



POWERING ASEAN: CAN THE NORDIC MODEL WORK?

APGCC Meeting
3 May 2016, Vientiane

**NORD
POOL**

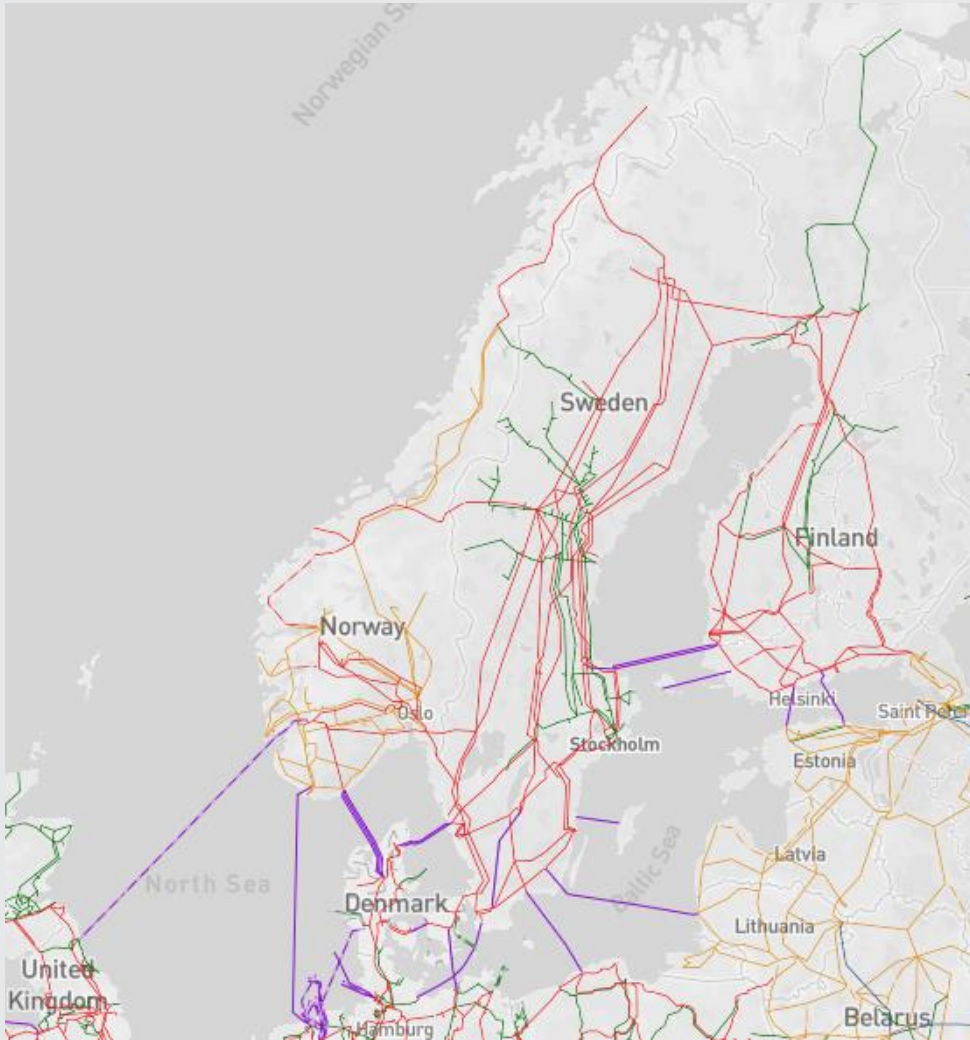
Acknowledgement

*Hans-Arild Bredesen
Nord Pool Consulting
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The Nordic Power Market and its Dynamics

The Nordic power system



Norway:

- Population 5,5 mill
- Peak load: 24 000MW
- Installed capacity: 30 000MW
- Annual Consumption: 119 TWh
- Normal production: 125 TWh
- Variation. 60 TWh
- Hydro production: 99%

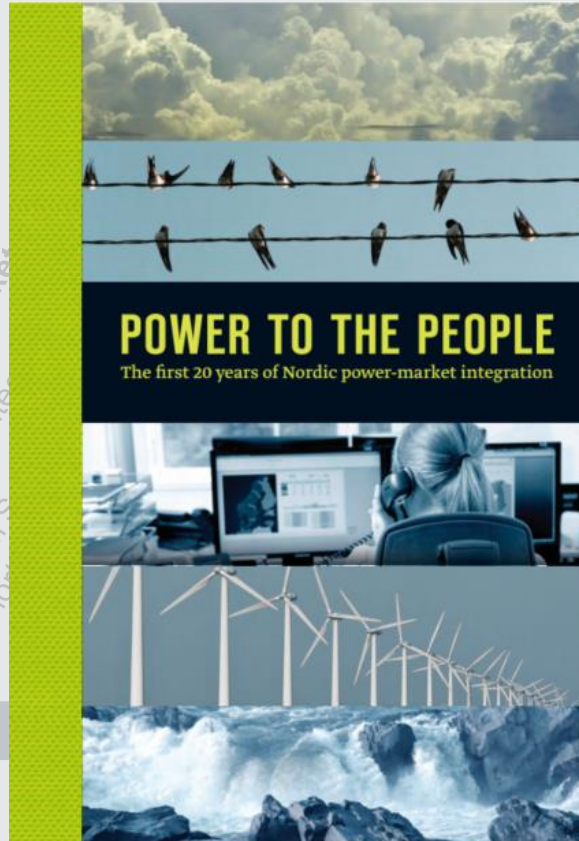
Nordic:

- Population > 24 mill
- Peak load: 69 000MW
- Installed capacity: 89 000MW
- Annual consumption: 412 TWh
- Production:

- Hydro: 52%
- Nuclear: 14%
- Thermal: 32%
- Wind: 2%

Our history

1991 Norwegian power market deregulated
1993 A power market is established by the Norwegian TSO
1996 Nord Pool is established as the world's first
1998 international power market
1999 Finland joins Nord Pool
2000 First international intraday market
2002 Nordic market fully integrated
Nord Pool Spot launched for short-term trading

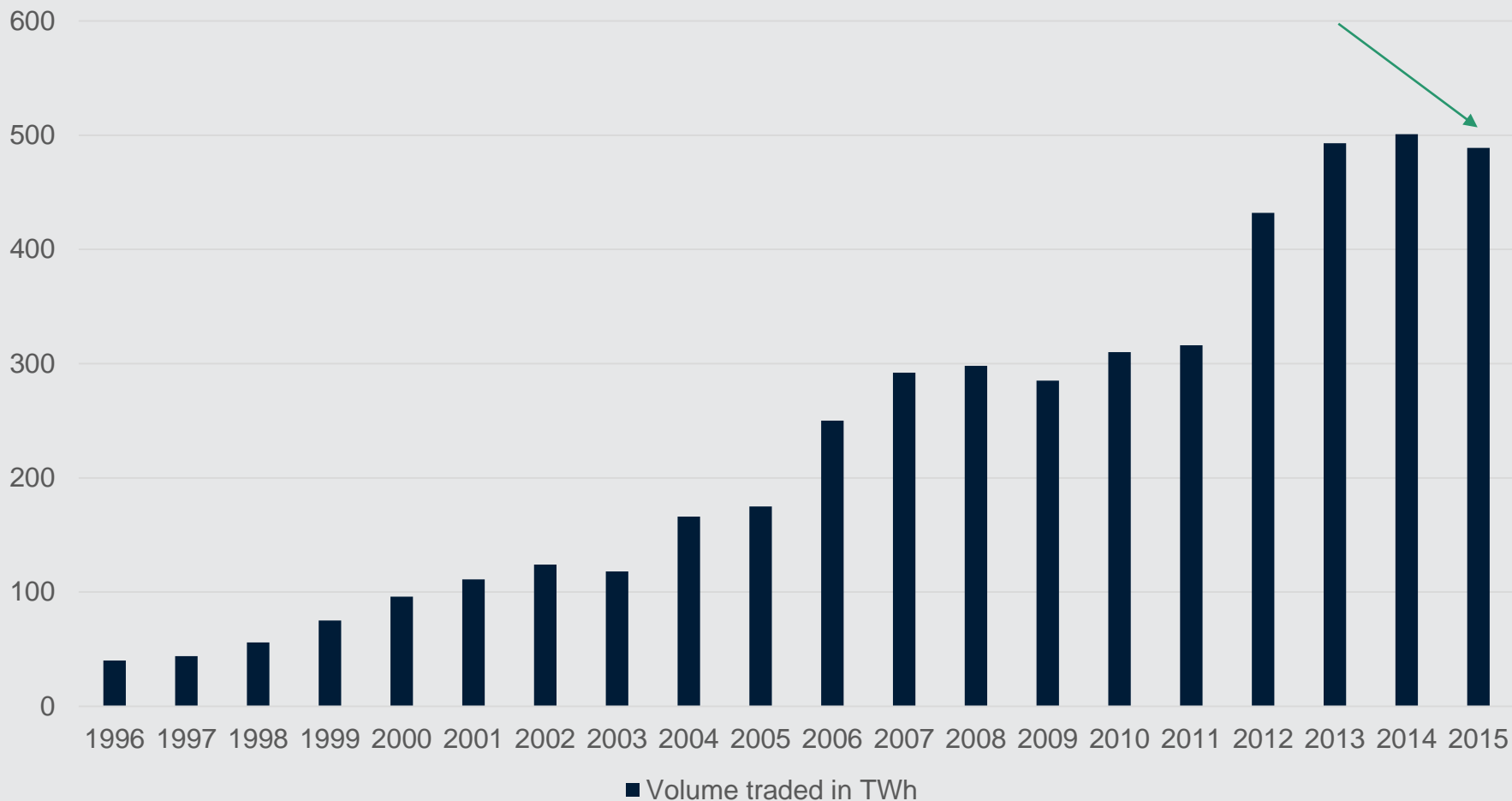


2014 Nord Pool Spot opened as a market
2014 North-Western European power markets coupled
2015 Nord Pool Consulting launched
2016 Nord Pool Spot designated NEMO within 11 markets
Nord Pool Spot becomes Nord Pool

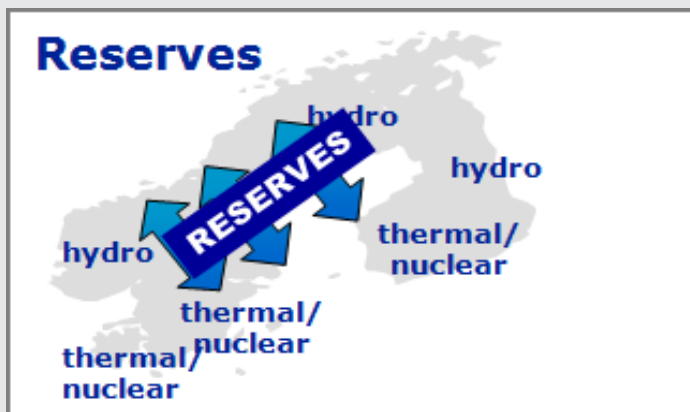
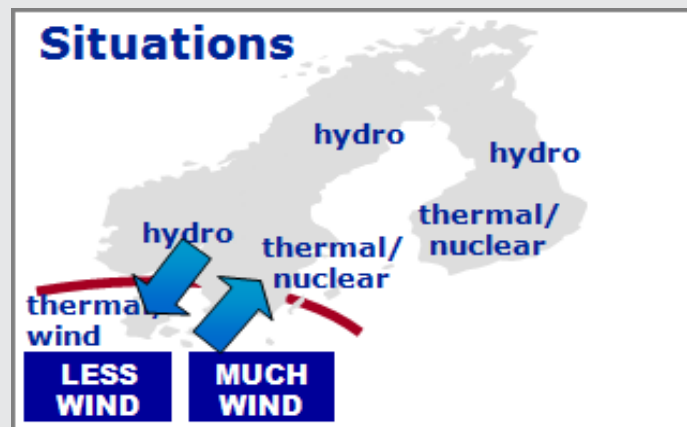
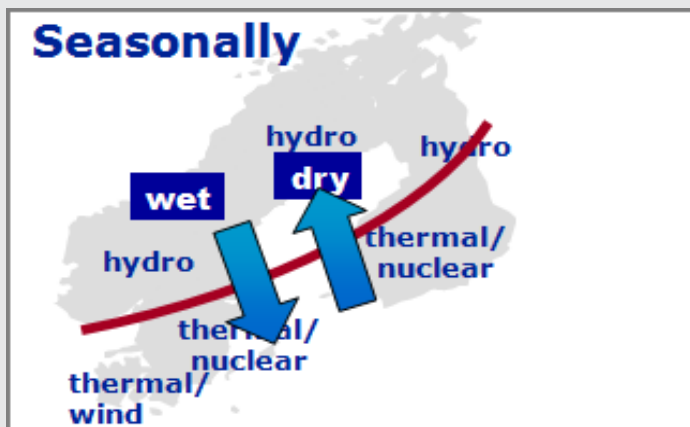
Volume growth from 1996

A total of 489 TWh traded in 2015

- Day-ahead market Nordic/Baltic 374 TWh
- Day-ahead market UK 110 TWh
- Intraday market Nordic/Baltic/Germany 5 TWh



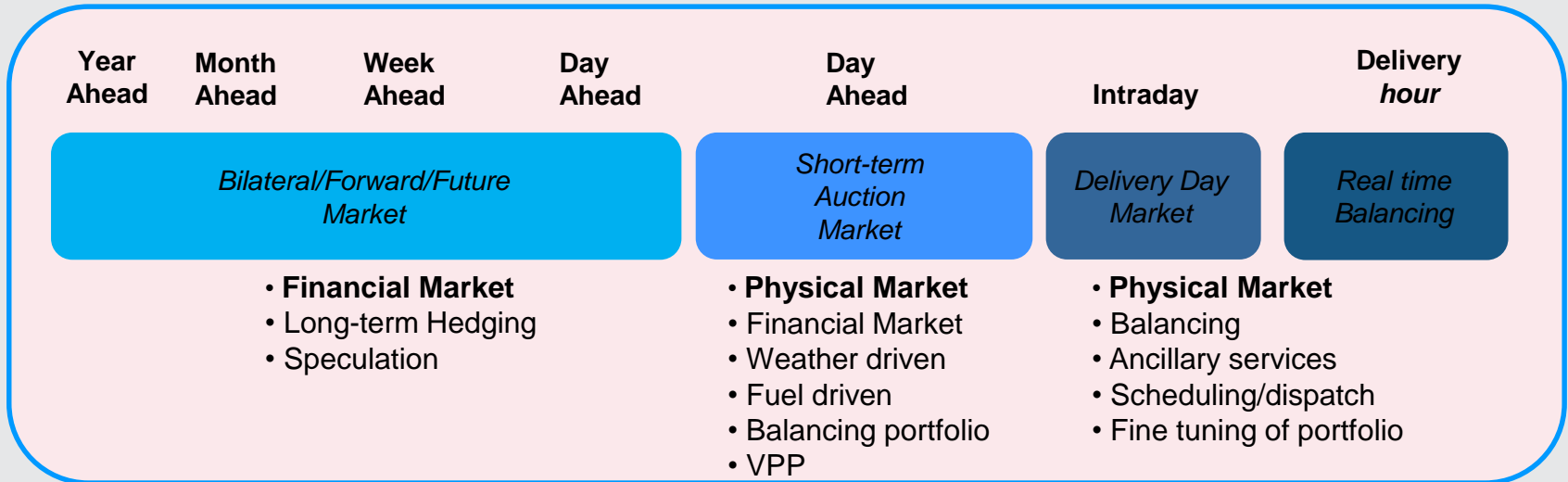
Utilizing the Value of Differences in a Region



- ➡ Complementary production
- ➡ Security of supply
- ➡ Cost synergies
- ➡ Climate challenge

The Reason for Establishing a Competitive Power Market

- The commodity power is characterized by high volatility and there is a potential need of long term risk management and the possibility to change position close to delivery.
- Efficient use of transmission capacity between areas and countries
- Cost-reflective power price in different timeframes



Key success factors of the Nordic model (and some challenges and failures)

Success factors:

- ▶ Stepwise development
 - Both in geography and market/product offerings
- ▶ Involvement of the whole industry
 - Always had a strong Market Council
 - Adaptability – changing according to the need in the market and technological developments
- ▶ Transparency and neutrality
 - Market surveillance and access to data has always been public

Challenges (and one failure)

- ▶ European markets are being more and more regulated
 - Increases costs and complexity
- ▶ California Power Exchange (1997-2000)
 - Tried the “big-bang” implementation – and failed dramatically
 - Did not base its market on any of our success factors

Nord Pool: The Market Operator

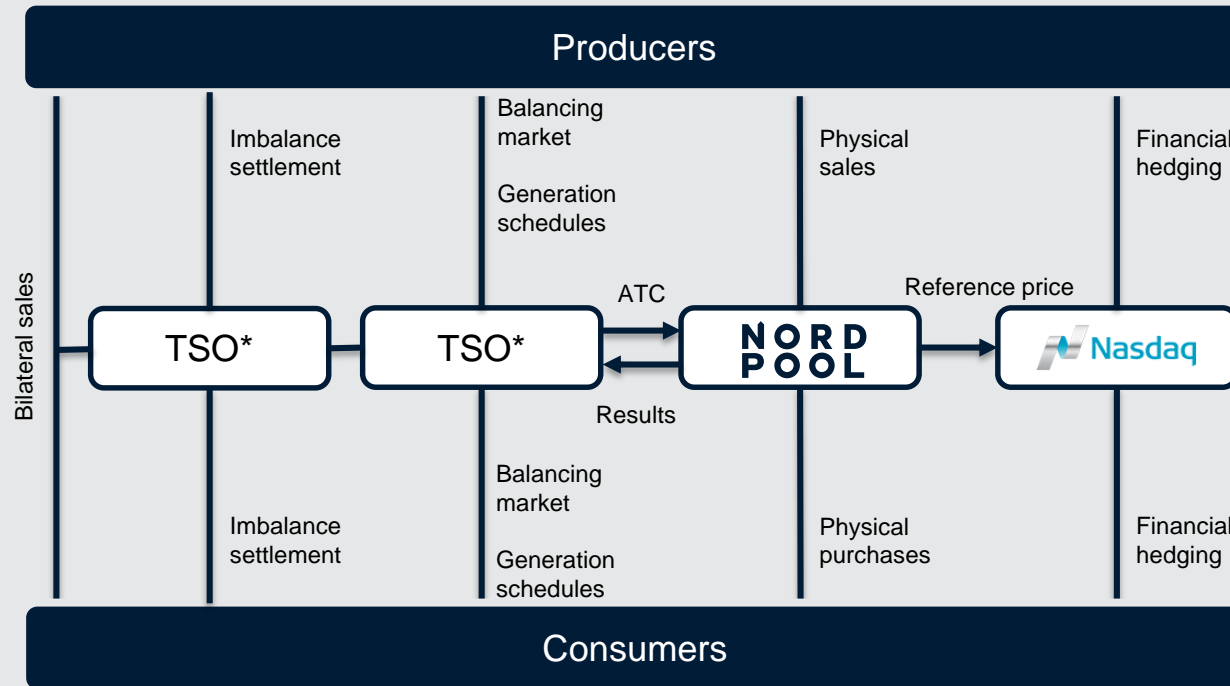
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The Market operator's role in the market

- ▶ To provide liquid, efficient and secure power markets to our customers
- ▶ To provide accurate information to the whole market, ensuring transparency
- ▶ To provide equal access to market for everyone wanting to trade power
- ▶ To be the counterparty for all trades; guaranteeing settlement and delivery

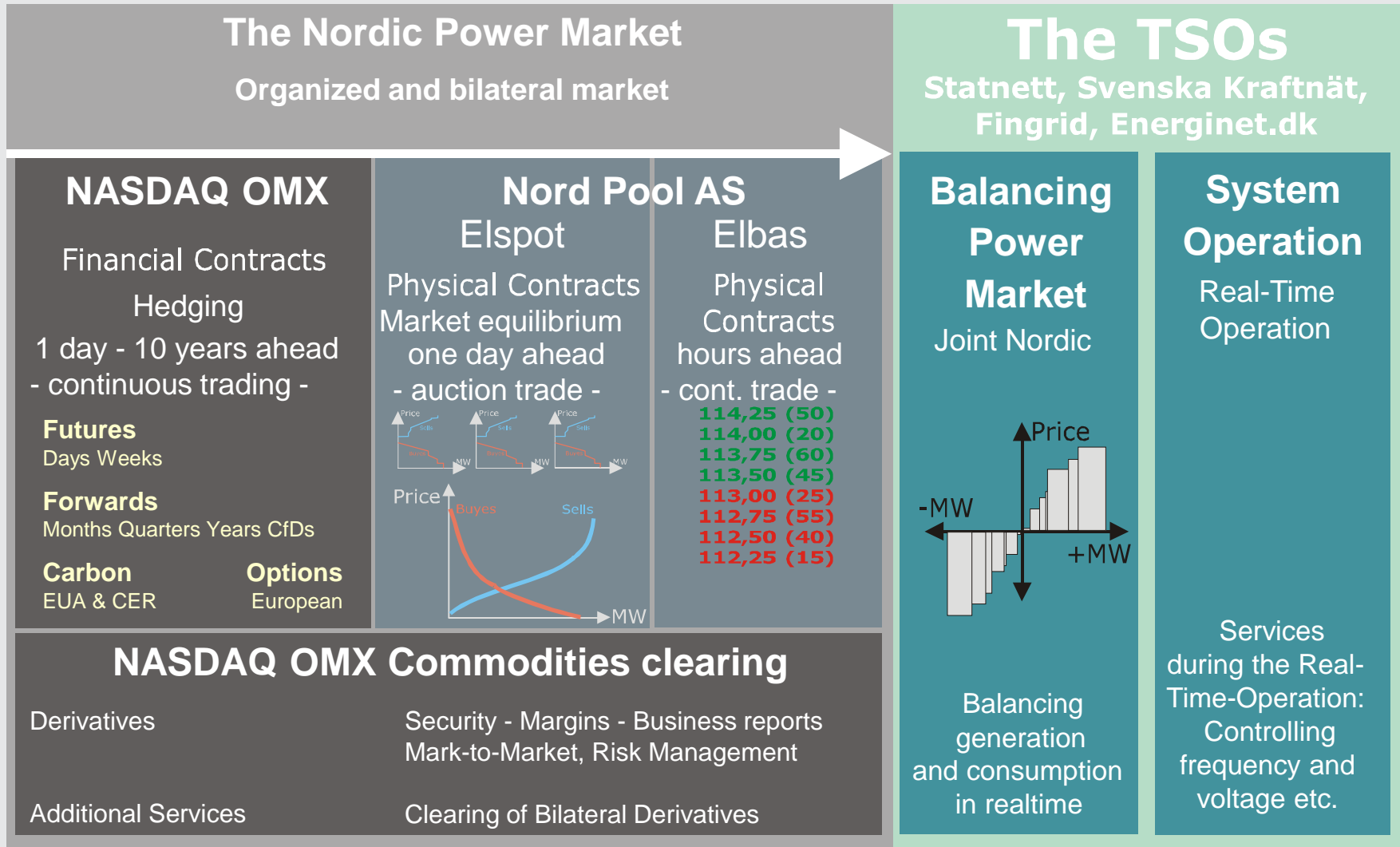


Roles of different parties in Nordic power market



* Svenska kraftnät, Statnett, Fingrid, Energinet, Elering, Litgrid, AST

The Nordic market design

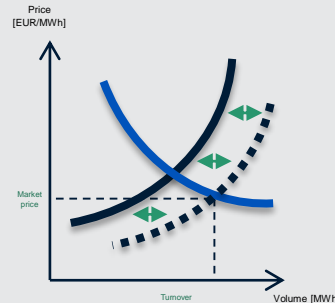


Day Ahead price formation in practice

Factors affecting the **supply** for electricity:

- Fixed costs of production
- Variable costs of production
- Plant startup and shutdown costs
- CO2 allowance prices
- Weather
- Hydro situation

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Factors affecting the **demand** for electricity:

- Retail volumes and delivery obligations:
 - Weather
 - Open deliveries, etc.
- Industrial consumers:
 - Fixed costs
 - Variable costs
 - Startup and shutdown costs
 - Flexibility of processes

TRANSMISSION CAPACITY

Available Transmission Capacity (ATC):

- Existing interconnectors
- Unavailability of interconnectors (faults, etc.)

Europe's leading power market

■ Nordic/Baltic and UK – day-ahead and intraday

■ German market – intraday

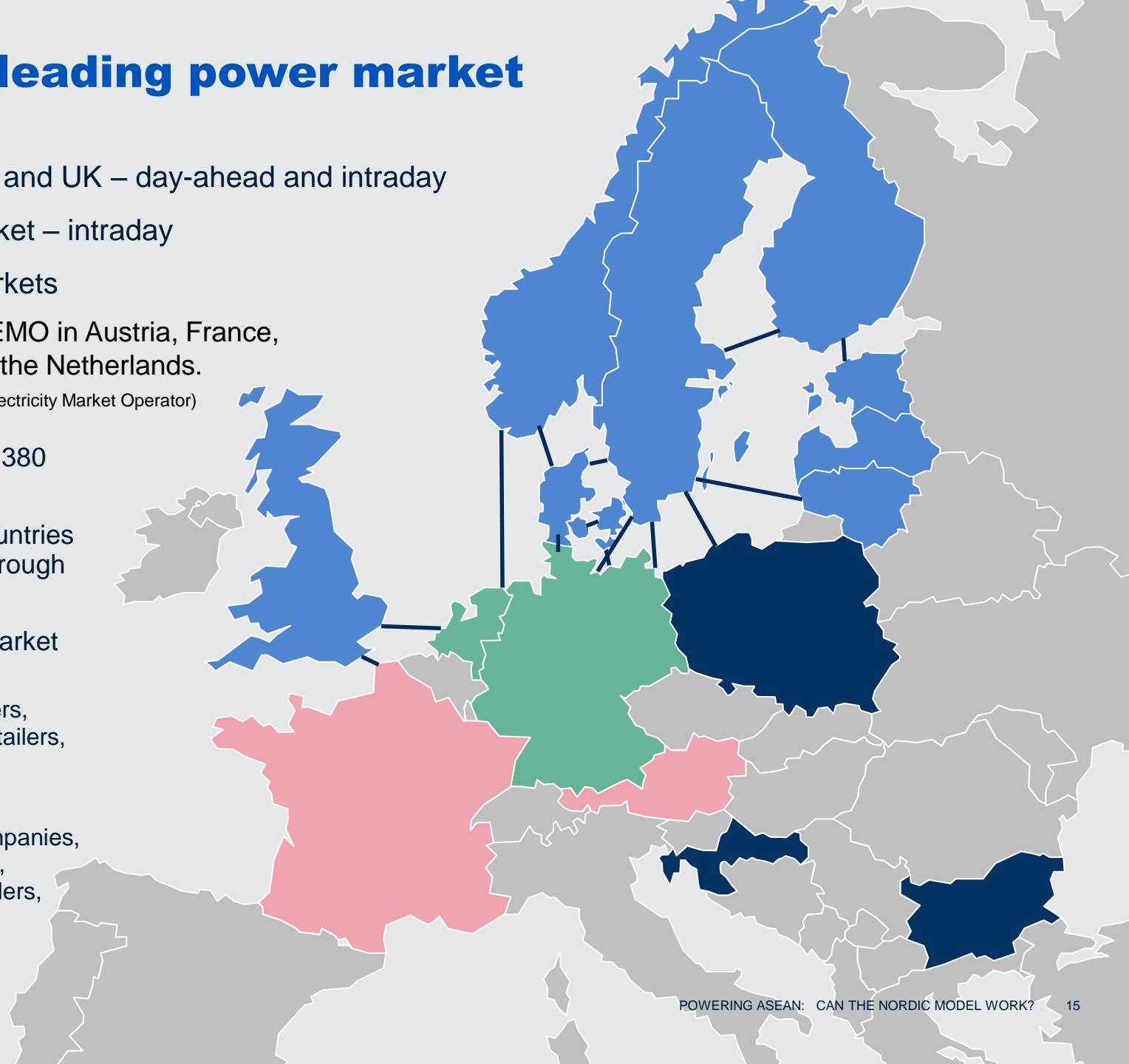
■ Serviced markets

■ Nominated NEMO in Austria, France, Germany and the Netherlands.

NEMO (Nominated Electricity Market Operator)

- ▶ Nord Pool has 380 members
- ▶ 19 different countries represented through members
- ▶ Versatility of market participants:
 - End consumers, producers, retailers, brokers
 - large utilities
 - Industrial companies, municipalities, service providers, etc.

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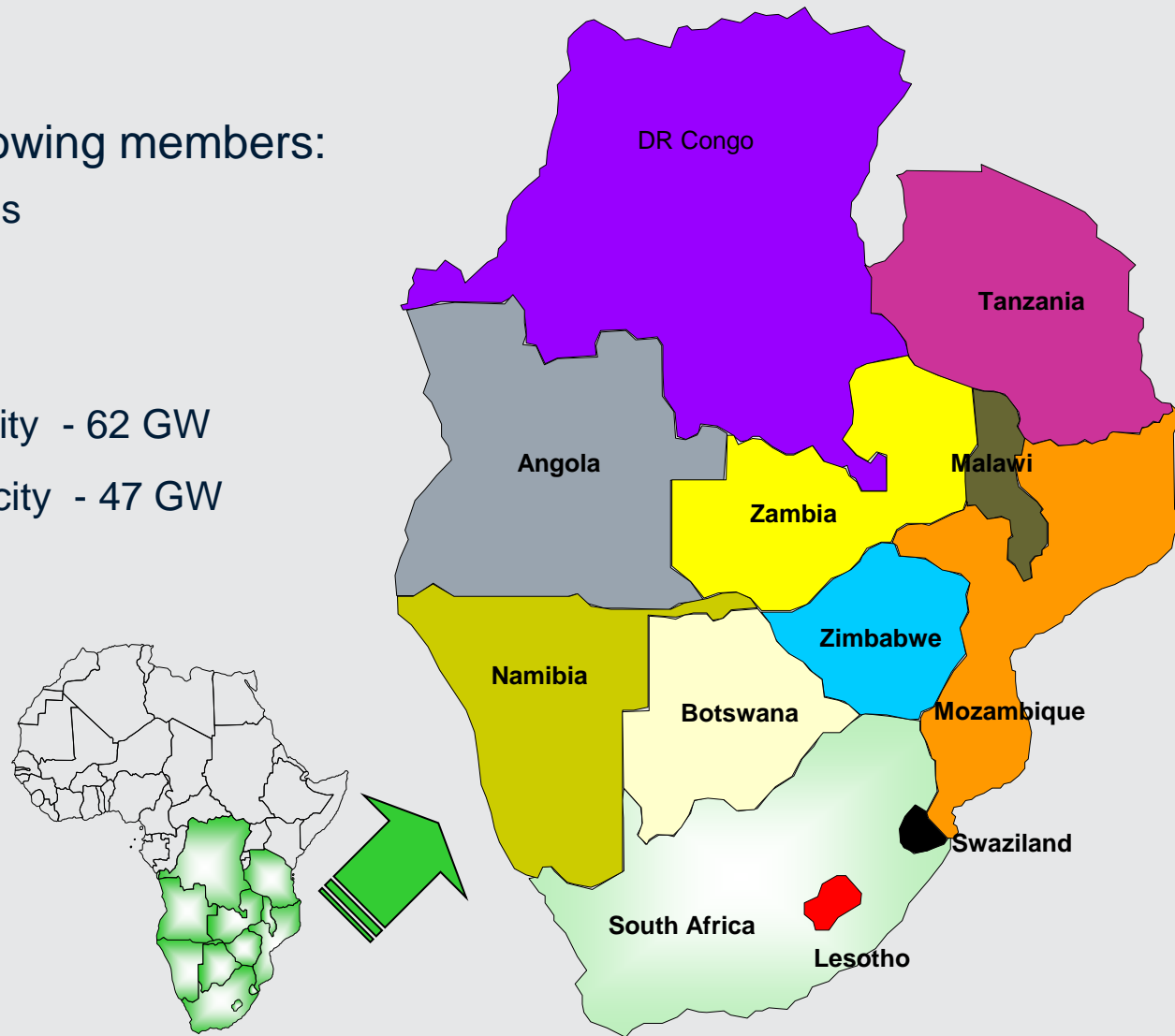


The Southern African Power Pool: A Nordic Model in Africa

SAPP Market Area

SAPP consists of the following members:

- ▶ 12 SADC Member Countries
- ▶ 16 SAPP Members
- ▶ 280 Million people
- ▶ Installed Generation Capacity - 62 GW
- ▶ Available Generation Capacity - 47 GW
- ▶ Peak Demand - 55 GW
- ▶ Consumption - 400TWh



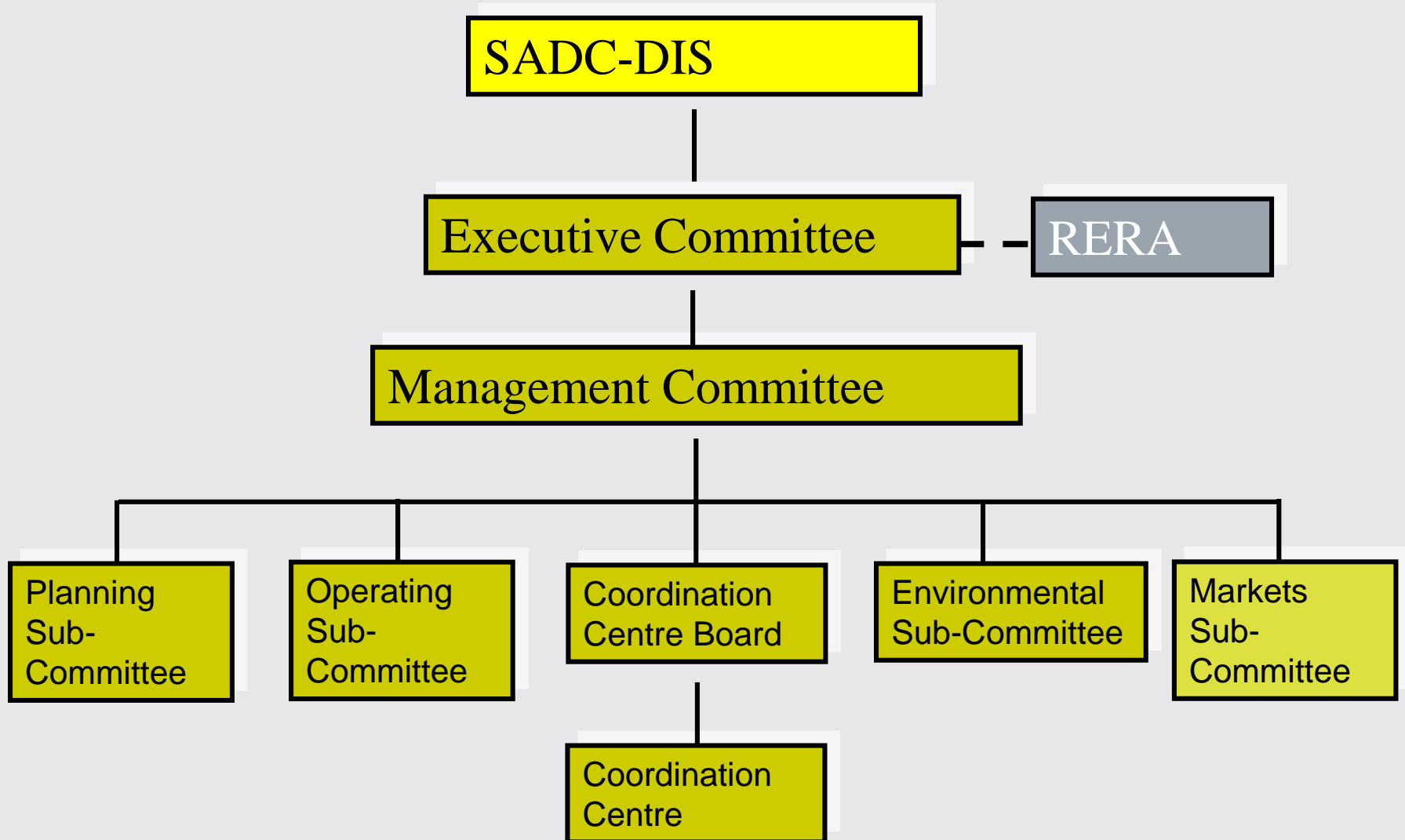
Regional Power Market Preconditions

The aim for SAPP was to enable national power capacity merging into regional market in order to further optimize social welfare and increase security of supply.

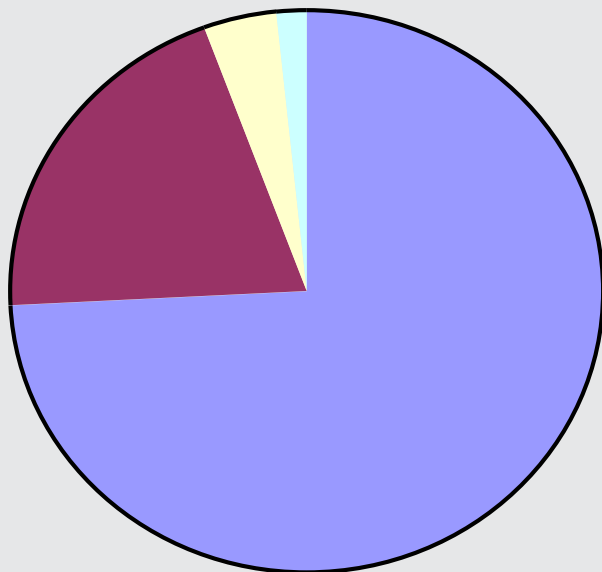
- ▶ More power resources will be more available in a large region than nationally
- ▶ The market will facilitate more efficient management of marginal available production and transmission resources
- ▶ A regional power market has proven to add value to the common interconnected power market
- ▶ The slogan for the market integration in SAPP can be summarized as

“National control – regional cooperation”

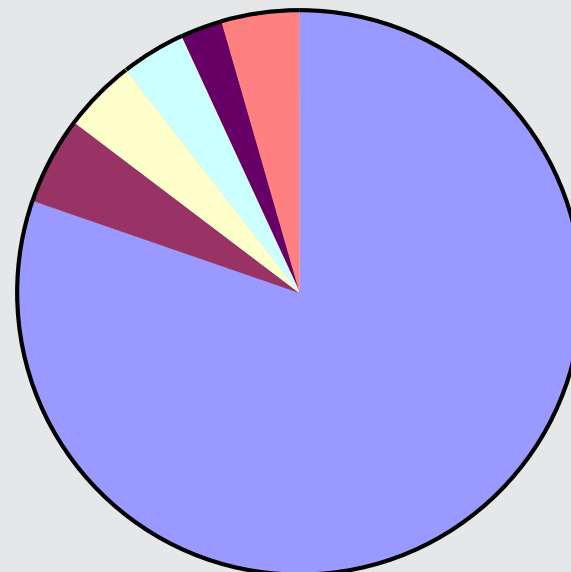
SAPP Governance structure



SAPP Generation mix – is this dominated by S-A?



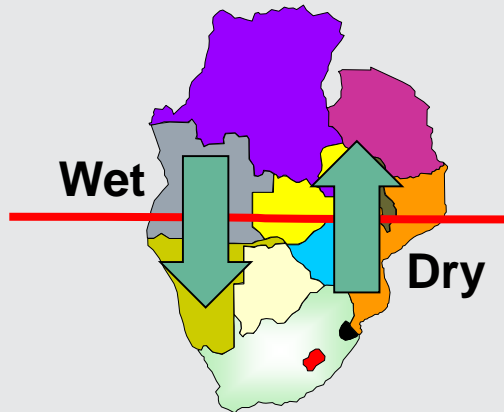
- 74.3% Coal
- 20.1% Hydro
- 4.0% Nuclear
- 1.6% Gas/Diesel



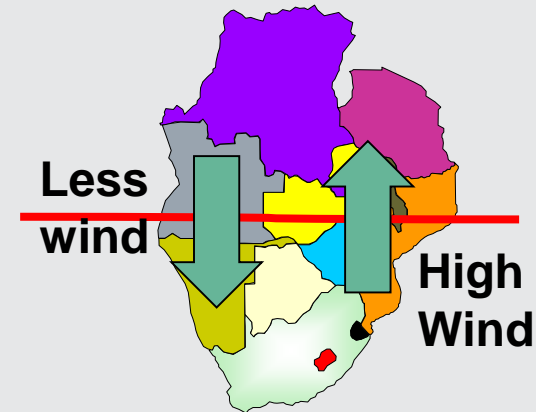
- 80.4% South Africa
- 5.0% Mozambique
- 4.1% Zimbabwe
- 3.6% Zambia
- 2.6% DRC
- 4.4% Rest

Utilizing the Value of Differences in a Region

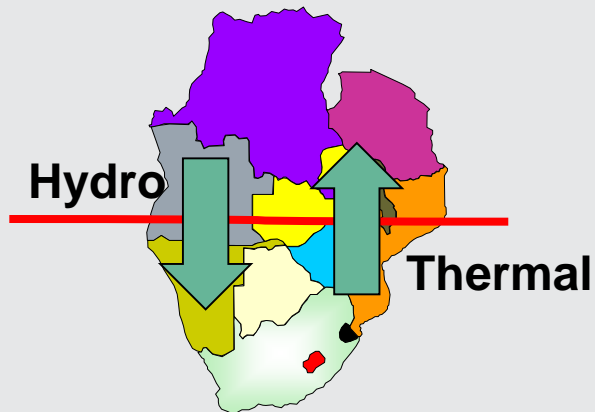
Seasonally



Situations

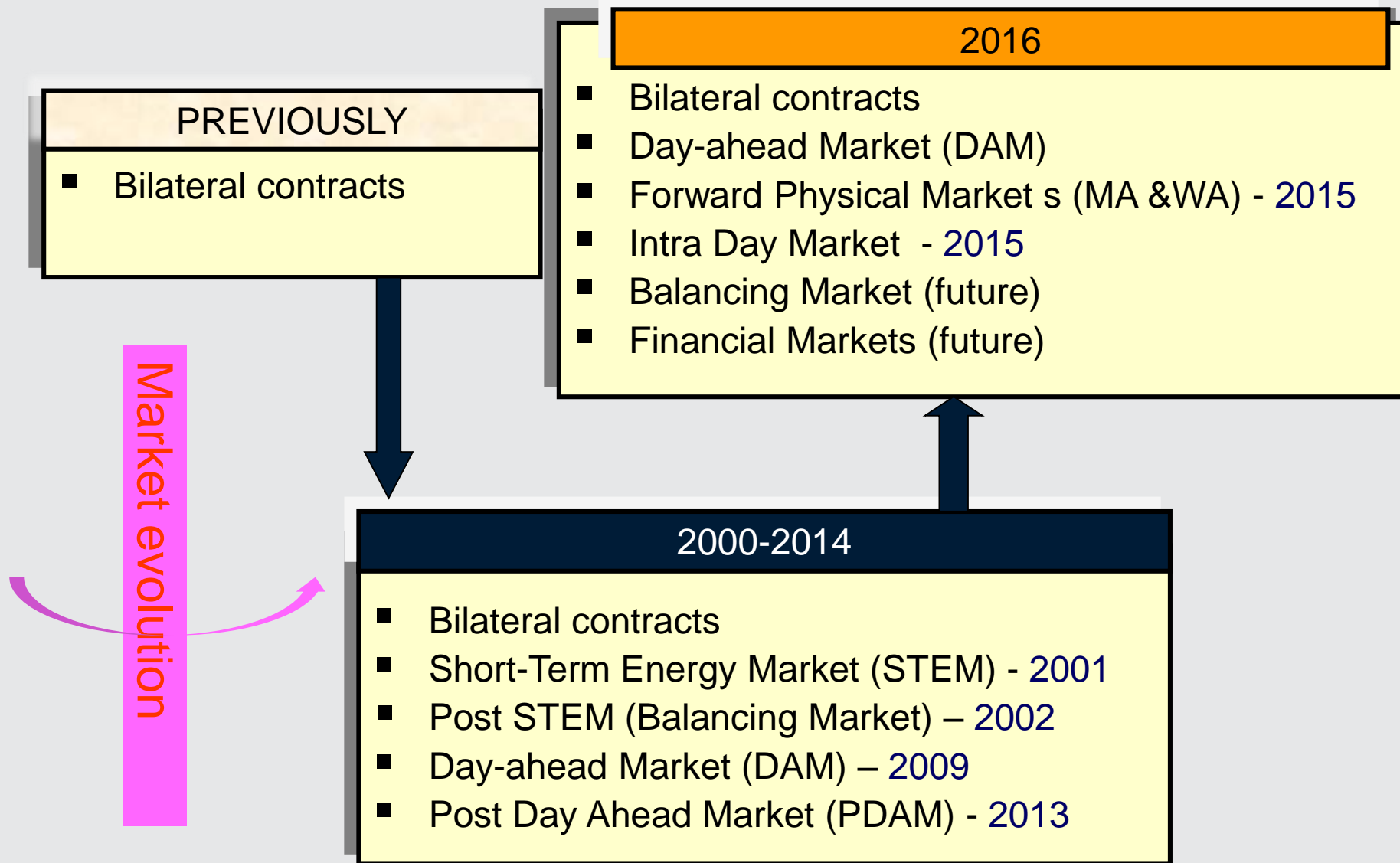


Reserves



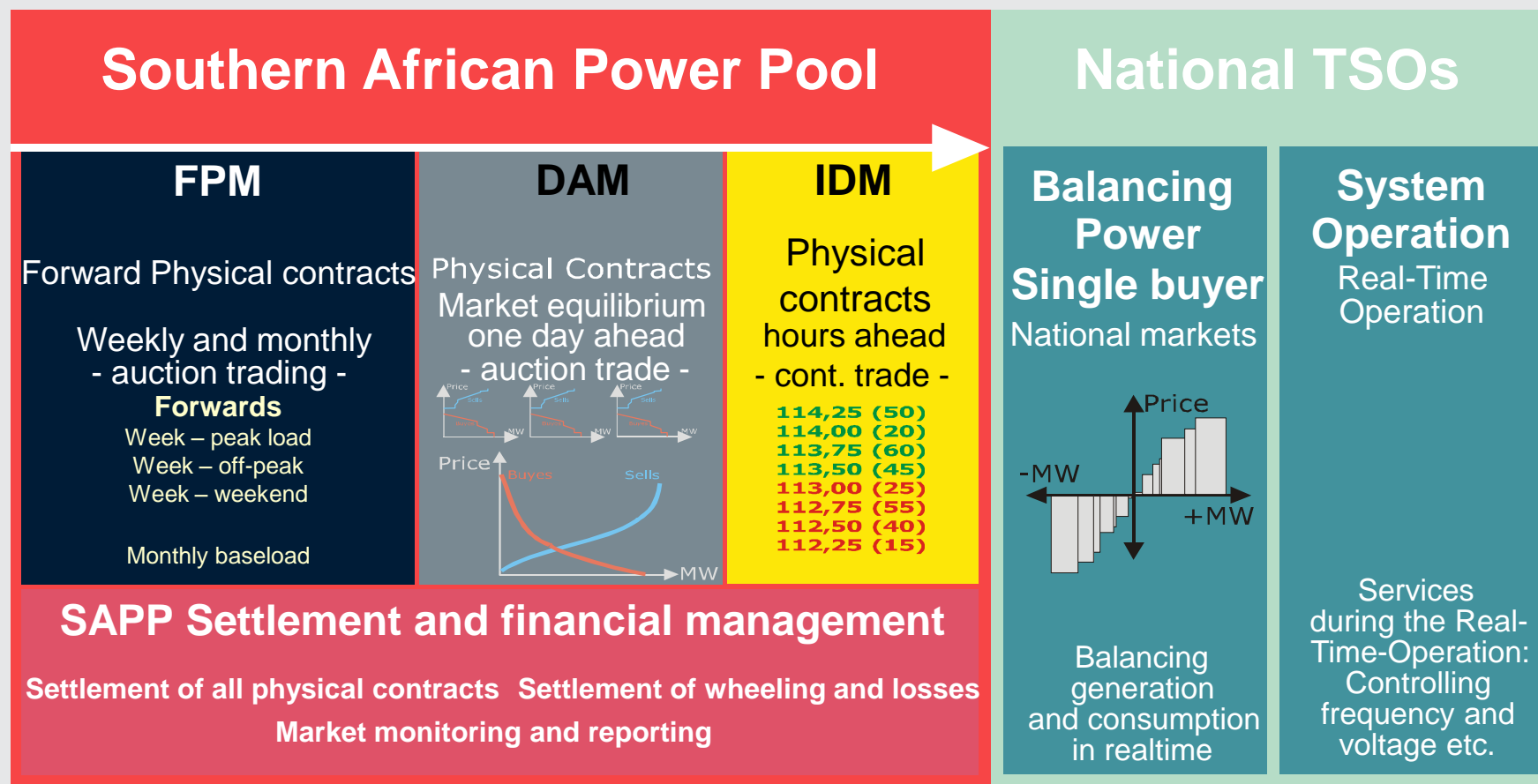
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SAPP Market evolution



SAPP Market concept

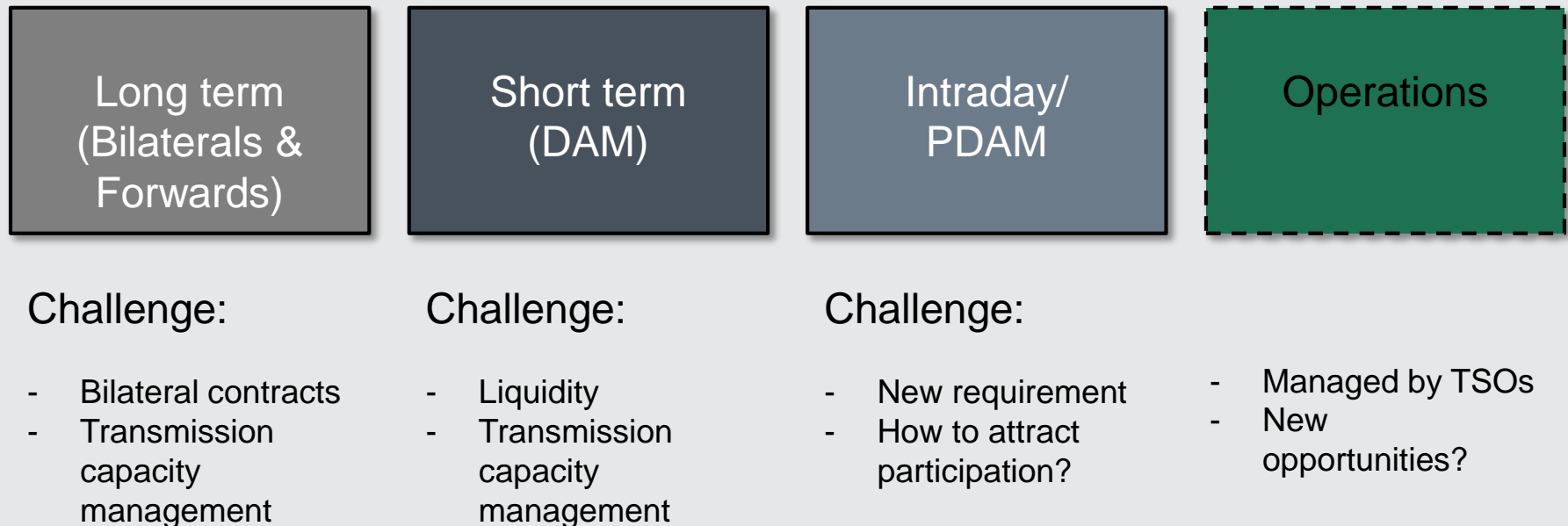
Based on evolution, not revolution



The Southern African Pool: Does it Work?

CHALLENGES FOR SADC IN 2012

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



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

What did SAPP do to answer these challenges?

Their question was: Is the low liquidity a signal to shut down the market all together?

No - SAPP answer was to reinforce the SAPP vision on the market:

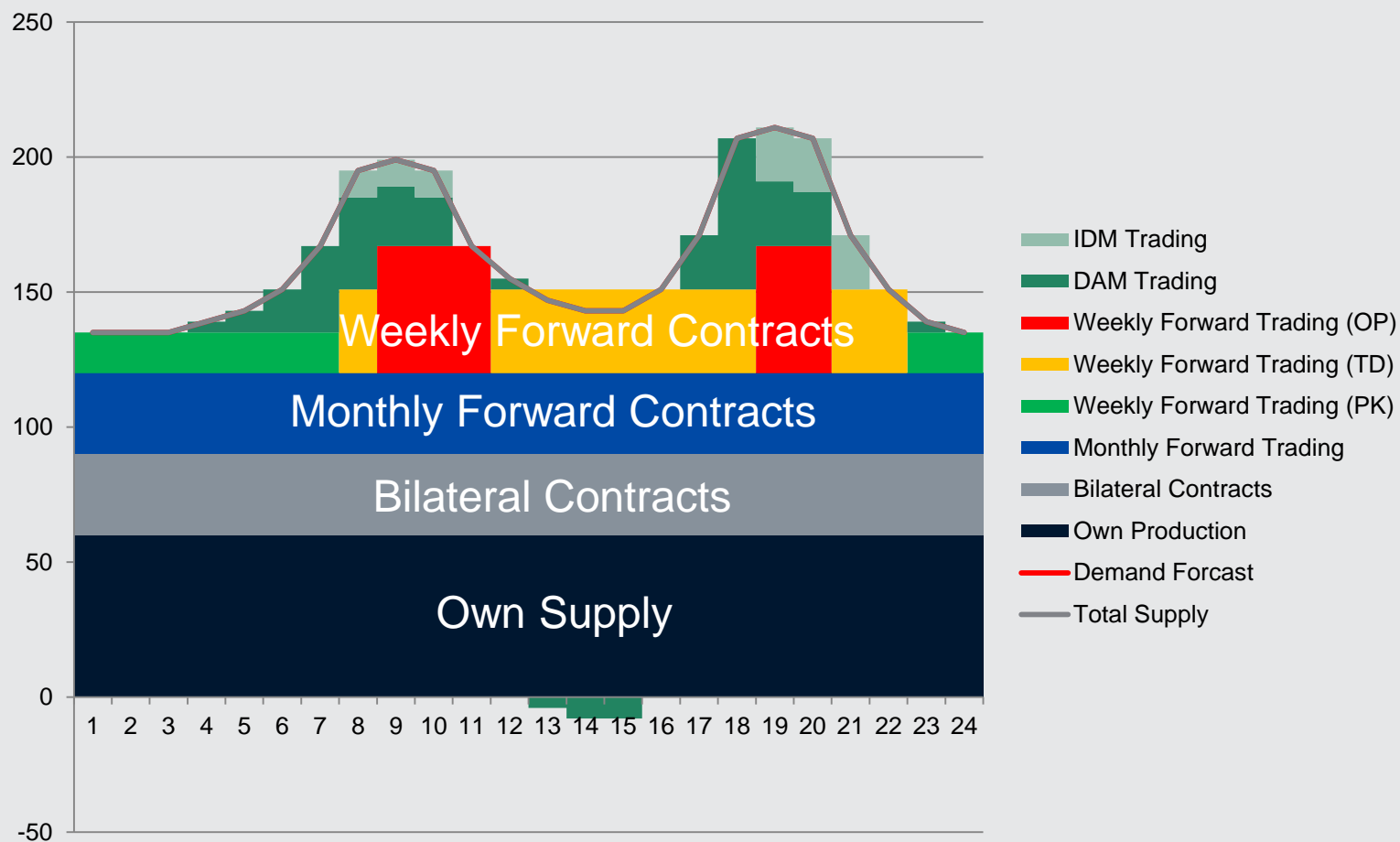
“Facilitate the development of a competitive electricity market in the Southern African region.”

The follow-up question was then: How can we then enhance trading?

Create the Southern African power market model with integrated markets and services through a central marketplace.

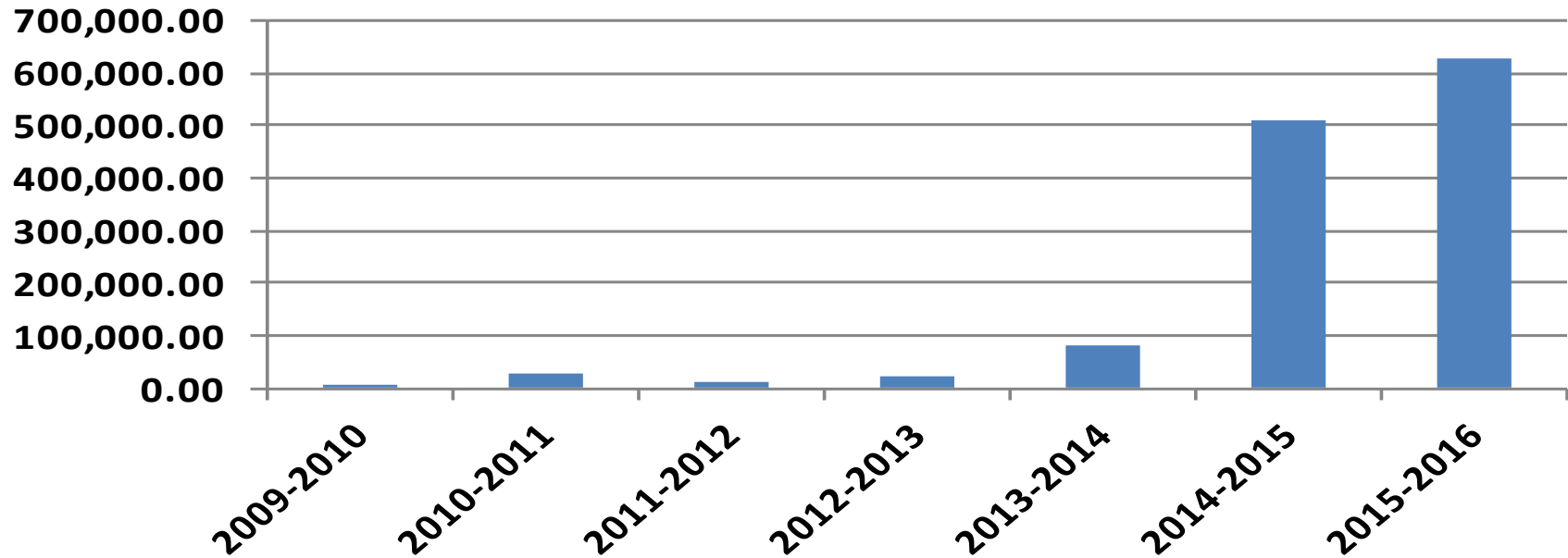
Role of Different Markets in Supply

Balancing on the Day – Hourly Contracts



Market Performance – Competitive Market

Traded Volumes on Competitive Market (MWh)



- ❖ Significant increases in trade volumes were recorded in 2014/15 (508,526 MWh) & 2015/16 (627,796 MWh for the period Apr to Oct.) when compared to previous years of less than 100,000MWh annually

Does it really work?

Is the market dominance of South Africa a problem?

- ▶ One could think that based on the installed capacity that the market would be totally dominated by South Africa
- ▶ However – the trading is based on ***cross-border capacities***
- ▶ The trading pattern has changed over time:
 - Initially (2009-2011) buying in South-Africa from the others
 - Changed with new interconnection – and increased understanding of the market
 - Now flow of base-load capacity in off-peak hours from South-Africa all the way to Zambia (+ Zimbabwe) and Mozambique
 - Trading more expensive (but flexible) hydropower in the opposite direction during standard and peak time
 - The focus on capacity building has improved the trading patterns to follow economic principles

Does it really work?

How can a market work in an under-supplied region?

- ▶ In a shortage situation, the use of the scarce resources should be based on economics
- ▶ There are hours/periods of the day where there is little trading – but trading small volumes “on the margin” also help.
- ▶ The same objections was made in India – but has proved to be wrong

But the national markets are not deregulated?

- ▶ True – but still the region benefits of regional cooperation and integration
- ▶ The market model is flexible so that when the underlying national markets opens, they will have access to the larger market from day one.



Hans-Arild Bredesen

CEO, Nord Pool Consulting

Email: Hans-Arild.Bredesen@nordpoolgroup.com

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