

Market Code Consultation WS 6

International Trade
SAPP regional market – key components



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SAPP Market Framework

FPM

Forward Physical Contracts

Weekly and monthly
- auction trading -

Forwards
Week – Peak
Week – Standard
Week – Off-Peak

Monthly – Off-Peak
Monthly – Non-Off-Peak

DAM

Physical Contracts
Market equilibrium
one day ahead
- auction trading -

IDM

Physical contracts
Up to hour ahead
Continuous Trading

114,25 (50)
114,00 (20)
113,75 (60)
113,50 (45)
113,00 (25)
112,75 (55)
112,50 (40)
112,25 (15)

TSOs

Balancing Power @SAPP
Regional market

Balancing generation and consumption in realtime

System Operation
Real-Time Operation

Services during the Real-Time-Operation:
Controlling frequency and voltage etc.

SAPP Settlement and financial management

Settlement of all physical contracts Settlement of wheeling and losses

Market monitoring and reporting

Requirements to be allowed to trade in SAPP

- **Operates or contracts** generation capacity or a load of **at least 5 MW** that is physically connected to the SAPP Grid; and
- Having been **licensed or given permission** by the host country to undertake **cross border** trading
- **Power is not be tied to a single buyer contract**; or, where such contract exists, must have counter party consent to trade the contracted power on the market; and,
- **Possess capability of balancing** agreed schedules or **must have a contract for balancing agreed schedules** with a SAPP operating member.
- **Acceptance** as a Market Participant **by SAPP Executive Committee**
- Signing the **SAPP Market governance documents**
- Opening of the requisite **accounts for trading purposes** and having the requisite security for trading purposes
- Have at least two trained Traders



Key Objective of Power Markets

Optimise resources on a **regional** bases **instead of a national bases** in order to **balance the demand and supply** of electricity in the region as a whole at the lowest cost possible.



Different Types of Markets

Auction Markets:

FPM-Monthly, FPM-Weekly, DAM

- Buyers and sellers need to submit their bids and offers before a specific time.
- All bids and offers are cleared at the same time.
- Market price is set at the interception between the seller's willingness to produce and the buyer's willingness to consume.
- The Market price algorithm determines the unconstrained system marginal price and the constrained area marginal price for a defined market area.
- Buyer who were willing to pay the marginal price or more will be successful (\leq bid price).
- Seller who were willing to sell at the marginal price will be successful (\geq offer price).

Continuous Markets:

Intraday:

- Sellers and buyers can submit order up and until the interval closed for trading.
- Trades are concluded on a continuous bases when the buyer is willing to pay the sellers price AND transmission capacity is available to deliver the order.
- Trades are concluded at the **sellers price**.

Balancing Market:

- Up and Down regulation orders need to be submitted from 1 hour up to 45 minutes before the interval starts.
- Orders can be activated (traded) on a continuous bases provided that TX capacity is available to deliver the order.
- Trade (currently) is concluded at the **marginal area price** (most expensive up regulation order activated or least expensive down regulation order that was activated).



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Forward Physical Market

Auction based market

Based on the principles where market price is set at the interception between the seller's willingness to produce and the buyer's willingness to consume.

FPM-Monthly

Open to trade monthly products as an alternative to bilateral contracts

- Peak

- Standard

- Off-Peak

All months of the year

Trading apply to all hours included in the monthly product

FPM – Weekly

Open to trade weekly products

- Peak

- Standard

- Off-Peak

All weeks of the year

Trading apply to all hours included in the weekly product



The Day-Ahead Market

- Open to trade individual hours for every day of the year.
- The participants main opportunity for short term trading of power.
- Called the Cornerstone of the market concept.
- Used to balance the total portfolio before next delivery day.
- Can be used as the reference price for other markets like the financial market, intraday market and the balancing market.



The Intraday Market - IDM

- Continuous trading
- To adjust balance ahead of operating hour
- Utilizes the Available Transmission Capacity (ATC) after DAM trades have been allocated.
- Hours for the next day is opened for trading at 14:00 provided that DAM for that day has been concluded.



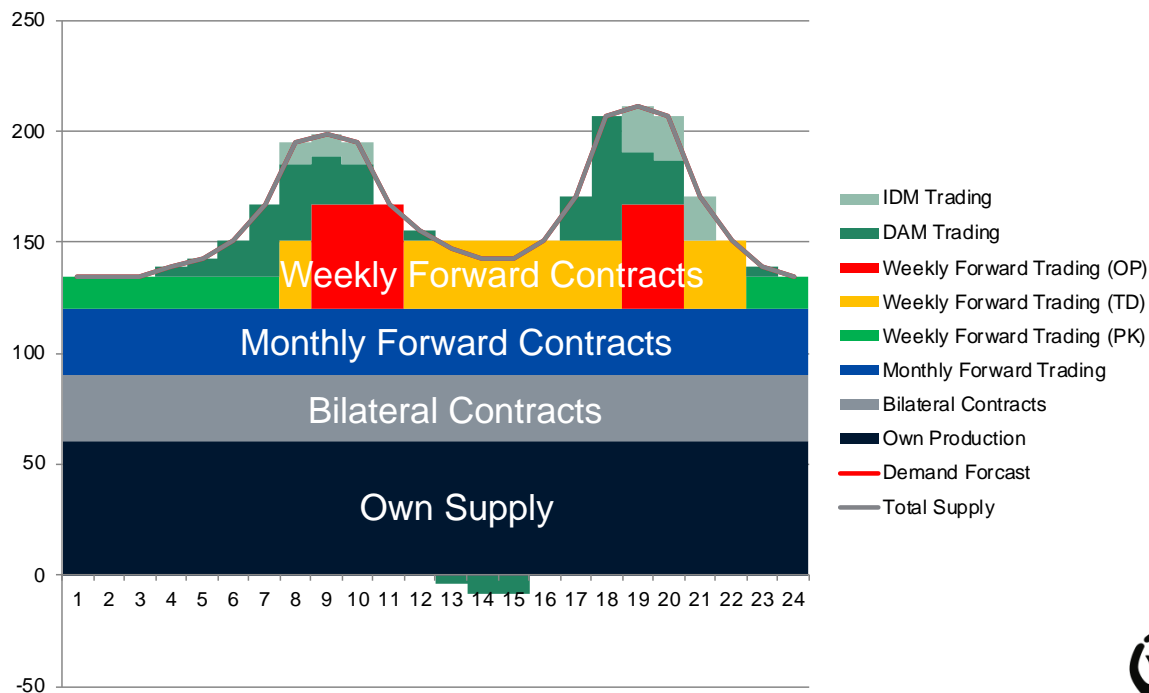
The Balancing Market - BM

- Continuous trading
- Used to respond to short term imbalances primarily to respond to system events
- Utilizes the Available Transmission Capacity (ATC) after IDM trades have been allocated.
- Orders are submitted for the entire hour.
- Hours are opened for trading 45 minutes before the hour starts.
- It is allowed to activate only a portion of the hour.
- Trading open until 10 minutes before the end of the hour.



Role of Different Markets in Supply

Balancing on the Day – Hourly Contracts



Management of Transmission Capacity

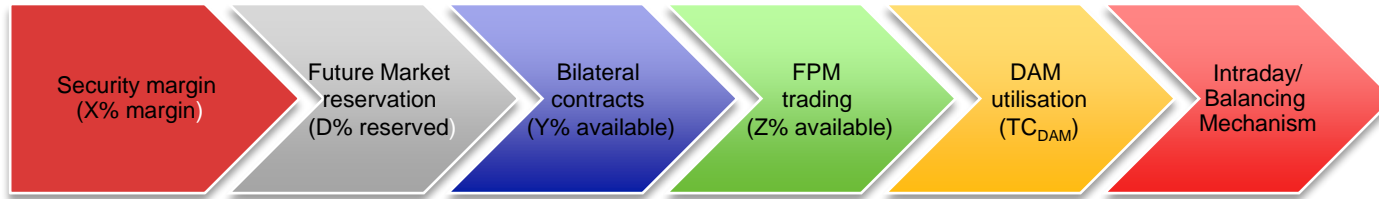
The **effective** management of Transmission Capacities is a **critical** success factor for the operation of all markets.

In the case that we have several different markets, it is crucial that this is done based on some sound principles



Management of Transmission Capacity

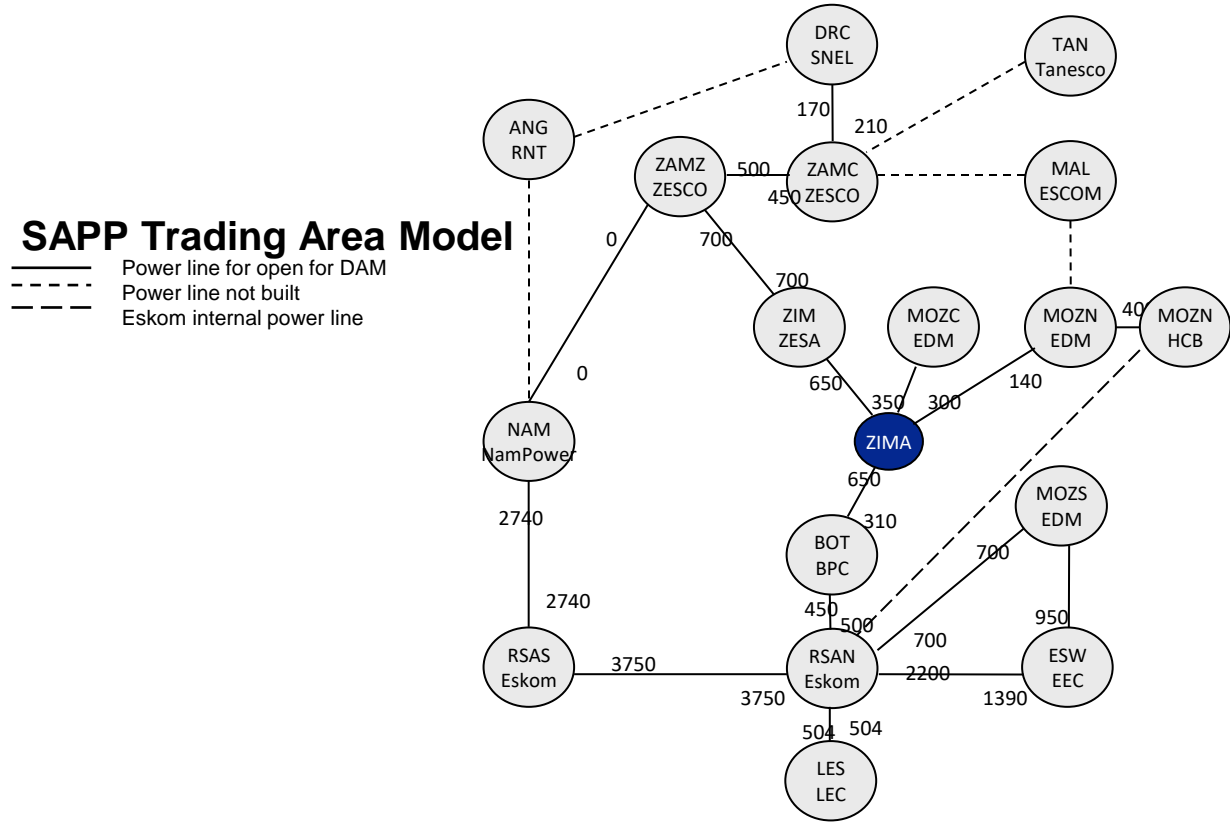
This is a key issue when introducing new markets on top of today's.
An illustration of the allocation:



The management of this is part of the SAPP Book of Rules



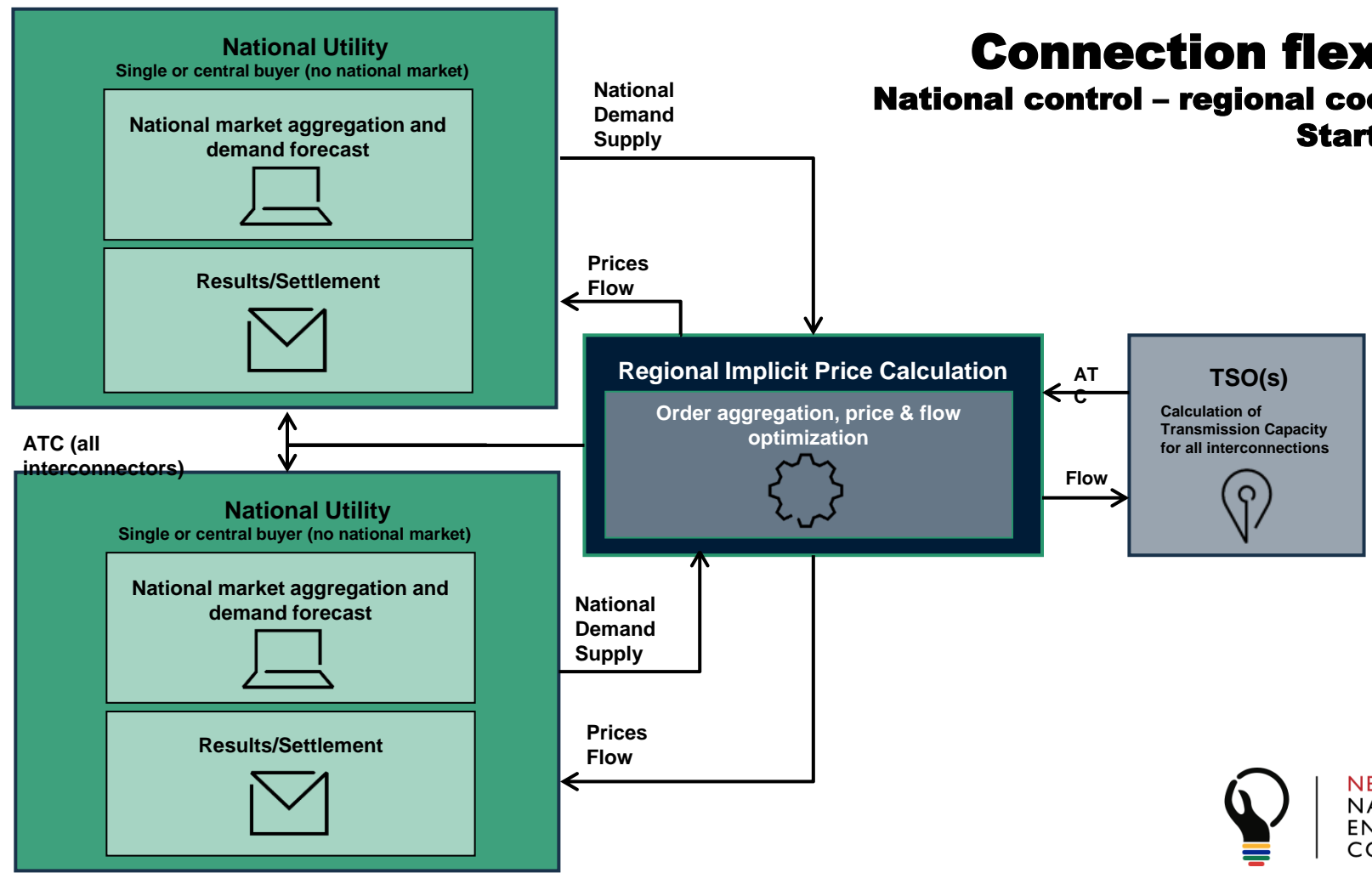
SAPP Market area model



Connection flexibility

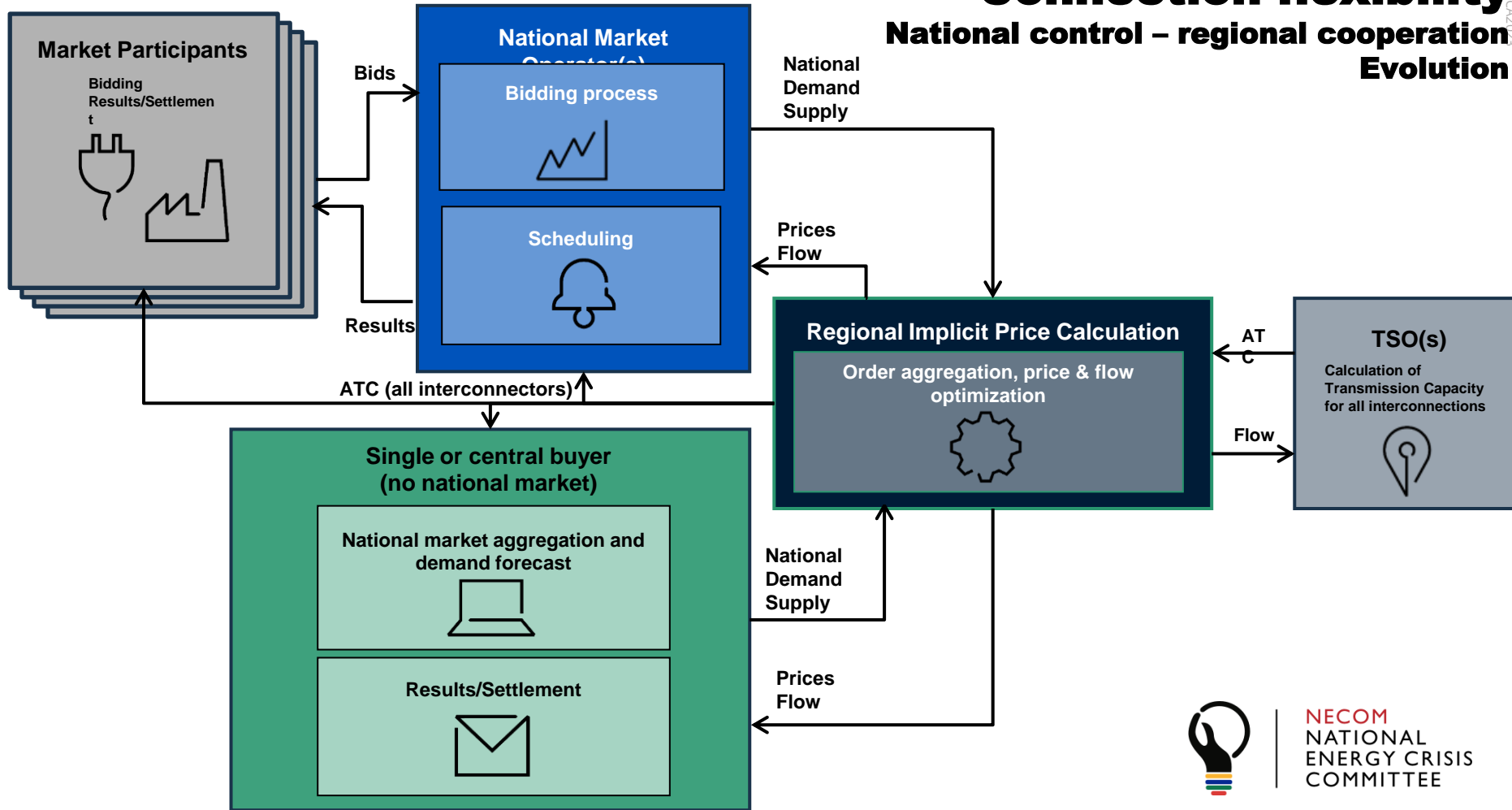
National control – regional cooperation

Starting point

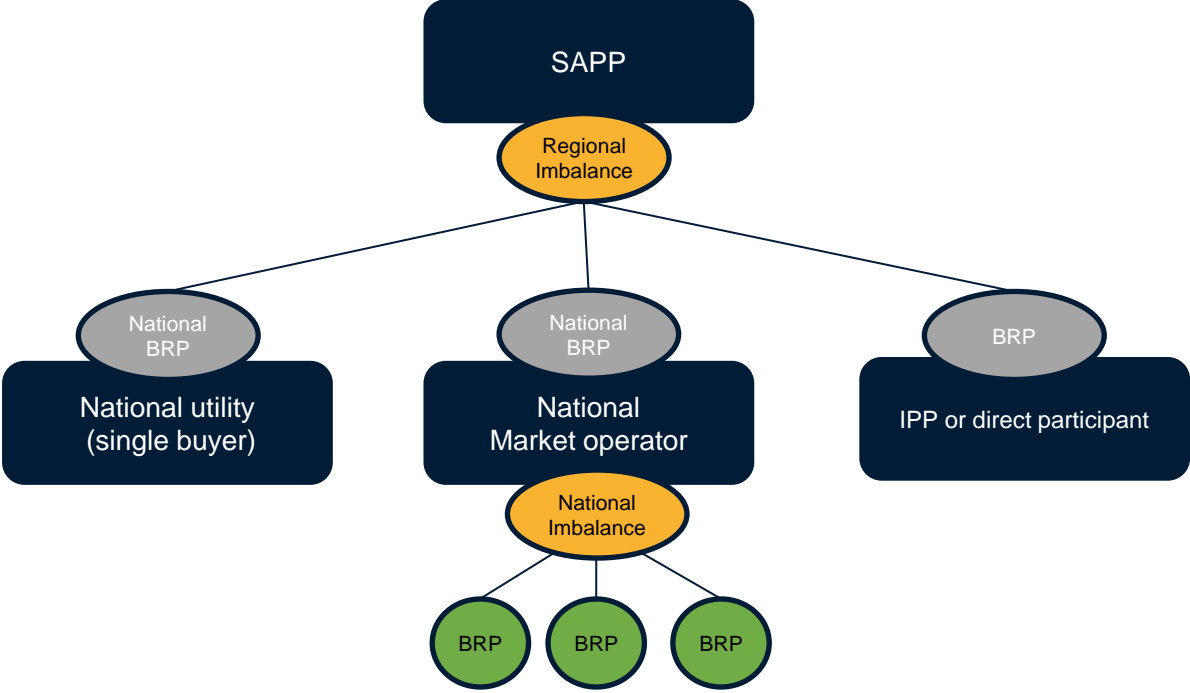


Connection flexibility

National control – regional cooperation Evolution



SAPP BRP setup (national vs regional)



Main roles in the SAPP markets

Traders

- Submitting orders (Bids and Offers) in the different markets.
- Verifying the Market Results

Transmission System Operators (TSO)

- Providing information regarding the **planned** state of transmission interconnectors
 - Total Available Transmission Capacity (TTC).
- Providing information regarding the **operational** state of transmission interconnectors
 - “Actual” Available Transmission Capacities (ATC)

Bilateral Nominators

- **Bilateral Contract Reservations:** Energy scheduled for delivery (transfer) on all bilateral contracts.
 - Required for Transmission Capacity Allocation Management
- **Final Bilateral Contract Nominations:** After the fact agreed energy delivered on bilateral contracts.
 - Required for the Settlement of Imbalances

Market Operator

- Ensuring the smooth operation of all markets including:
 - Pre Market Clearing Activities
 - Market Clearing Activities
 - Post Market Clearing Activities

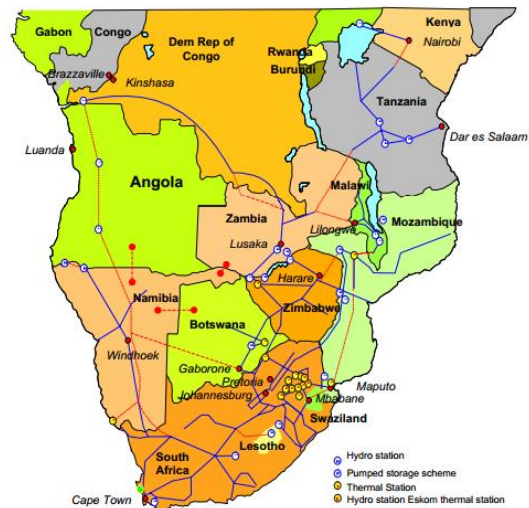


SAPP transmission pricing

Initially, SAPP deployed a postage stamp method based on:

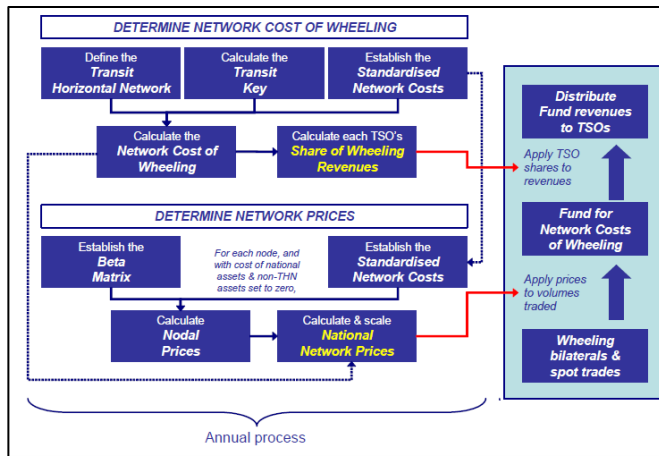
- A wheeling charge of 7.5% of the contract energy value if wheeling took place through one country
- A wheeling charge of 15% of the contract value if wheeling through two countries.

In 2003, SAPP moved from postage stamp to MW-km (load flow) methodology.



In 2005, Plans to move to Nodal pricing did not go ahead due to various factors.

- Computational complexity/lack of transparency



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SAPP transmission pricing – proposed improvements

Current wheeling charge methodology: the MW-km load flow-based methodology introduced in 2003

Works well for bilateral contracts, but has a number of challenges...

Locational signals are limited to buyers, as they incur the full costs of wheeling

The current methodology depends on defined locations of buyers and sellers – it is a “point to point” methodology, that is not compatible with evolving market platforms where counterparties are not known

Motivation for review of wheeling charges:

- A desire for common charges for all users of the transmission systems
- International wheeling charges and national charges should be non-discriminatory
- Charges need to be compatible with the DAM – a competitive short-term market in which counterparties are not known

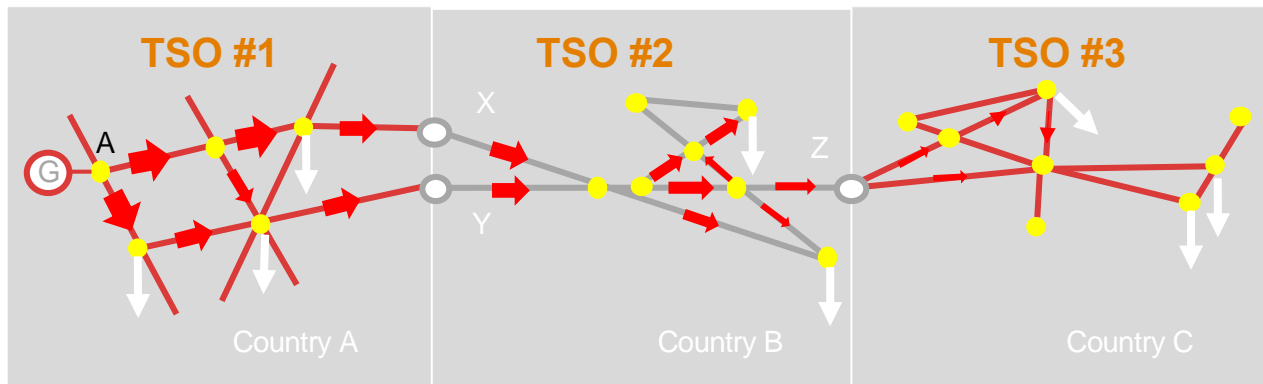
A pricing method is required that is cost-reflective and based on efficient service provision, thereby promoting construction of new transmission infrastructure



SAPP transmission pricing – proposed improvements

SAPP is planning to implement a method based on an **average participation/marginal participation** methodology, which considers the contribution made by each generation and demand node in the transmission network to the flow in each line element

Marginal participation approach



Generation Transmission Charge at Node A = $\sum_{l=1}^n \frac{F_l}{R_l} * C_l$, where

l = line no.

n = total number of lines in the full SAPP system

F = flow in each line arising from generation at A

R = rating of the line

C = cost of the line



Setting available cross-border transmission capacity

The SAPP Operating Guidelines provide requirements for calculating the Total Transfer Capacity (TTC) as follows:

- The transfer limits must be determined for normal operation and emergency condition using steady state, stability and voltage collapse models.
- This must be done using, as far as possible, the N-1 criteria.
- These limits must be identified and the limit which has the most severe consequences, if exceeded, should be recommended as the transfer limit to the appropriate Control Centres.
- The voltage and stability limits are defined in the SAPP Operating Guidelines.
- The SAPP planning committee annually convenes a working group for determining the total transfer capability and these values are published. The transmission reliability margin is not used in the SAPP methodology.

Available Transmission Capacity on the interconnection between the areas for IDM, for a new delivery day, is calculated and made continuously available to the participants by use of the Market Trading System.

The general rule is that any transmission capacity not utilised in the FPM and DAM is given to the IDM.

The TSOs can also give more capacity to the IDM, if it is technically feasible. Participants can utilise their potential flexibility in production/consumption to make use of trading opportunities in the IDM, as well as trading small volumes to ensure their internal balance.

