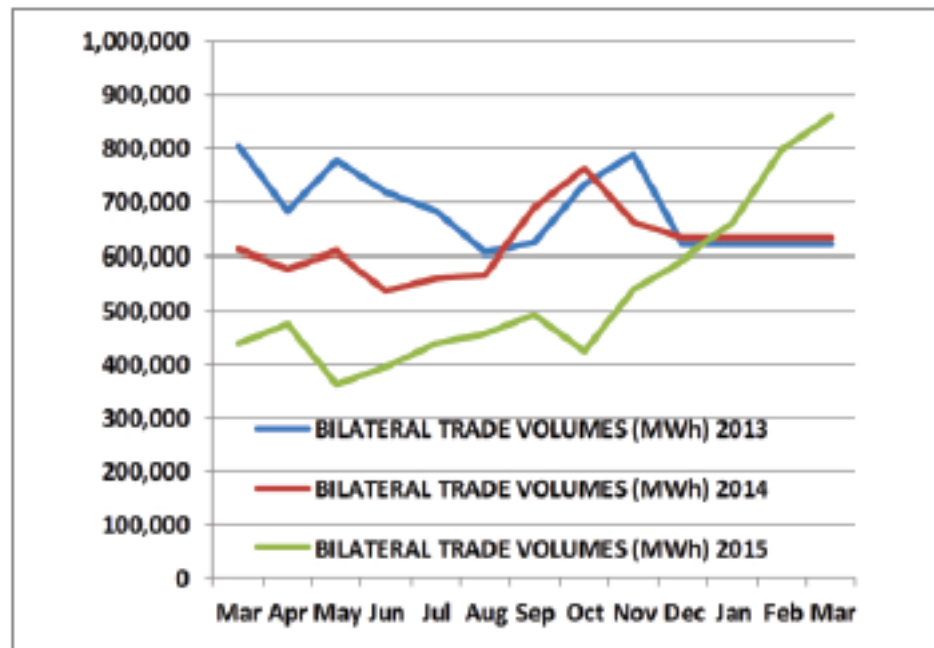
December 2016



Historical Supply and Demand on the SAPP Competitive Market (MWh)



SAPP Bilateral Trade Market



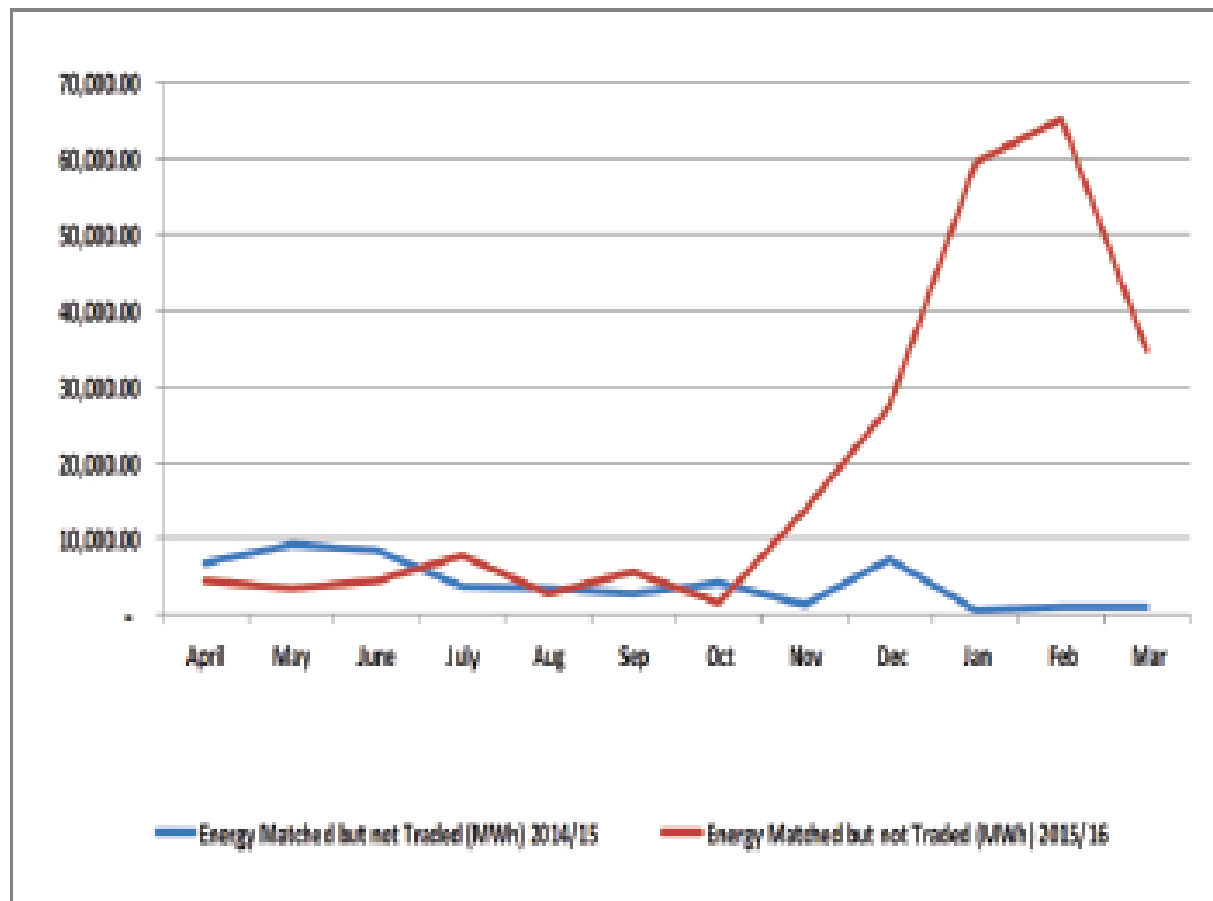
SAPP Competitive Market Share



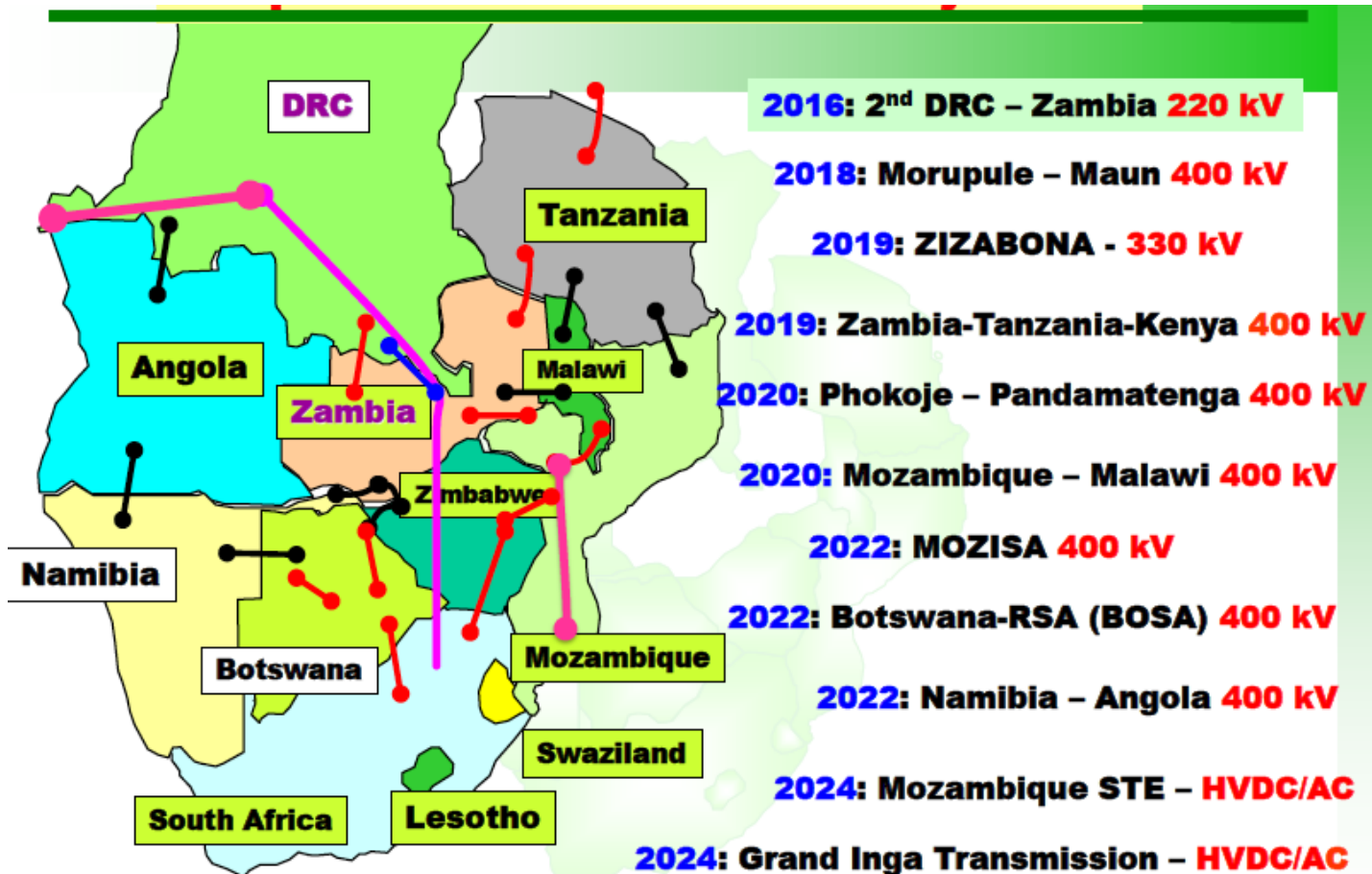
Transmission Pricing in the SAPP

- 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.

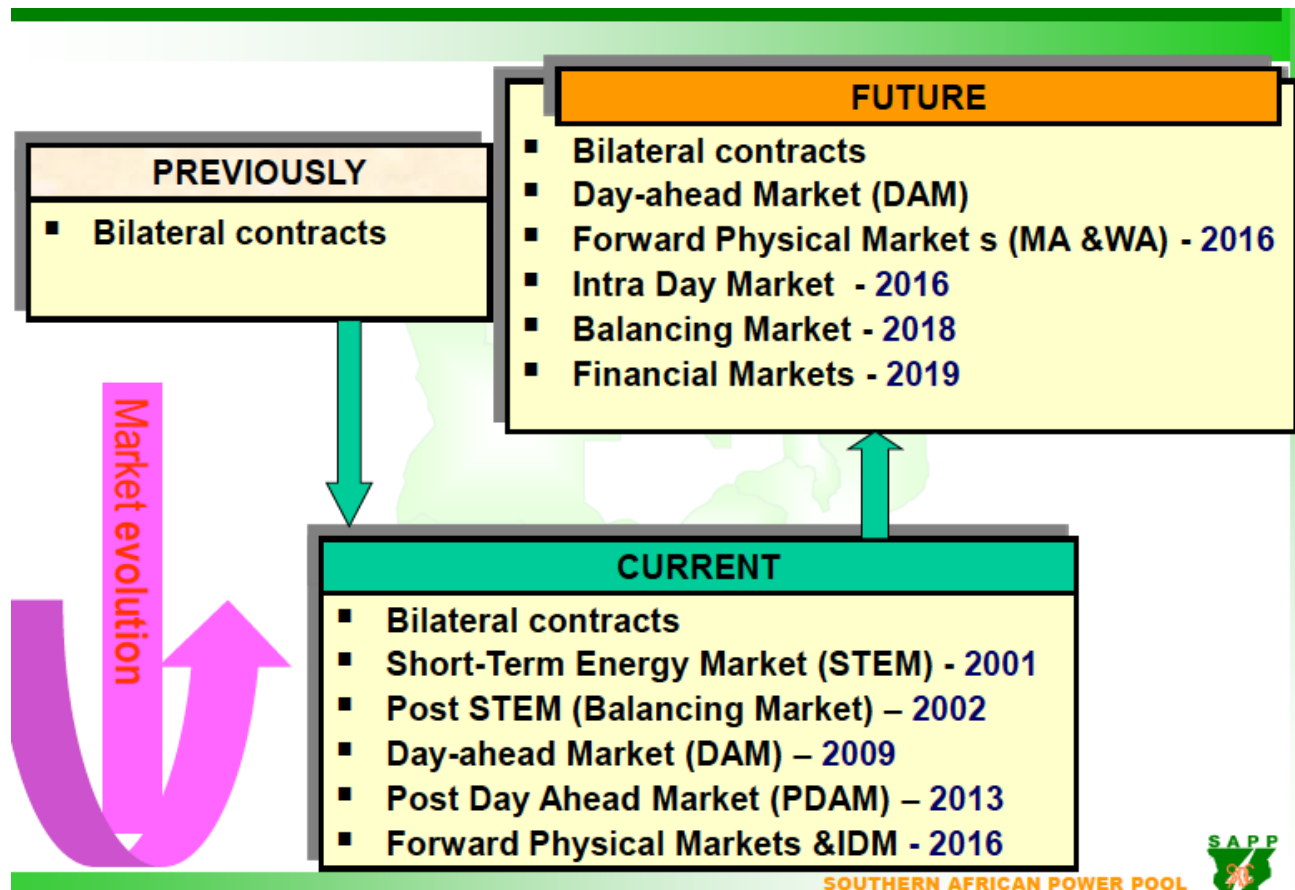
Transmission Constraints



Planned Transmission Projects (map not to scale)



How the Market will Evolve



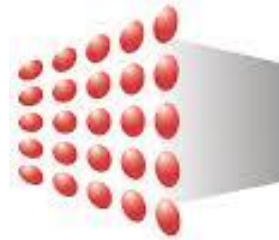
Regional Trading: Key Issues

- 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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