



The Spot Market in the Southern African Power Pool and Impact of Demand Side Management Options

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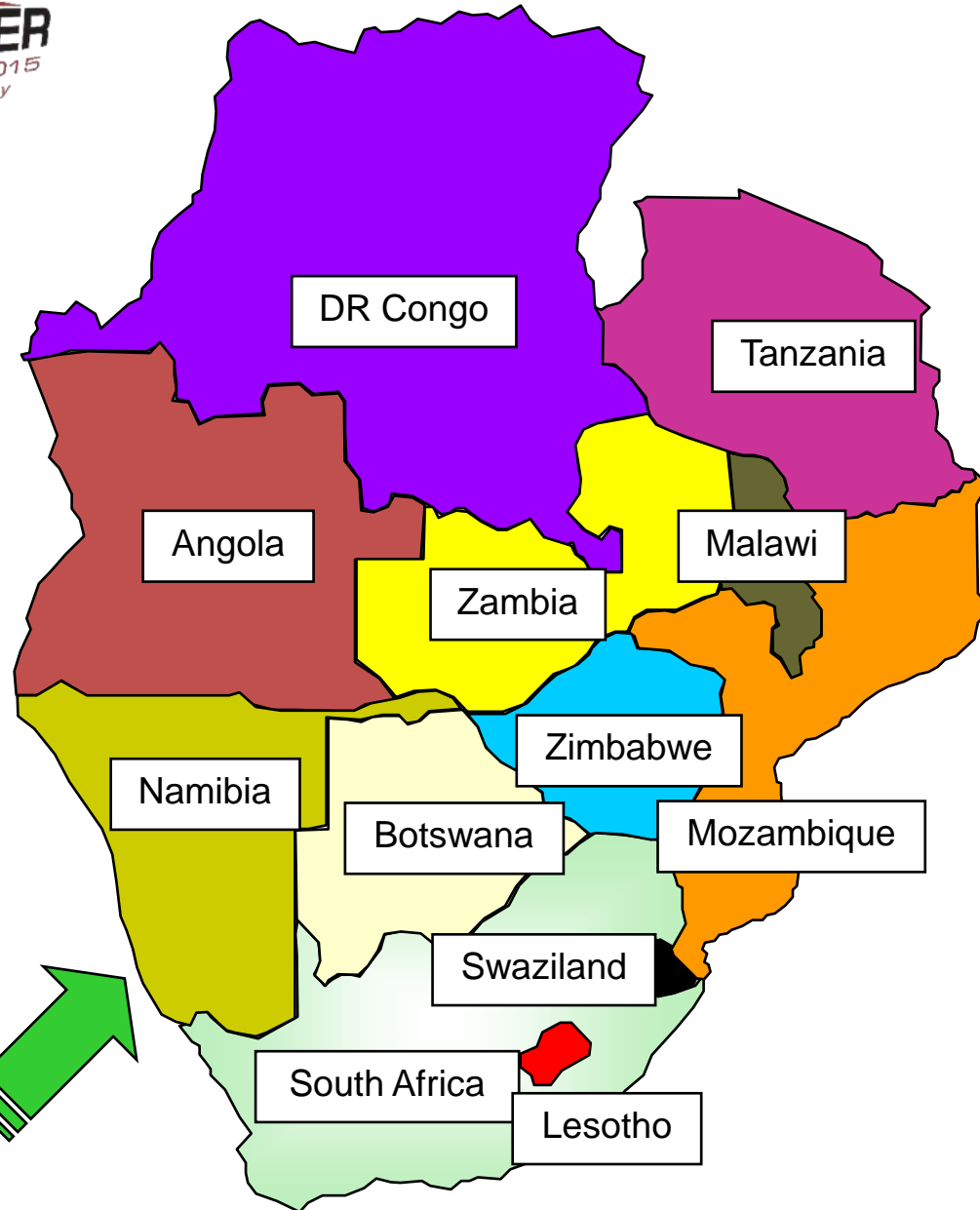
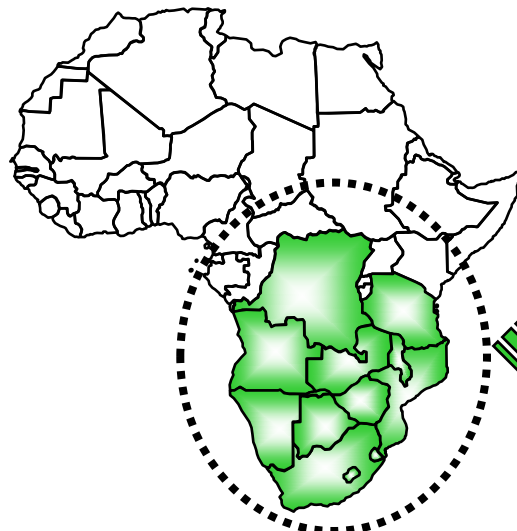


Presentation Overview

1. Introduction of SAPP
2. Demand and Supply Balance
3. Demand Side Management
4. SAPP Electricity Market Overview
5. Demand Market Participation
6. Conclusion

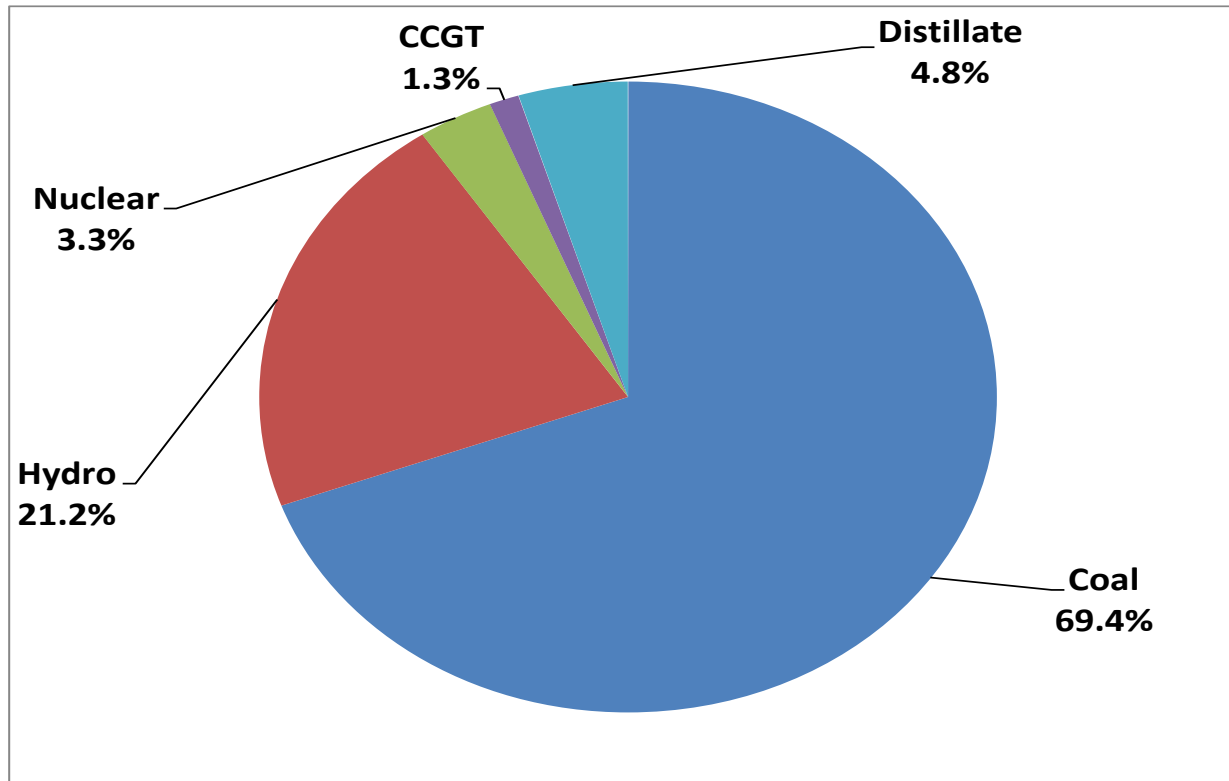


- ❑ 12 Countries
- ❑ 280 Million people
- ❑ Installed Generation Capacity - 56 GW
- ❑ Available Generation Capacity - 51 GW
- ❑ Peak Demand - 54 GW
- ❑ Consumption - 400TWh



Generation Mix in SAPP - 2015

The objective of the SAPP is to provide **reliable and economical electricity supply** to the consumers of each of the SAPP Members consistent with reasonable **utilization of natural resources** and effect on the environment



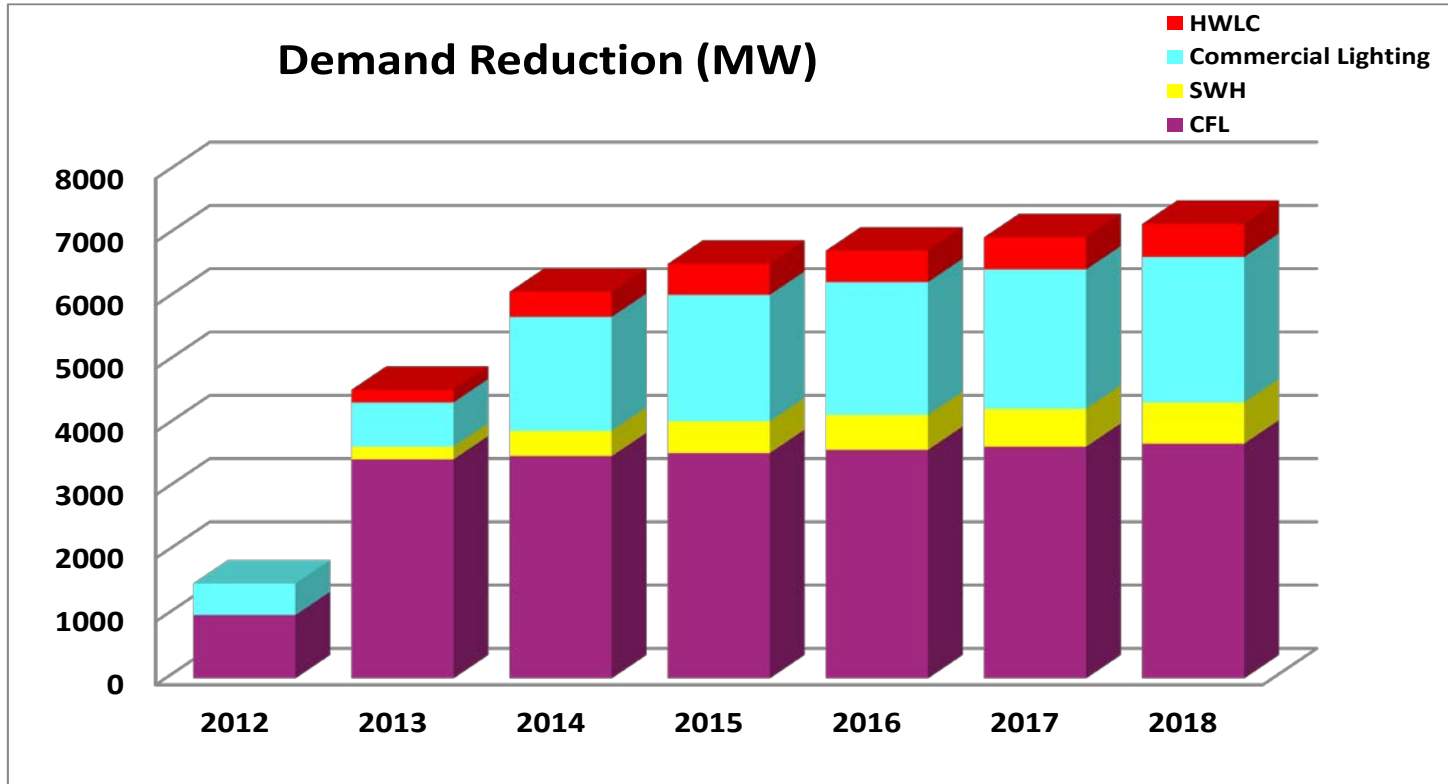
Demand and Supply Situation

No	Country	Utility	Installed Capacity [MW] As at FEB 2015	Available Capacity [MW] FEB 2015	Operating Capacity [MW] FEB 2015	Peak Demand	Capacity Excess / Shortfall including reserves, MW
1	Angola	ENE	2,195	1,772	1,772	1599	
2	Botswana	BPC	892	680	410	610	
3	DRC	SNEL	2,442	993	1,066	1381	
4	Lesotho	LEC	74	70	70	150	
5	Malawi	ESCOM	351	351	351	326	
6	Mozambique	EDM/HCB	2308	2,279	2,279	830	
7	Namibia	NamPower	501	392	354	629	
8	South Africa	Eskom	44,158	41,074	36,000	37661	
9	Swaziland	SEC	70	60	55	219	
10	Tanzania	TANESCO	1226.24	1,159	823	935	
11	Zambia	ZESCO / CEC/LHPC	2,246	2,204	2,175	2287	
12	Zimbabwe	ZESA	2,145	1,555	1,555	1589	
	TOTAL		58,608	52,589	46,910	48,216	(8,247)

Capacity Shortfalls and Energy Constraints
is an opportunity for
Demand Side Management (Constraints up to 2019)



Demand Side Management Initiatives



HWLC – Hot Water Load Control

SWH – Solar Water Heater

CFL – Compact Fluorescent Lamp

4,500 MW saving and Virtual Power Station established

Electricity Market Evolution in SAPP

PREVIOUSLY

- Bilateral contracts

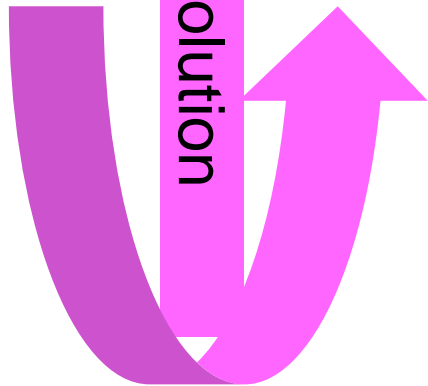
FUTURE

- Bilateral contracts
- Day-ahead Market (DAM)
- Forward Physical Markets (MA &WA) - 2015
- Intra Day Market - 2015
- Balancing Market - 2016
- Financial Markets - 2016

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

Market evolution



SAPP Integrated Market Design

Bilateral Market (Existing)

Negotiated contracts. No clearing services.

Forward Physical Market (2015)

Month and Week Ahead auction markets. Clearing service.

Day-Ahead Market (Existing)

Day-ahead auction for all price areas. Equilibrium between supply and demand is established for delivery the following day. System price.

Intra Day Market (2015)

Intraday market with continuous trading up to one hour before delivery. Approximately 24 hours.

Balancing Market (Existing)

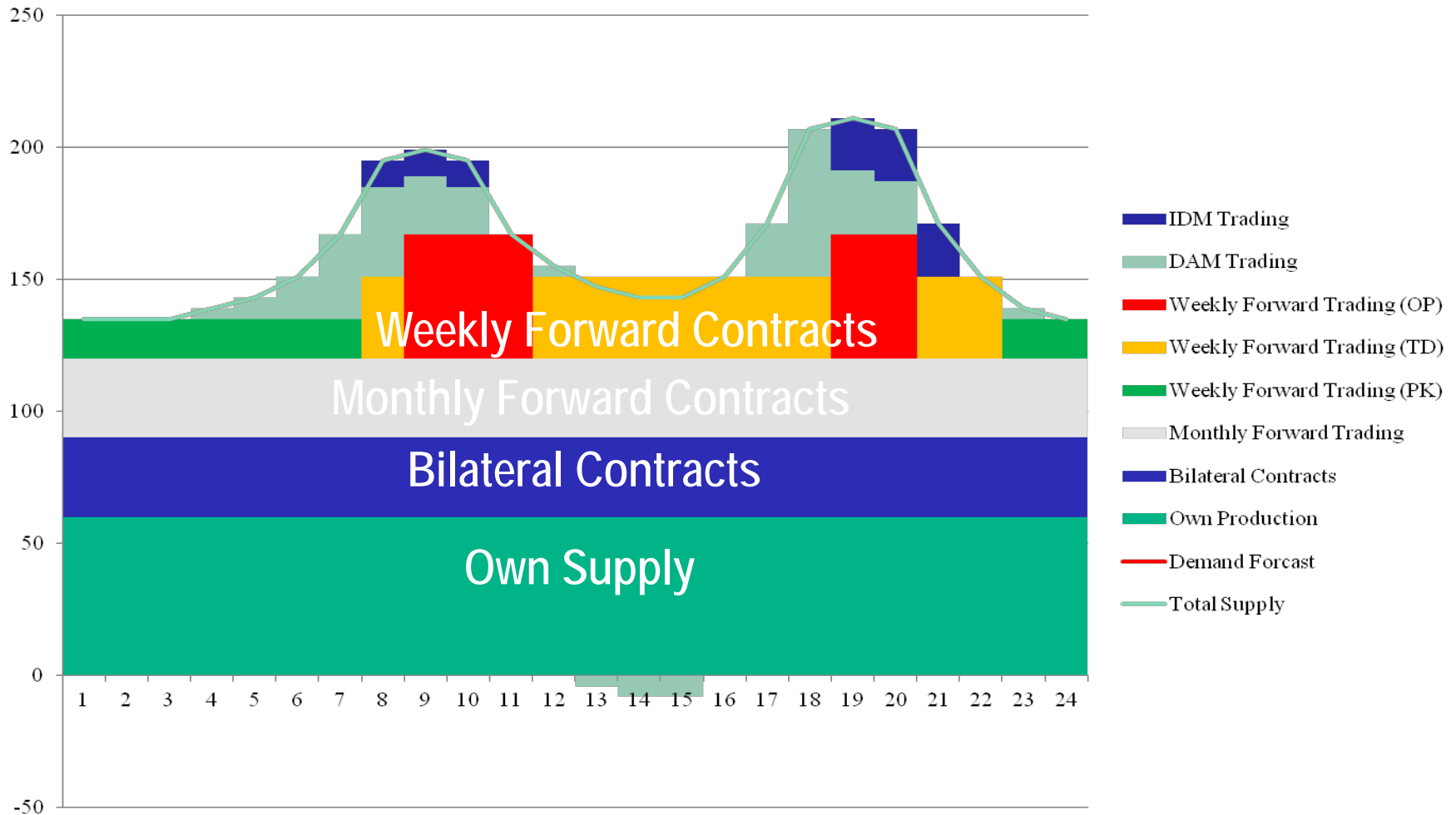
Operated by the respective TSOs where final adjustments are made to achieve balance between supply and demand. Price set after delivery by TSO, participant is price taker.

Financial Market (Future)

Cash settled futures, forwards and options. Clearing services.



SAPP Market Trading Options and Roles





Challenges for the SAPP Market

SAPP's main objective is to build a sustainable short term market model based on African power industry needs and requirements

Long term (Bilaterals & Forwards)	Short term (DAM)	Intraday/ PDAM	Operations
Challenge: <ul style="list-style-type: none">- Transmission capacity management- Generation Capacity Constraints	Challenge: <ul style="list-style-type: none">- Liquidity- Transmission capacity management	Challenge: <ul style="list-style-type: none">- New requirement- How to attract participation?	<ul style="list-style-type: none">- Managed by TSOs- New opportunities?

How can these challenges be addressed?
Who shall be allowed to participate?
How shall this be regulated?



Market Fundamentals

- **Should deliver value to Participants and instill confidence with Investors**
 - “Fit-for-purpose” trading mechanisms
 - Market platforms tailored for local conditions
 - Appropriate products and price setting
 - Easy to understand
 - Open access
 - Market and System Operations to be independent from Participants
 - Abuse of market power is “limited”
 - Promote demand-side participation
 - Legal and Regulatory Framework



Demand Market Participation Alternatives

Product	Description	Benefits
Day-Ahead Scheduled Load Shifting	Optimal scheduling of supply and demand options.	<ul style="list-style-type: none"> •“Flatter” daily load profile •Higher load factor for base-load generators •Reduced need for two-shifting
Instantaneous Reserve	Provide energy within 5 seconds following a frequency incident.	<ul style="list-style-type: none"> •Generators run more efficient •Higher load factor for base-load generators
Supplemental Reserve	Provide energy within 1/2 to 6 hours following a deviation from the day-ahead schedule.	<ul style="list-style-type: none"> •Relieves generators of cycling operation •Improves reliability of supply when no other generators are available
Emergency Reserve	Provide energy in emergencies.	<ul style="list-style-type: none"> •Improves reliability of supply



Benefits of Demand Side Management

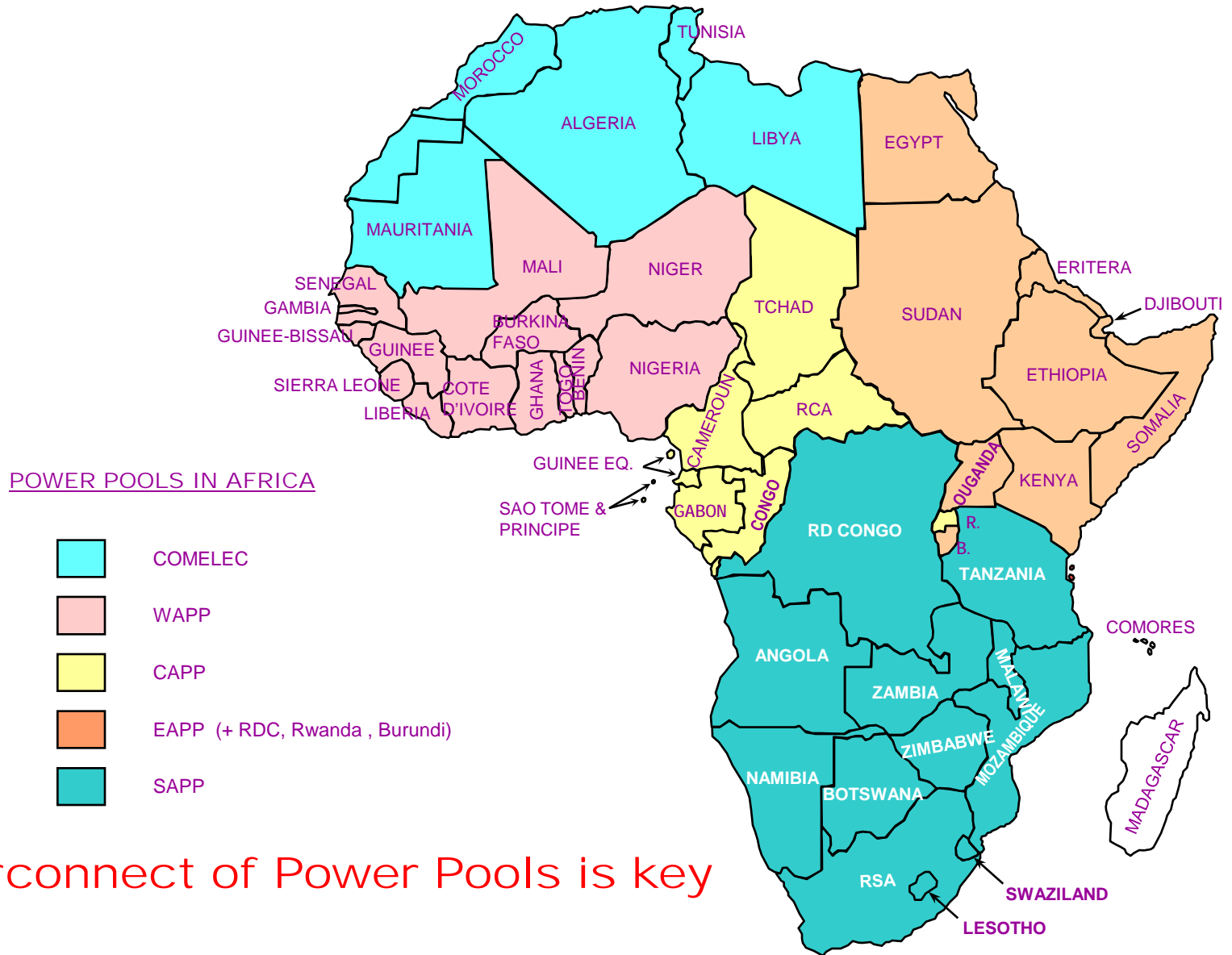
- Mitigating electrical system emergencies
- Reducing power system outages and increasing system reliability
- Reducing dependencies on expensive fuels and reduction of energy prices
- Deferring high investments in generation, transmission and distribution



Demand Side Impacts on Energy Markets

- Introduction of Renewable Energy Technologies means there is greater need for load following capabilities. New operating regime for System Operators
- Demand Response is responding to **price signals**, **Interruptible Loads** being used and paid when switched off. Special tariff category defined.
- Demand Side Participation currently allowed within country borders. Regulations and rules needs to be put in place to allow demand to participate without hindrances

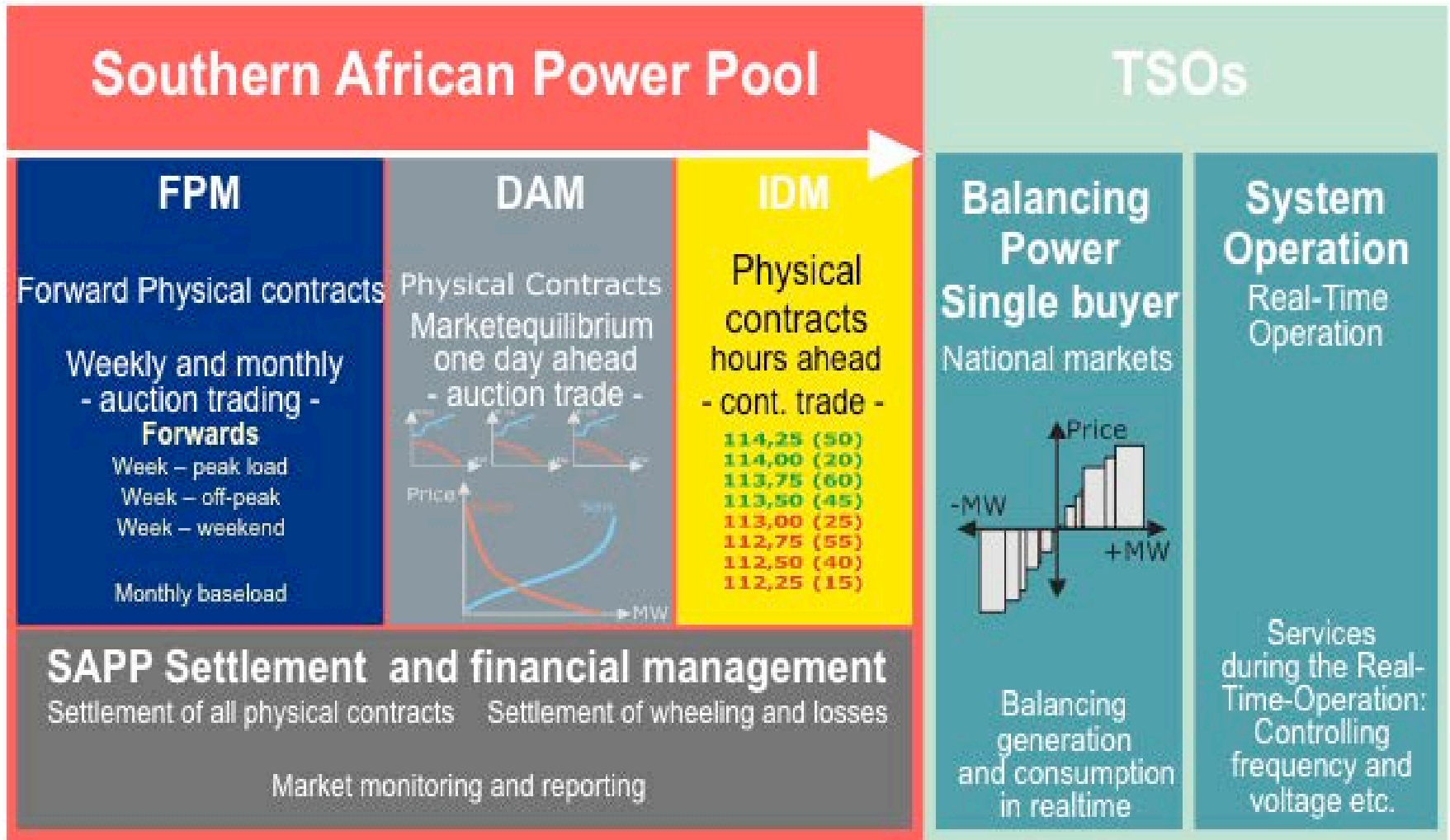
Vision is to have an African Market



Interconnect of Power Pools is key

The SAPP Market Trading Platform

Built to support the future African power markets





Experiences from SAPP

- Regulators should be involved in making the conditions conducive for private players.
- Transmission open access should be given to both generators and loads and both should pay.
- The competitive market is an opportunity to get good prices rather than to be locked in a long term PPAs.
- The participation of demand has helped manage the demand and supply balance and in optimizing generation investments.



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