# POWERING ASEAN: CAN THE NORDIC MODEL WORK?

May 24-26 2016

Jakarta

NORD POOL

# Acknowledgement

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*Nord Pool Consulting*
*May 2016*

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# Session Two

**What is the Nordic Model?**

# The Nordic Power Market and its Dynamics

Mr. Hans-Arild Bredesen, CEO, Nord Pool Consulting

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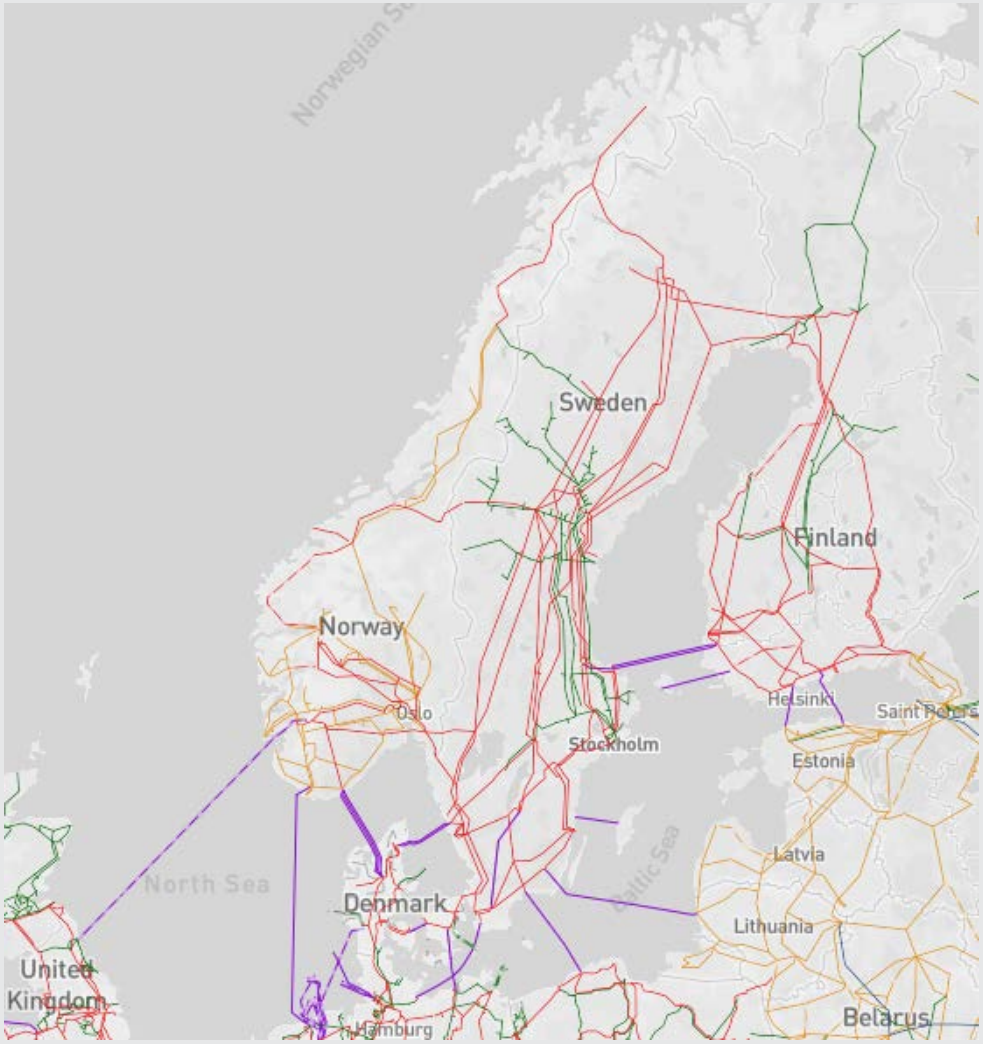
# The Nordic power system




## 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% |

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# Prerequisites for the establishment of the market – example from Norway

Economic inefficiencies and lack of coordination in the Norwegian market

- Starting point in Norway was over-investment and thereby low prices
- Inefficient management where municipalities were responsible for the local power balance (Norway at that point had 4,5 mill people and 435 municipalities)
- Investments and profits for the companies literally disappeared ‘straight into the ocean’
- Excess power was exported to Sweden at a lower price than that paid by Norwegians
- The Ministry of Finance, not the Ministry of Oil and Energy, realising that the industry was based on uneconomic principles and operations, therefore raised the question of efficiency.

The challenge was to develop a model tailored to an industry and a commodity that was produced and consumed at the same time and that thus had special prerequisites and requirements.

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# Prerequisites for the establishment of the market – example from Norway

## First steps identified: Deregulation and Unbundling

- One of the key tasks in most power sector reforms is the unbundling of the power companies. The Norwegian power sector prior to the Energy Act was dominated by one incumbent, vertically-integrated power company. It was therefore important to unbundle this into separate companies:
  - **Transmissions system operator** – owner of the main grid and also the national system operator. This needs to be regulated as a natural monopoly by the national energy regulatory authority.
  - **Distribution companies** – distribution to end-consumers at a lower voltage level
  - **Generation company** – taking care of the power generation. This could also be split in several companies
  - **Retailers (trading) company** – selling power to the end-consumers – could be part of either a distribution company or a generation company.
- **Privatization** – **a potential tool, but no requirement**
- Other Nordic countries started their deregulation process in the first parts of the 90´s and essentially followed the same process. This was important to allow for an easy integration of the other countries into the Nord Pool market.

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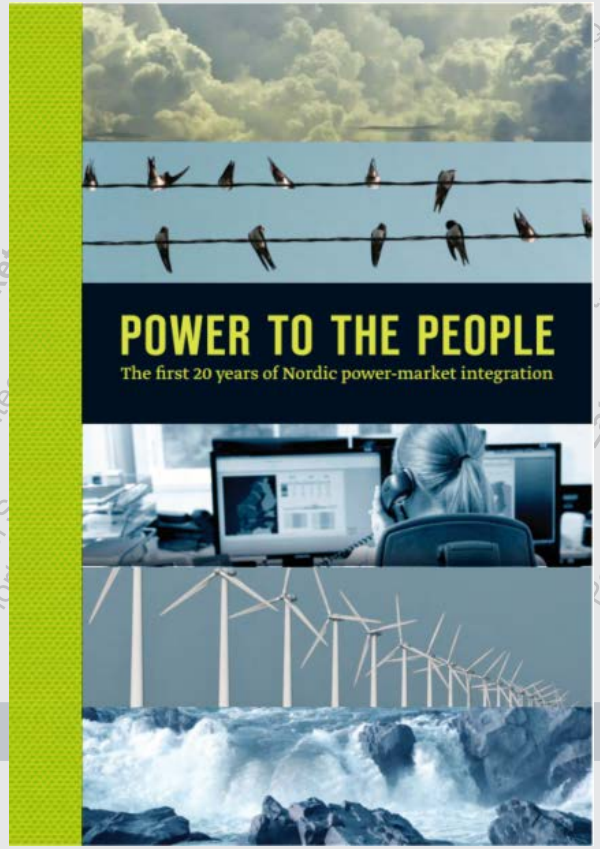
# Our history




1991 Norwegian power market deregulated
1993 **A power market is** established by the Norwegian TSO
1996 Nord Pool established as the **world's first international power market**
1998 **Finland** joins Nord Pool
1999 First international **intraday market**
2000 Nordic market fully inte
2002 Nord Pool s for sho
2014 **Latvia** opened as a marke
2014 North-Western European power markets coupled
2015 Nord Pool Consulting launched
2016 Nord Pool Spot designated NEMO within 11 markets
Nord Pool Spot takes sole ownership of UK market
Nord Pool Spot becomes Nord Pool

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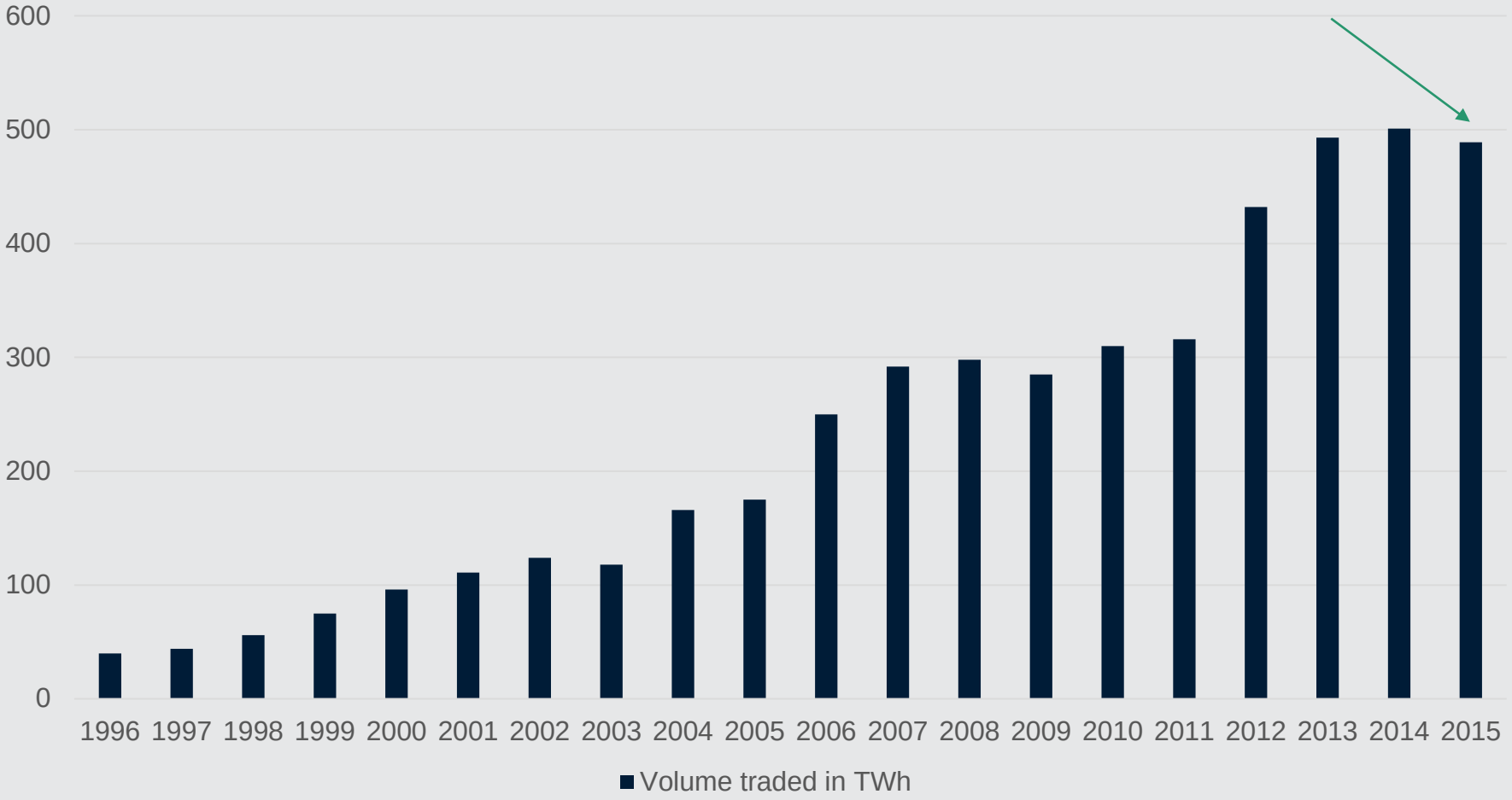
# Volume growth from 1996

**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

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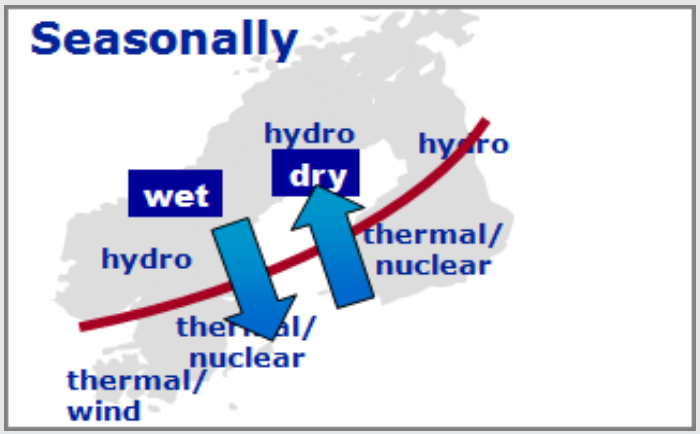
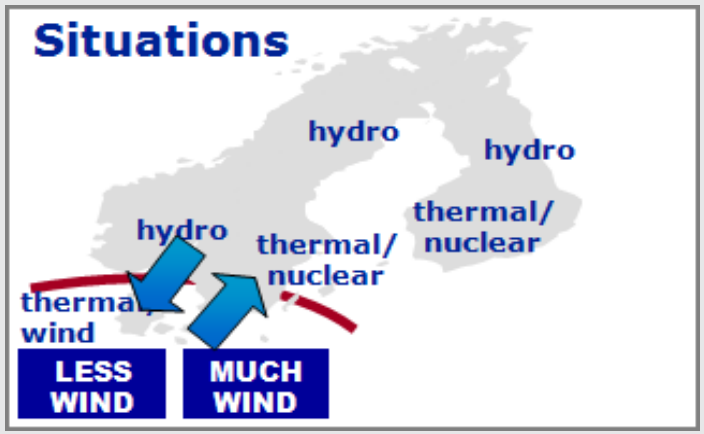
# Utilizing the Value of Differences in a Region





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

# Stakeholders

- Owned by Nordic and Baltic transmission system operators since the start
- Regulated by Norwegian Water Resources and Energy Directorate (NVE)
- Positives of TSO ownership:
  - All the markets for physical power will end up as a schedule that will be sent to the TSO for the ultimate balancing of the power system.
  - Ensure that the overall market concept be sharing common goals
  - In other words, all activities in the market are ultimately ***driven by planning***.
  - By having the TSO as an owner, connection and cooperation are ensured directly.

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Statnett – Norway – 28.2%

Svenska Kraftnät – Sweden – 28.2%

Energinet – Denmark – 18.8%

Fingrid – Finland – 18.8%

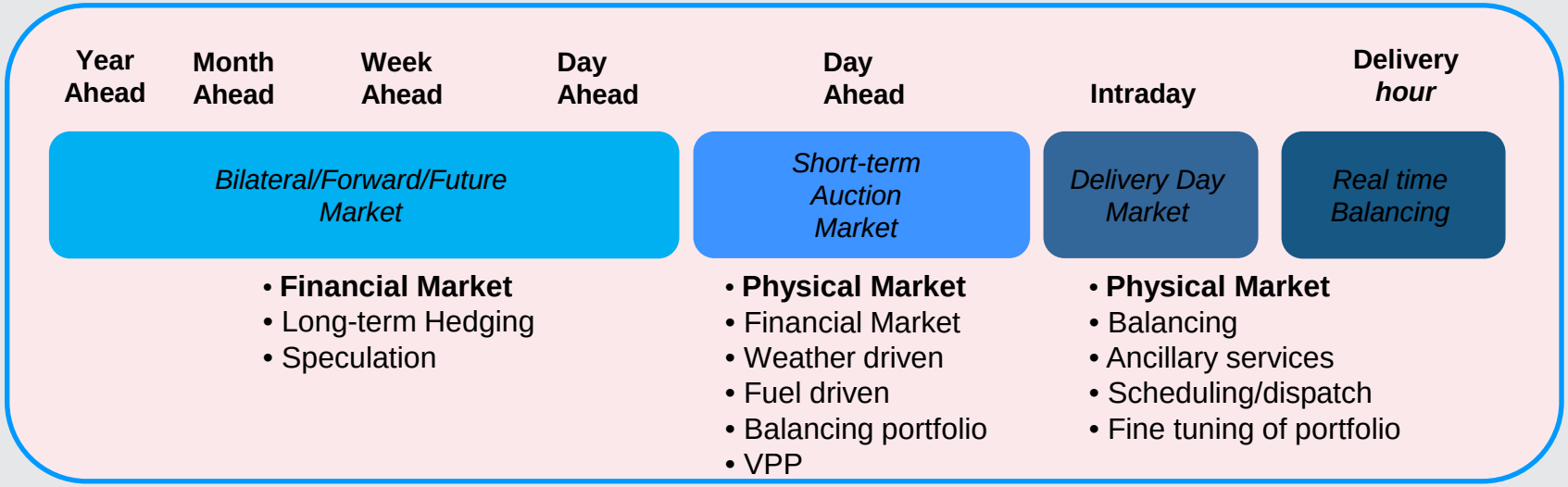
Elering – Estonia – 2%

Litgrid – Lithuania – 2%

AST – Latvia – 2%

# 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



# The Nordic market design

## The Nordic Power Market

**Organized and bilateral market**

### NASDAQ OMX

Financial Contracts

Hedging

1 day - 10 years ahead

- continuous trading -

**Futures**
Days Weeks

**Forwards**
Months Quarters Years CfDs

**Carbon**
EUA & CER

**Options**
European

### Nord Pool AS

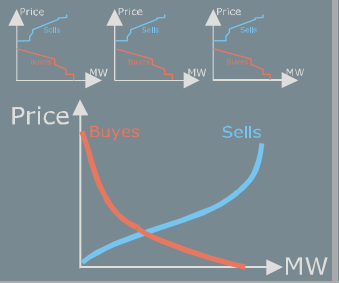
#### Elspot

Physical Contracts

Market equilibrium

one day ahead

- auction trade -




#### Elbas

Physical Contracts

hours ahead

- cont. trade -

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

### NASDAQ OMX Commodities clearing

Derivatives

Security - Margins - Business reports
Mark-to-Market, Risk Management

Additional Services

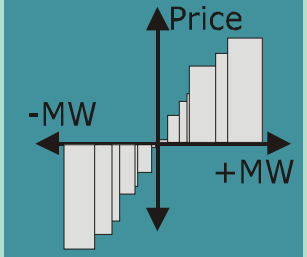
Clearing of Bilateral Derivatives

## The TSOs

**Statnett, Svenska Kraftnät, Fingrid, Energinet.dk**

### Balancing Power Market

Joint Nordic




Balancing generation and consumption in realtime

### System Operation

Real-Time Operation

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

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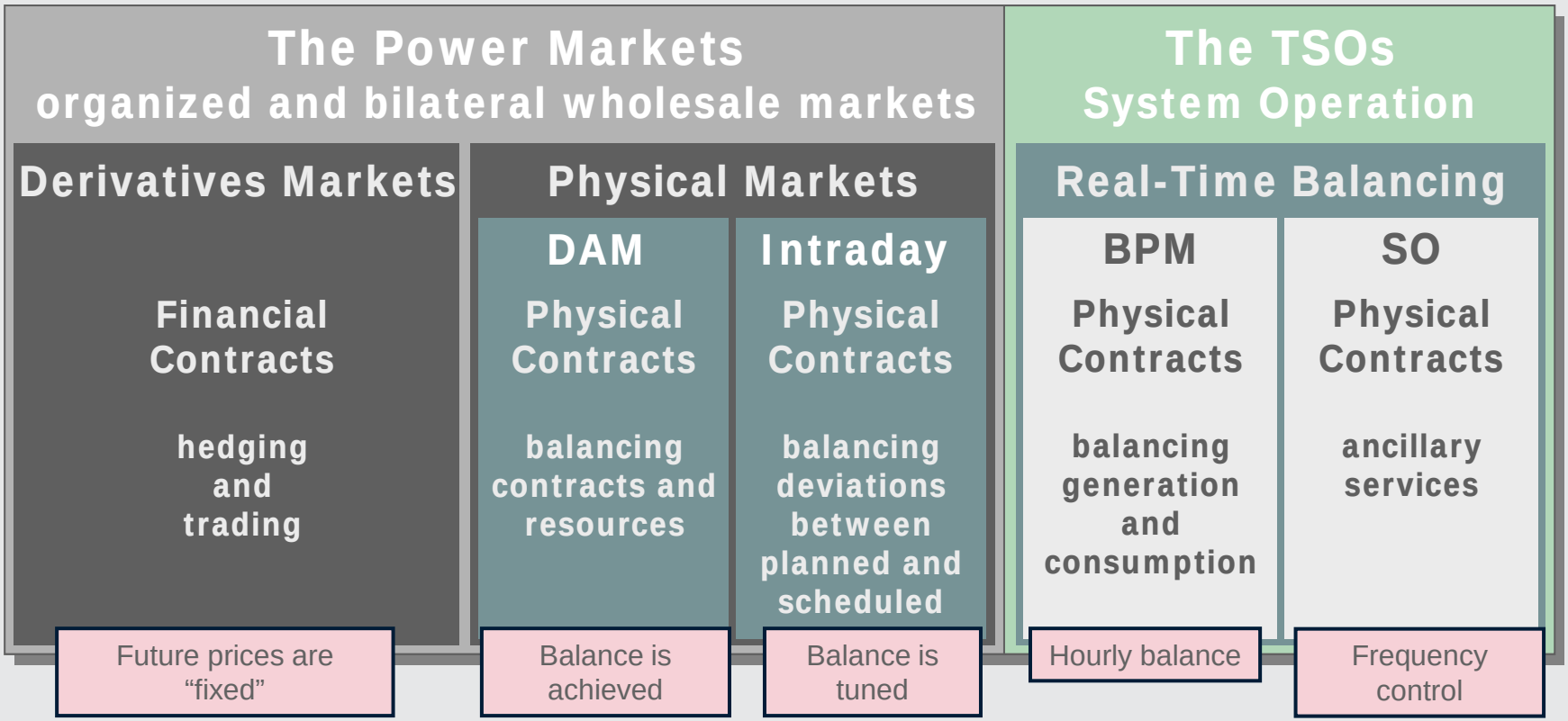
# Integrated Markets

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# 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

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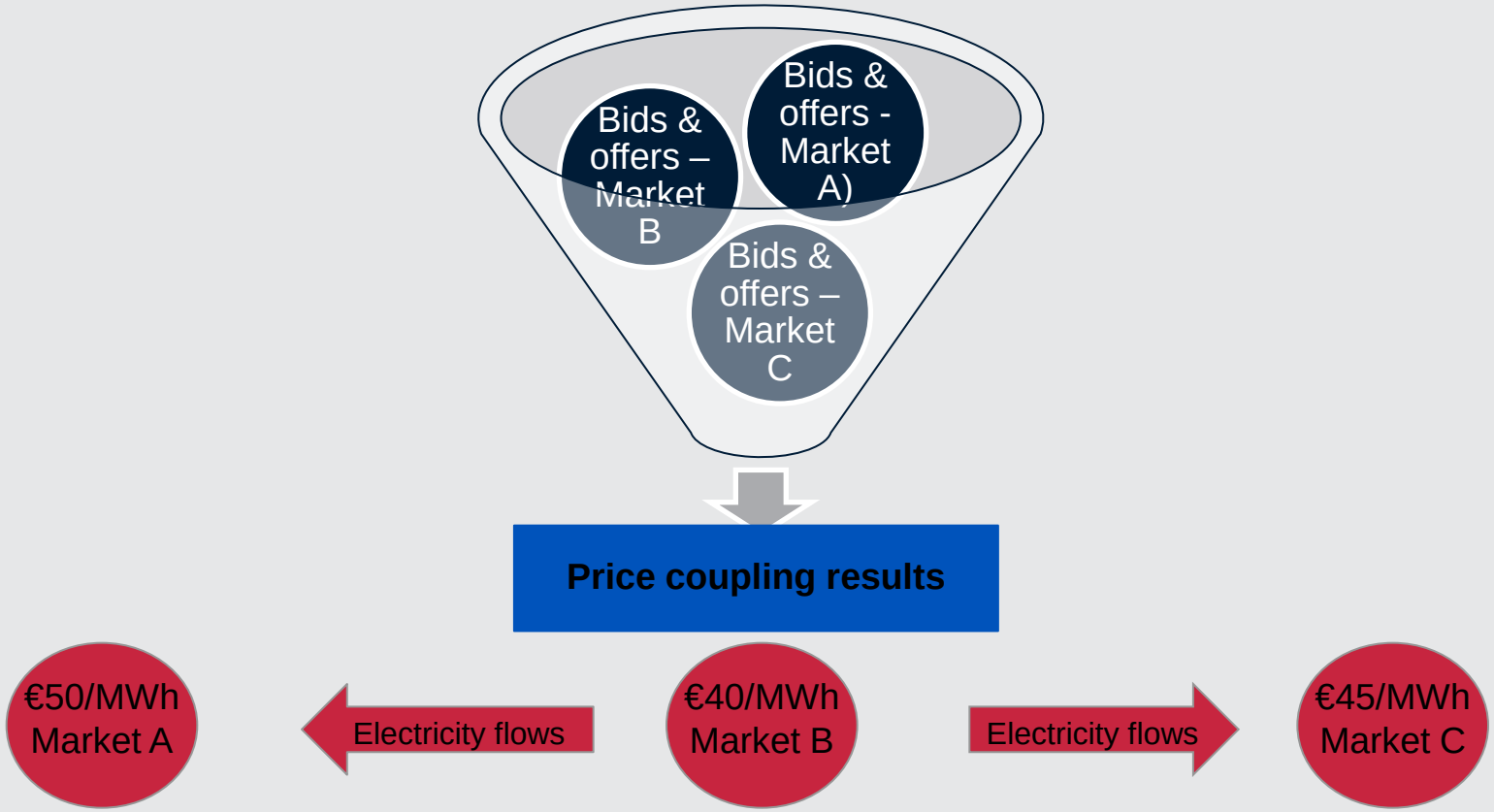
# Day-ahead: Prices and flows determined simultaneously in a one-shot auction

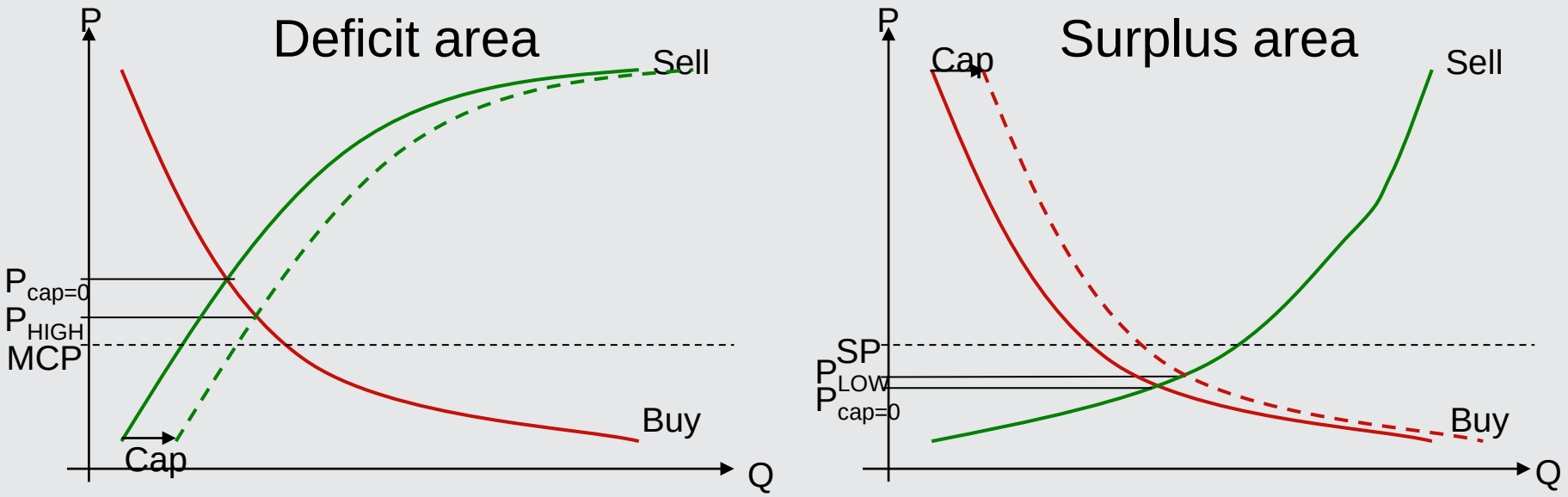


# Area Price Calculation (Market Splitting)

The ATC is added as price-independant orders in both surplus area and deficit area

Results in new balance prices

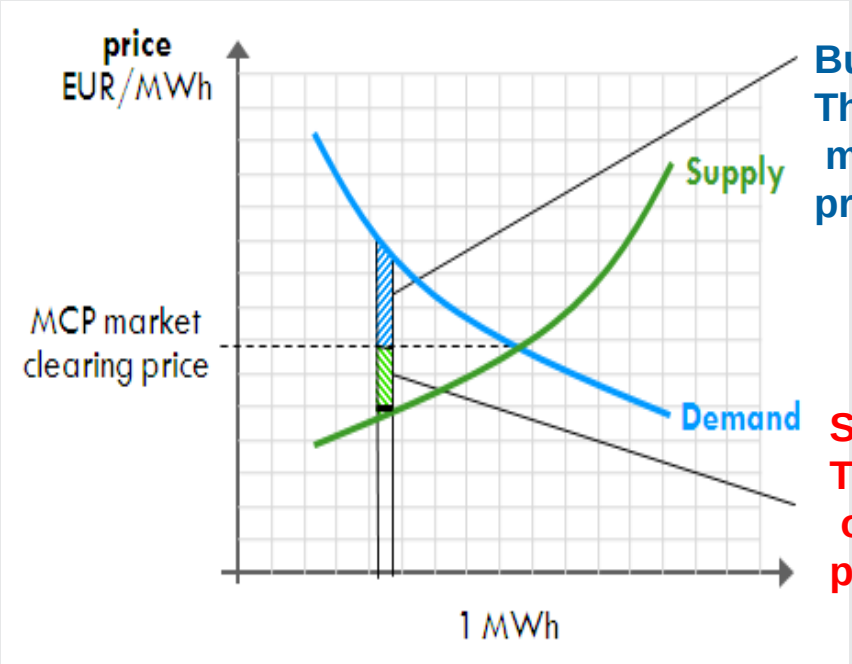
- Surplus area price < System price  Deficit area price > System price




$P_{cap=0}$ →Price in area ATC = 0

# Market Sosioeconomic Welfare Aspect

Both the buyer and seller are settled by the balance price in the intersection between demand and supply
The price formation process is therefore economically effective for society.
The demand side will pay less than the bidding price and the seller will get paid more than the bidding price for the calculated contract volume




**Buyers' gain for this MWh: The difference between the market price and the bid price**

**Sellers' gain for this MWh: The difference between the offer price and the market price**

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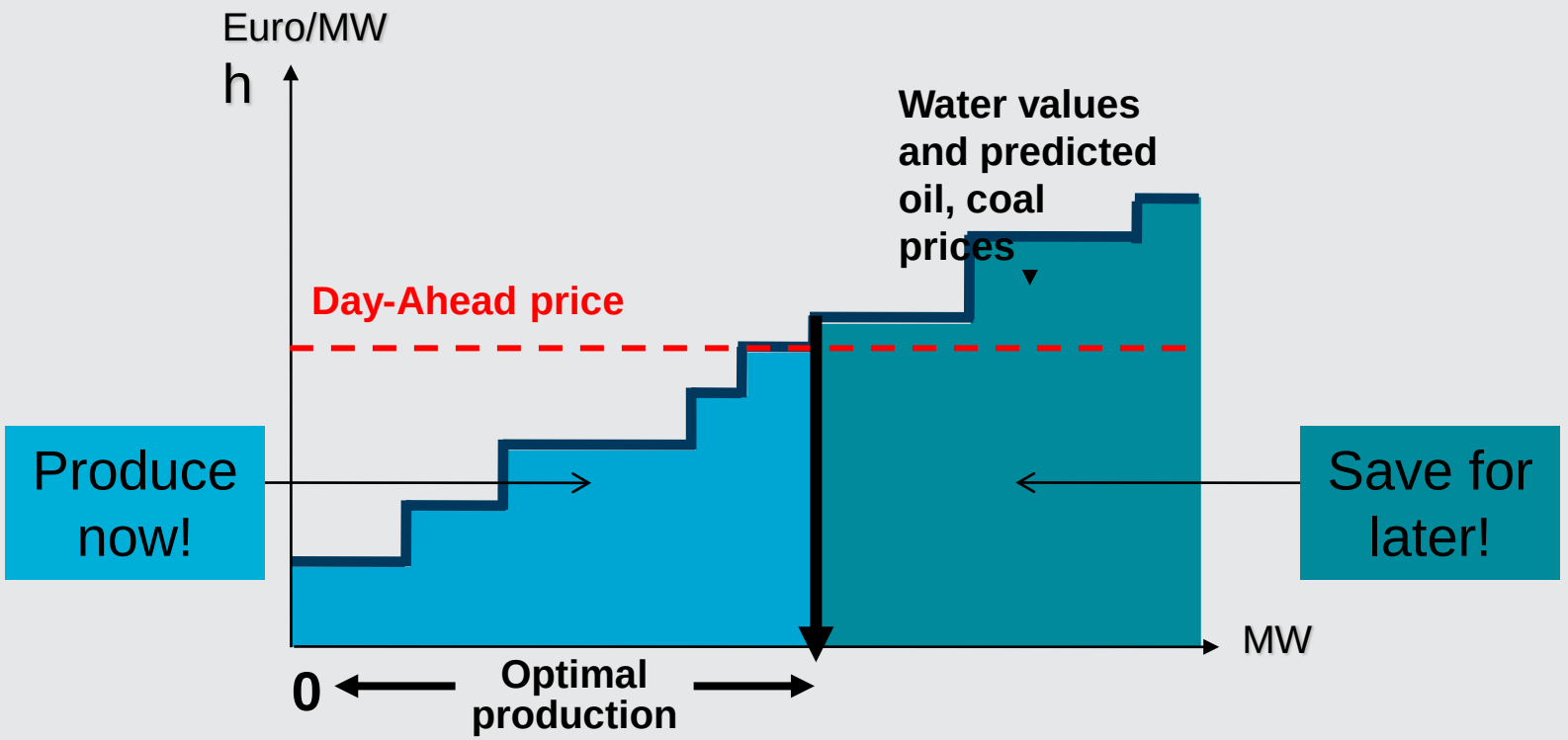
# To Produce or not to Produce




**The fuel value is the opportunity cost of producing now compared with producing in the future?**

# Nord Pool: The Market Operator

Mr. Wilhelm Söderström, Senior Consultant, Nord Pool Consulting

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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

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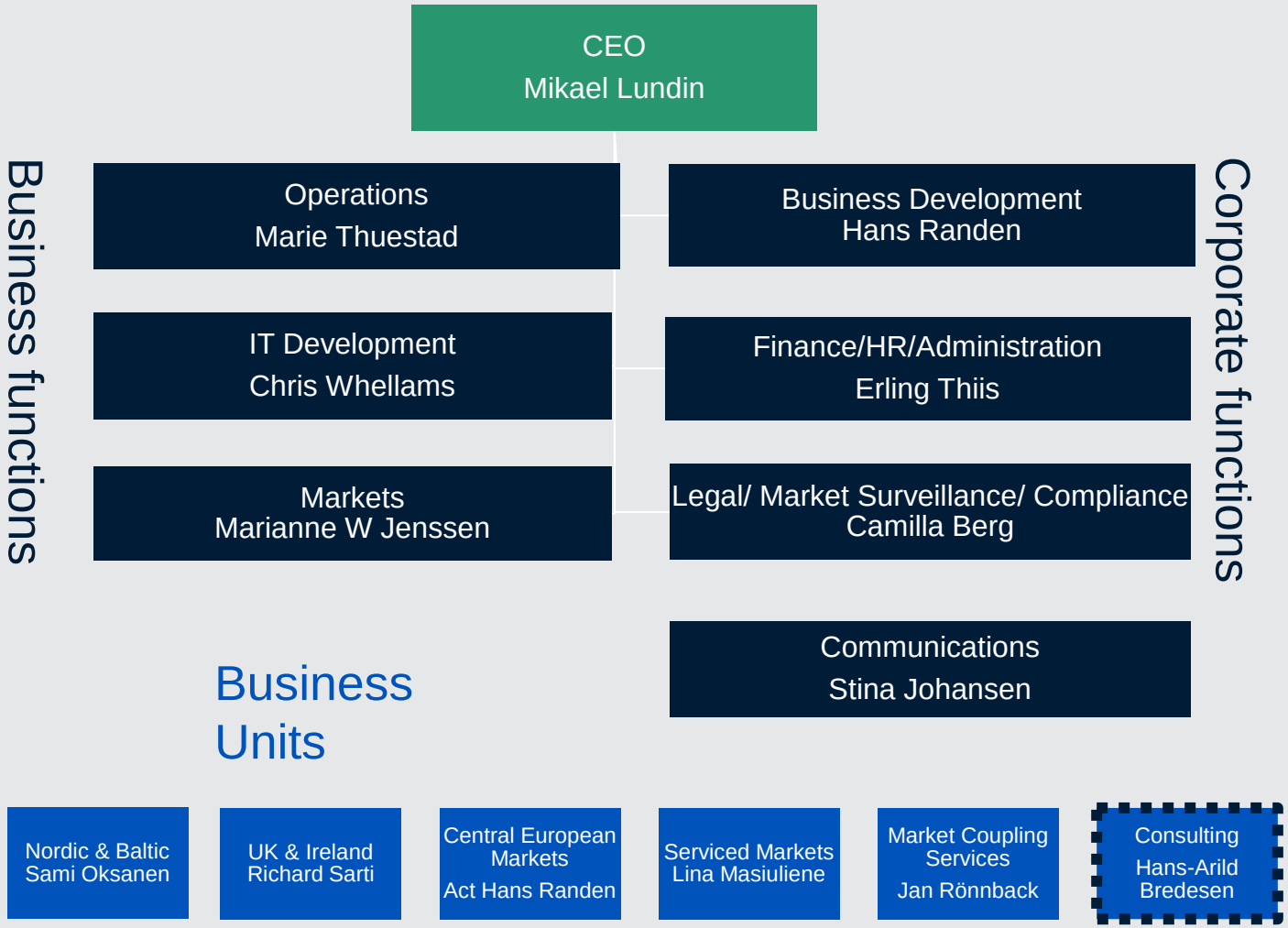
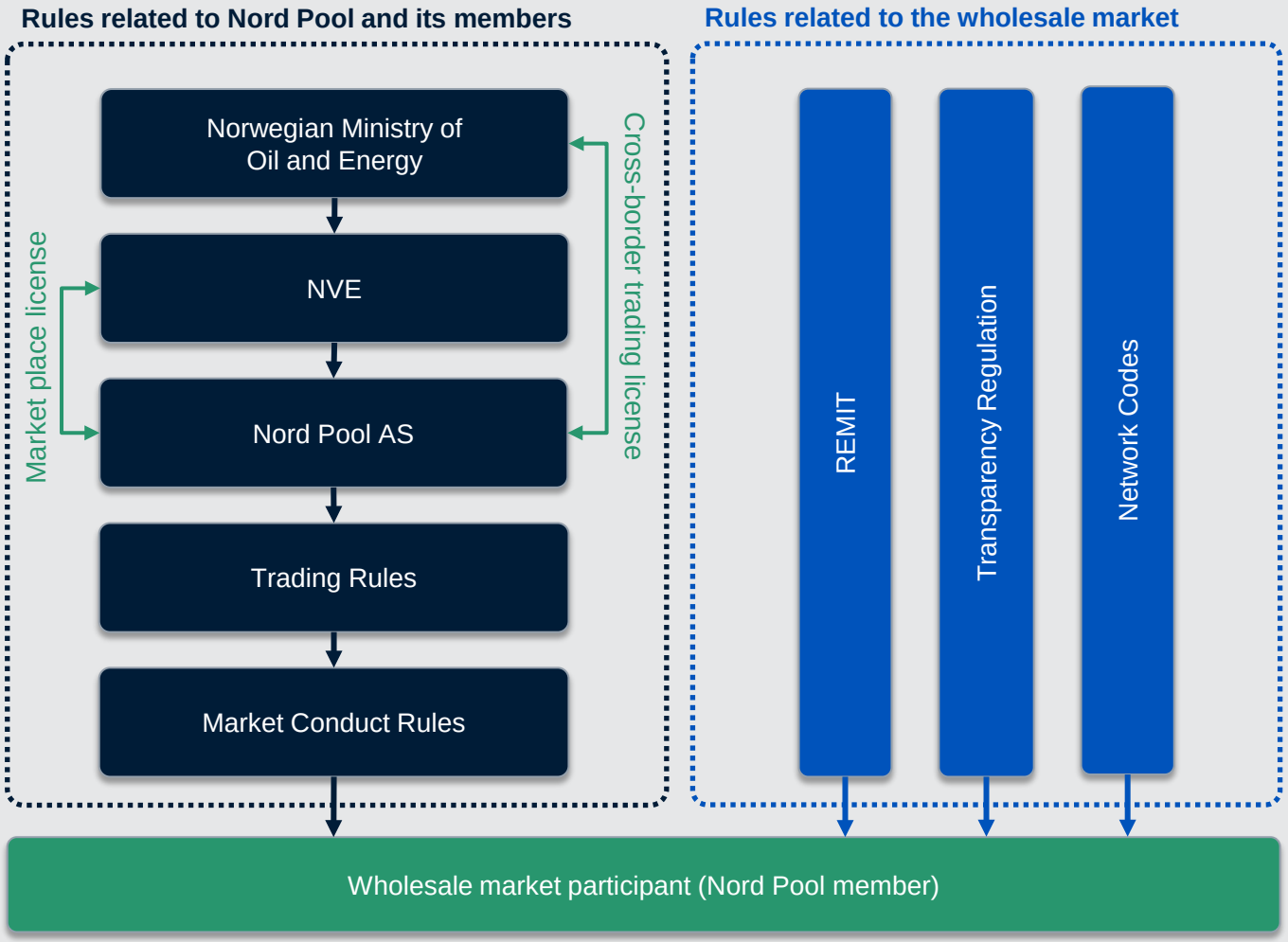
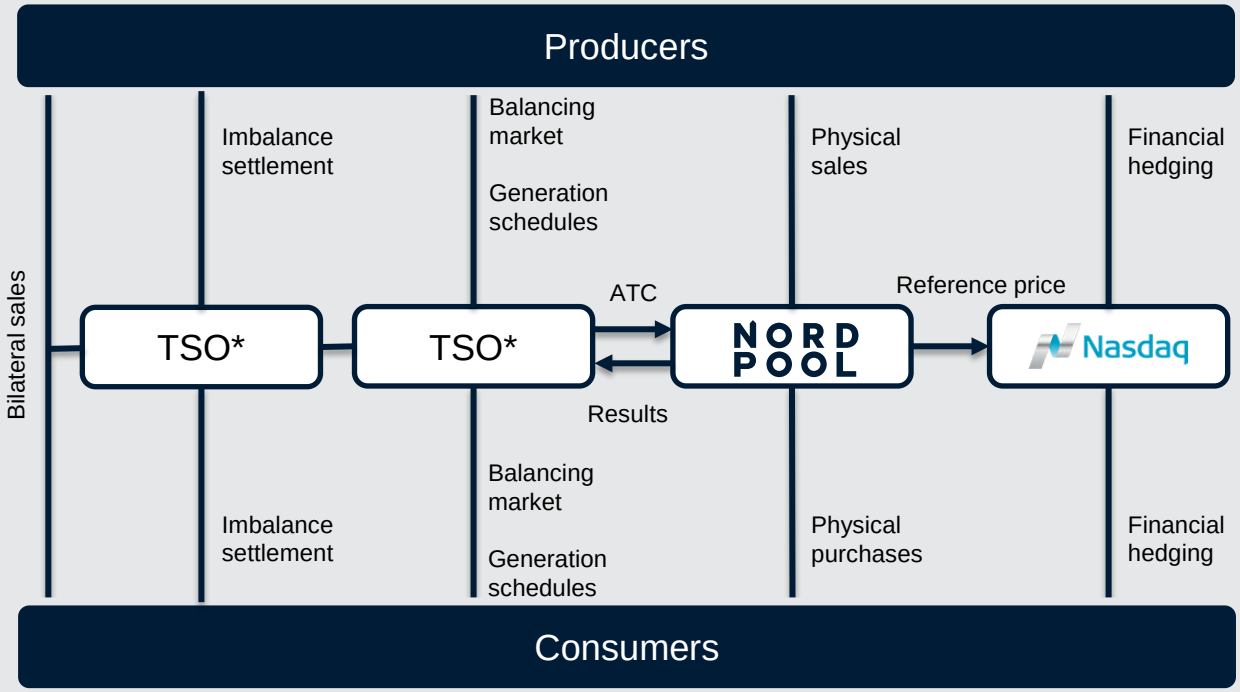
# Nord Pool organization



# Electricity wholesale market regulation



# Roles of different parties in Nordic power market




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

# Day Ahead prices are determined simultaneously across Europe

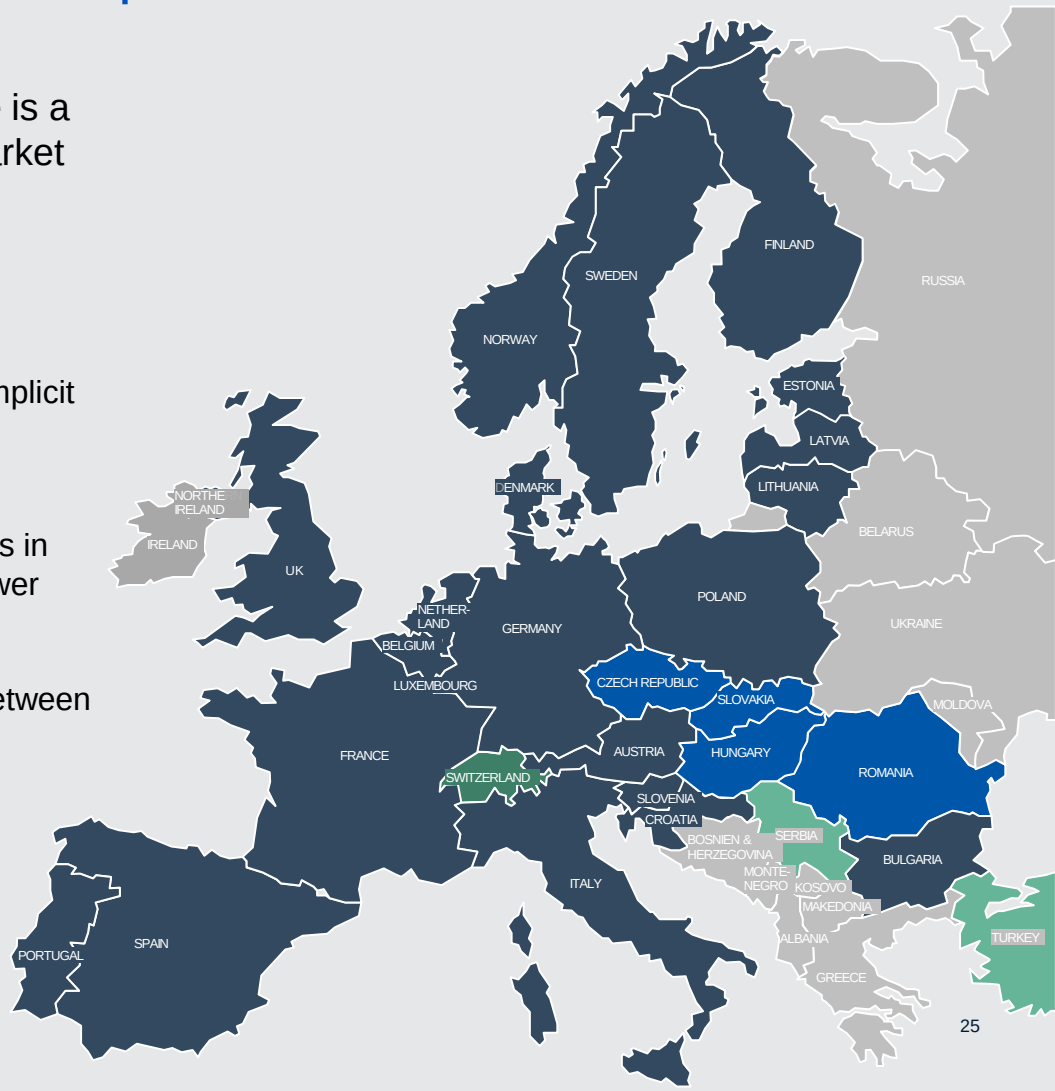
A fair and transparent day-ahead power price is a key factor for the successes of the Nordic market model.

The day-ahead market is an auction for delivery the following day, run every day of the year.

In Europe the Day-ahead price calculation is given implicit cross boarder capacity allocation.

The Price Coupling of Regions (PRC) initiative now enables the coupling of Day Ahead electricity markets in 23 countries representing over 90% of European power consumption.

Optimizes flows on the cross boarder connections between countries and areas.



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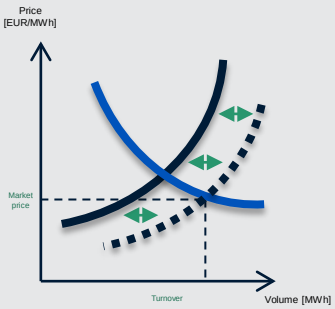
# Day Ahead price formation in practice

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

**SUPPLY**




**DEMAND**

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.)

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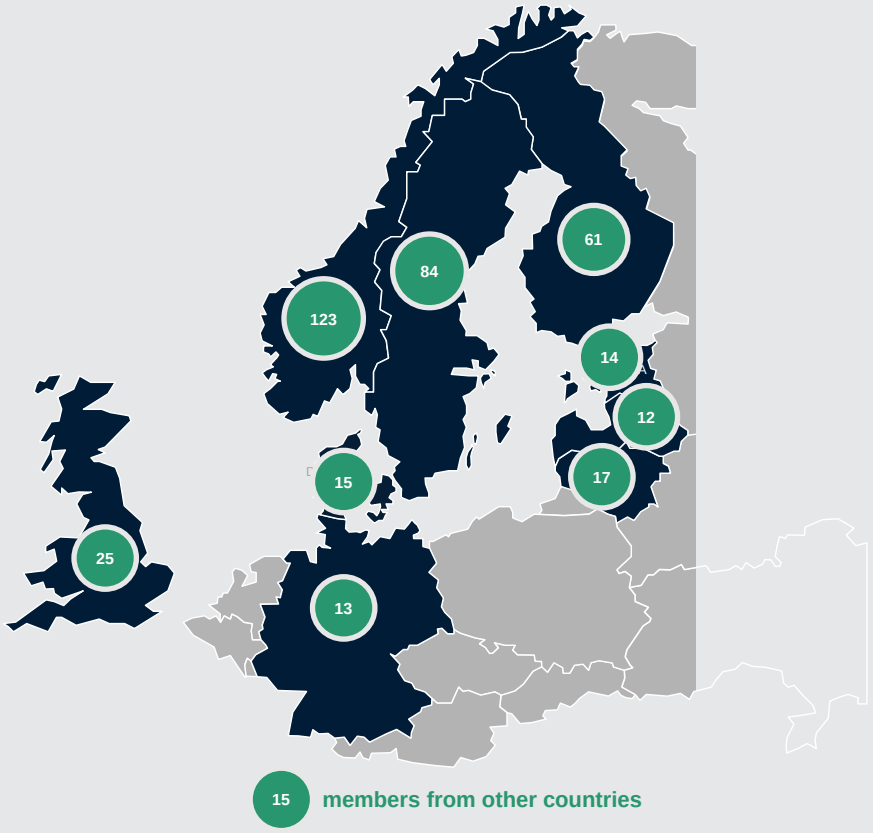
# Nordic and Baltic bidding areas

- Bidding areas are defined by local TSOs and indicates constraints in the transmission systems and ensure that regional market conditions are reflected in the price.
  - Norway 5 areas
  - Sweden 4 areas
  - Finland 1 area
  - Denmark 2 areas
  - Estonia 1 area
  - Latvia 1 area
  - Lithuania 1 area
- Orders on the Day-Ahead market are bidding area-specific:
  - Buying is possible from any area (balancing agreement)
  - Selling is possible only within areas where the trader owns production capacity


Source: Nord Pool website 21th March 2016

# Membership statistics

- Nord Pool has altogether approximately 380 members
- Majority of the members are Clients:
  - Participants: 40% (149)
  - Client representatives: 2% (6)
  - Client: 59% (222)
- Currently 19 different countries represented through members
- High level of versatility in terms of the type of market participants:
  - End consumers, producers, retailers, brokers
  - Starts ups and very large utilities
  - Industrial companies, municipalities, service providers, etc.




Source: Nord Pool 14th March 2016

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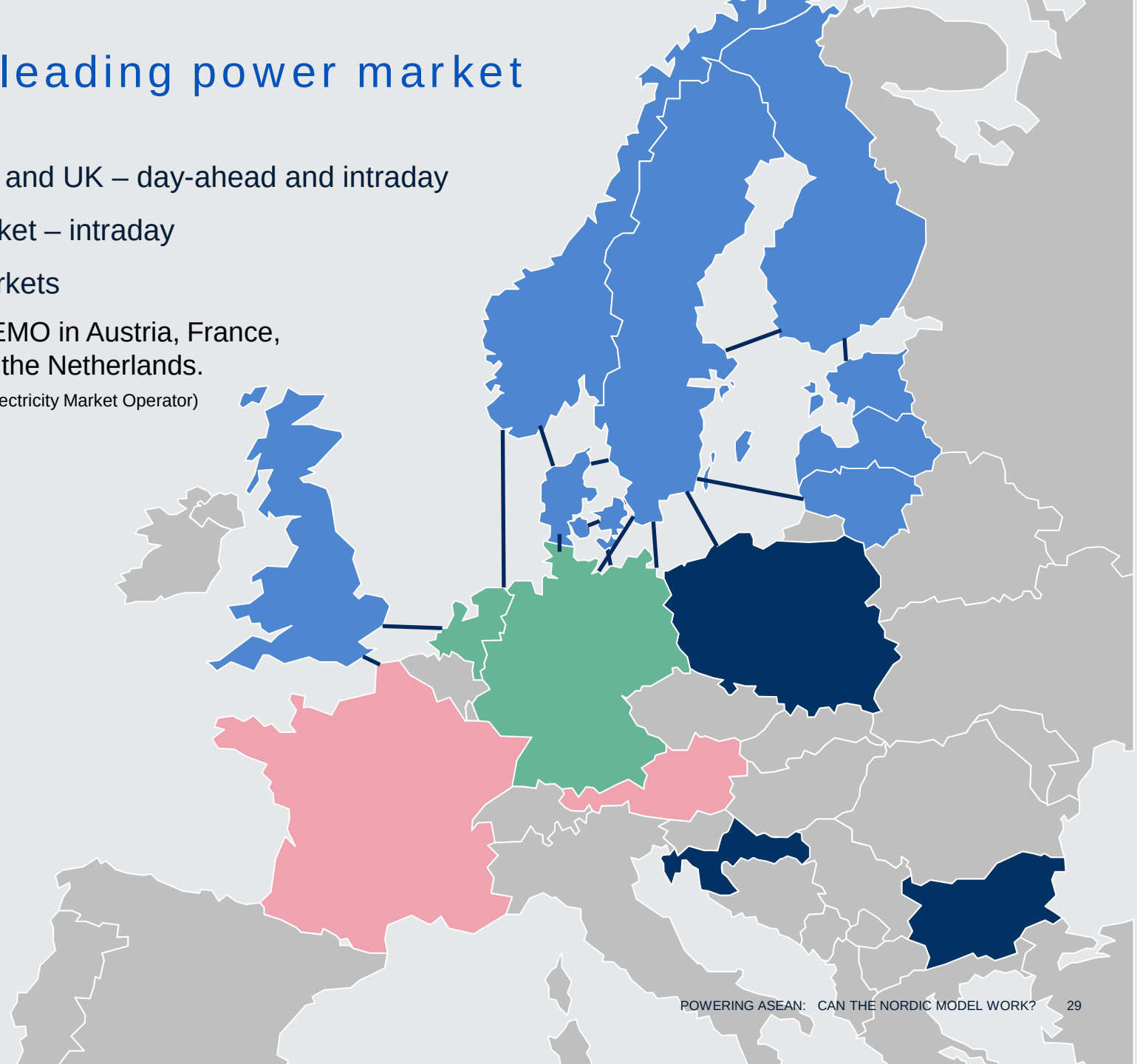
# Europe’s leading power market

- 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)



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# A Simple Bidding Example

Mr. Hans-Arild Bredesen, CEO, Nord Pool Consulting

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# Optimizing the physical portfolio

**For a given hour: Power portfolio content**

- Generator
  G1 = 150 MW-Hydro  Marginal price = 100 USD/MWh
  G2 = 100 MW-Gas  Marginal Price = 150 USD/MWh

- Purchased bilateral contract
  B1 = 50 MW

- Sold bilateral contract
  B1 = 25 MW

- Commitments towards not hourly metered customers
  forecasted load = 50 MW (price independent)

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# Optimizing the physical portfolio

**Power portfolio content**

- Own generation
  G1 = 150 MW
  G2 = 100 MW → use it or not?
- Purchased bilateral contracts
  B1 = 50 MW → consume or sell!
- Sold bilateral contract
  B1 = 25 MW → generate or buy!
- Commitments towards not hourly metered customers
  forecasted load = 50 MW → generate or buy!

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# Optimizing the physical portfolio - how to bid

How do I use the power portfolio content, if the Day-Ahead Market price is zero?

- I don’t use my own generation!
- I purchase as much as I can!

How do I use assets, if the Day Ahead price is at maximum?

- I use my own generation as much as possible!
- I sell as much as possible!

How do I use my assets, if the Day Ahead prices are between zero and maximum?

- I adjust my volumes by following the prices I at least need for my generation

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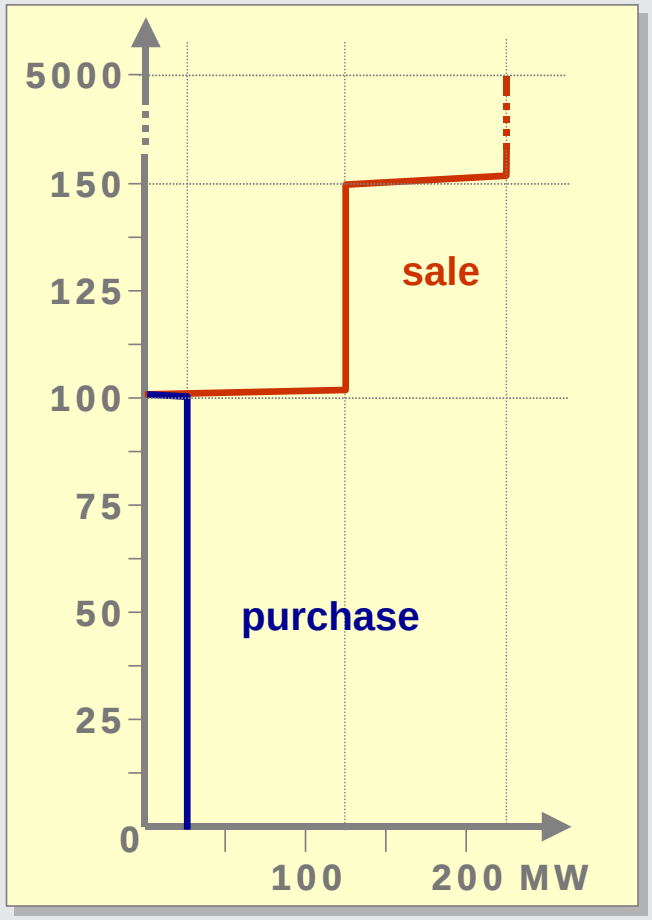
# Optimizing the physical portfolio - answer

**Hour 20:**

**Power portfolio optimization bid**

| price | 0 | 100 | 101 | 150 | 151 | 5000 |
|---|---|---|---|---|---|---|
| Volume | 25 | 25 | -125 | -125 | -225 | -225 |

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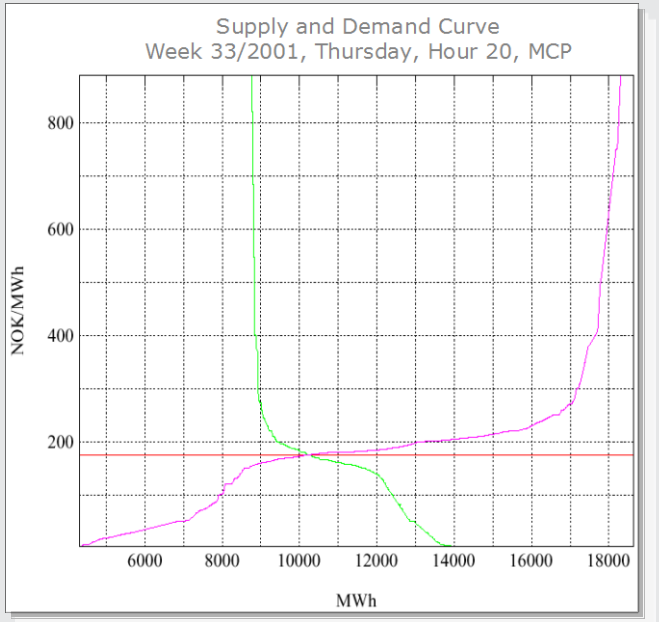
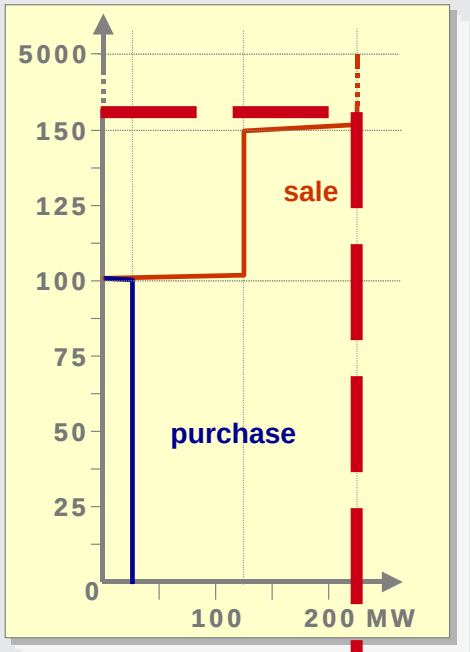
# Optimizing the portfolio - Results




1

2

3

**MCP = 180 USD/MWh**

**Volume = Sale of 225 MWh**

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# Session Three

**What is the Southern African Power Pool?**

# The Southern African Power Pool: A Nordic Model in Africa

Mr. Wilhelm Söderström, Senior Consultant, Nord Pool Consulting

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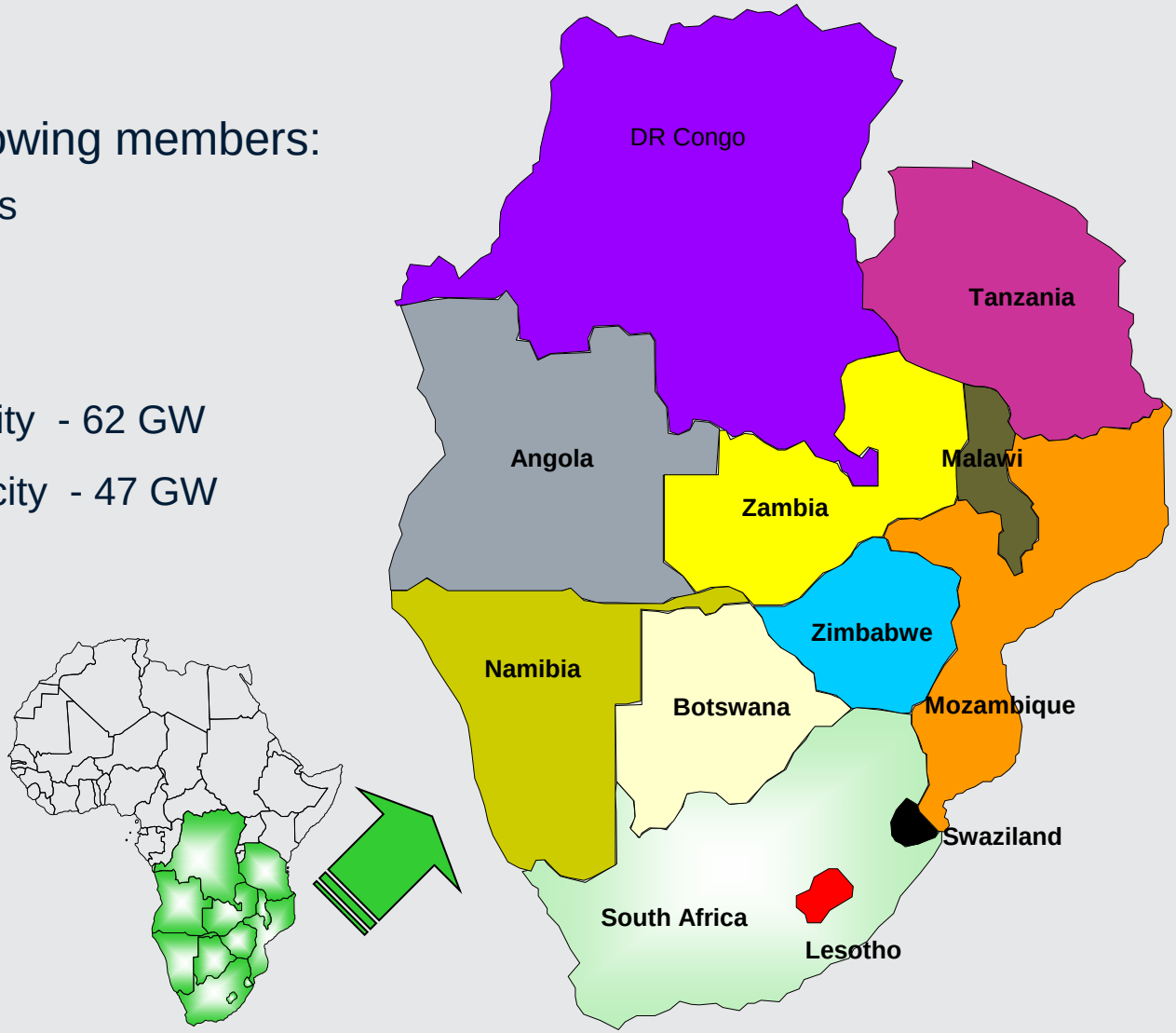
# SAPP Market Area

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

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# 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”**

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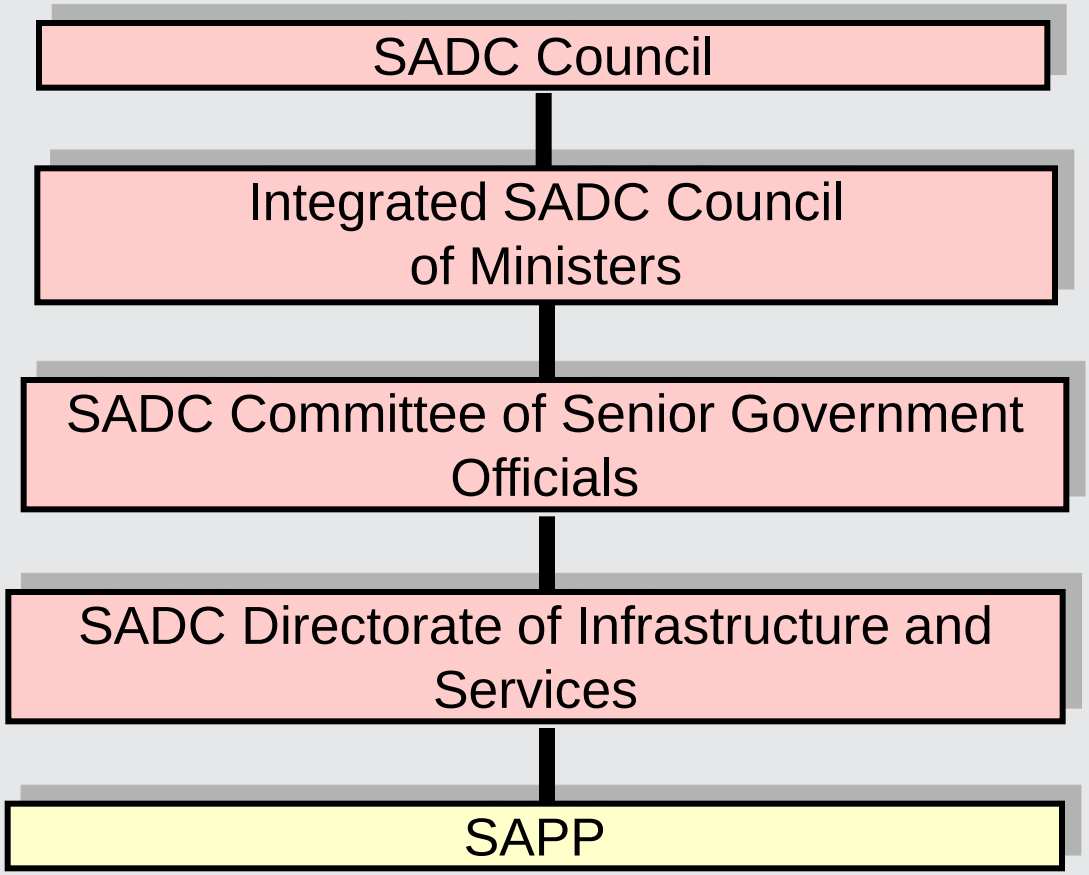
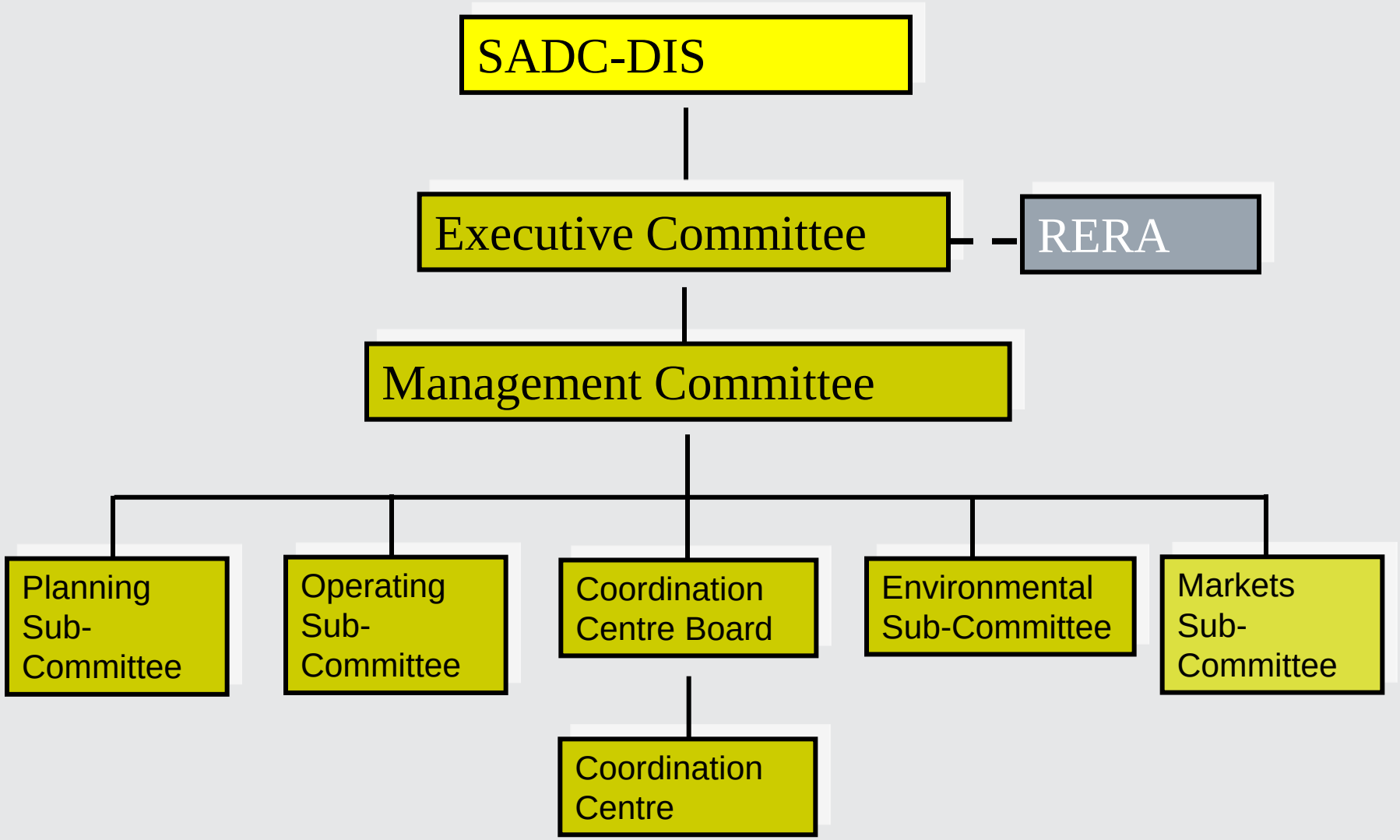
# SAPP reporting structure



# SAPP Governance structure



# SAPP Main governing documents

Inter-Governmental MOU
- Established SAPP and was signed by SADC Member Countries in 1995.
- Revised document signed on 23 February 2006.

Inter-Utility MOU
- Established the Management of SAPP.
- Revised document signed on 25 April 2007.

Agreement Between Operating Members
- Signed by Operating Members.
- Revised document signed May 2008

Operating Guidelines
- Reviewed and approved in 2014.

Market Guidelines (New in the SAPP Hierarchy)
- Developed and approved in 2014

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# SAPP supply situation

| Demand and Supply Balance with Current Peak Demand - 2015 | | | | | | |
|---|---|---|---|---|---|---|
| No. Country | Utility | Installed capacity (MW) | Operating Capacity (MW) | Current Peak Demand (MW) | Peak Demand Plus Reserves | Capacity excess/ shortfall including Reserves |
| Angola | ENE | 2,210 | 1,772 | 1,599 | 1,829 | (57) |
| Botswana | BPC | 892 | 410 | 610 | 698 | (288) |
| DRC | SNEL | 2,442 | 1,066 | 1,381 | 1,580 | (514) |
| Lesotho | LEC | 74 | 70 | 150 | 172 | (102) |
| Malawi | ESCOM | 352 | 351 | 326 | 373 | (22) |
| Mozambique | EDM/HCB | 2,724 | 2,279 | 830 | 949 | 1,330 |
| Namibia | Nampower | 501 | 354 | 629 | 720 | (366) |
| South Africa | Eskom | 46,963 | 36,000 | 37,661 | 43,080 | (7,080) |
| Swaziland | SEC | 70 | 55 | 219 | 251 | (196) |
| Tanzania | TANESCO | 1,380 | 823 | 935 | 1,070 | (247) |
| Zambia | ZESCO/CEC/ LHPC | 2,206 | 2,175 | 2,287 | 2,616 | (441) |
| Zimbabwe | ZESA | 2,045 | 1,555 | 1,589 | 1,818 | (263) |
| TOTAL ALL | | 61,859 | 46,910 | 48,216 | 55,157 | (8,247) |
| TOTAL Operating Members Only | | 57,917 | 43,964 | 45,356 | 51,885 | (7,921) |

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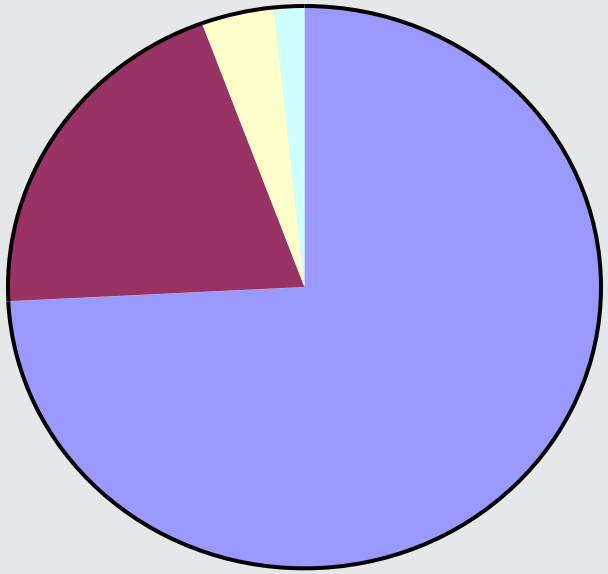
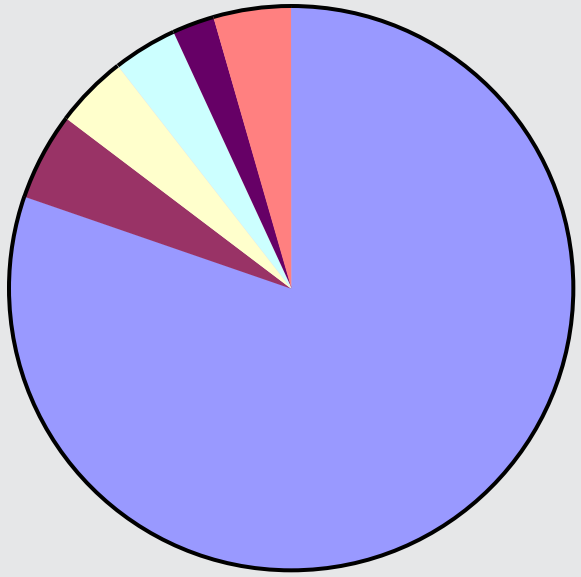
# SAPP Generation mix – is this dominated by S-A?



- 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

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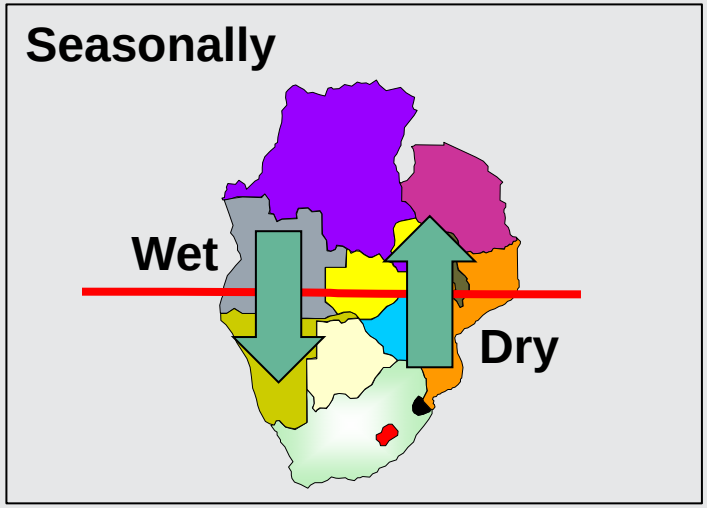
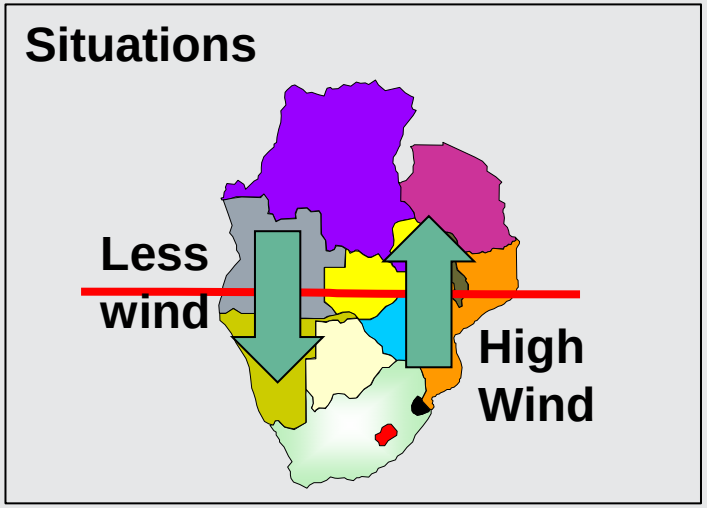
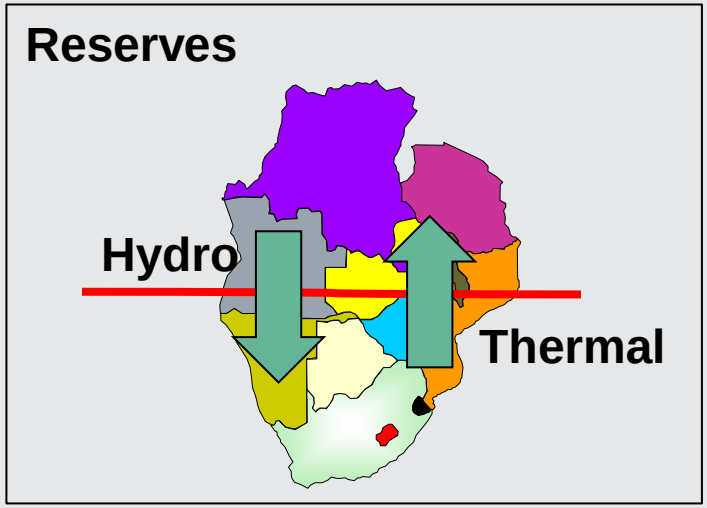
# Utilizing the Value of Differences in a Region




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

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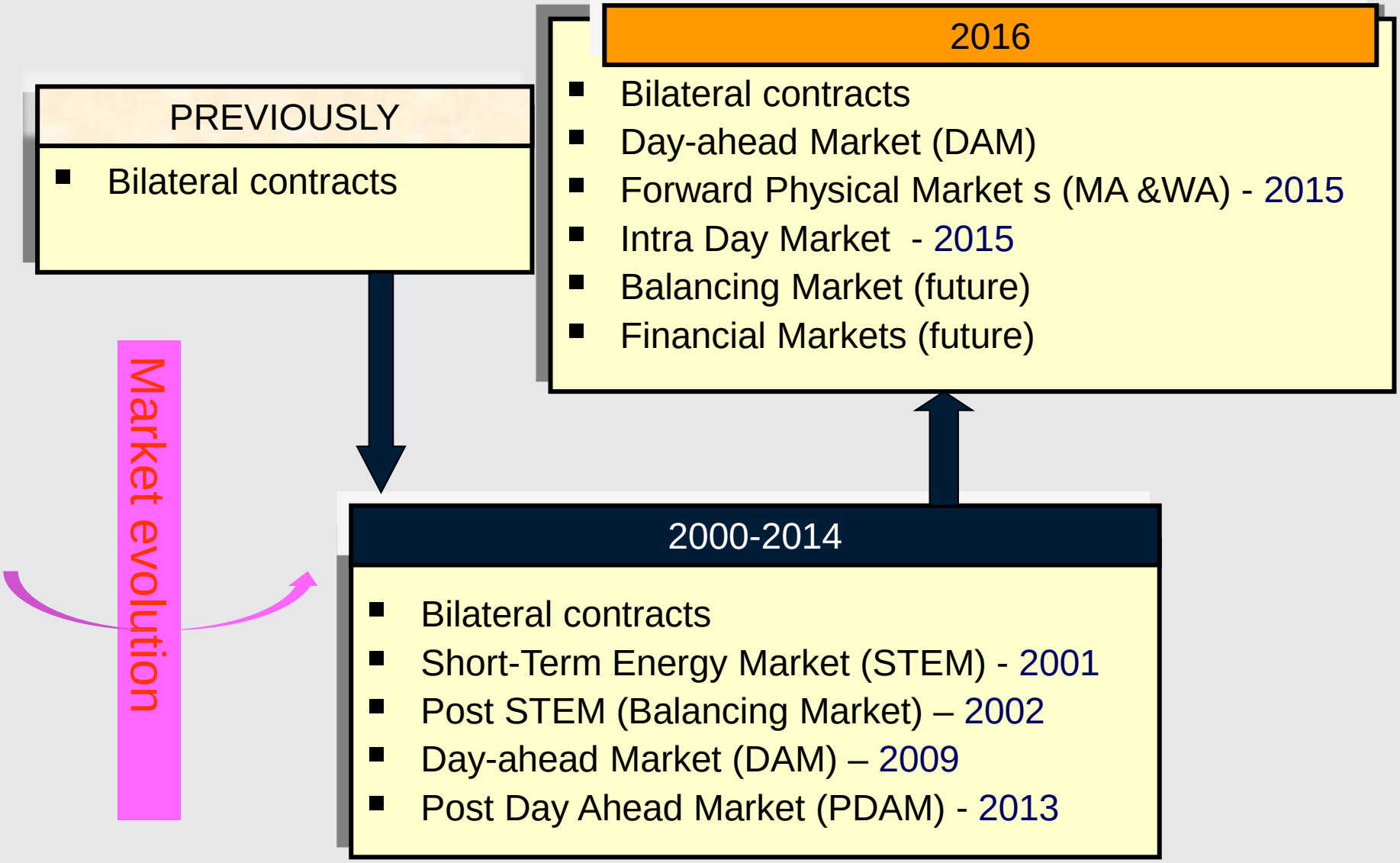
# SAPP Market evolution

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# The African power market development

## Based on **evolution**, not revolution

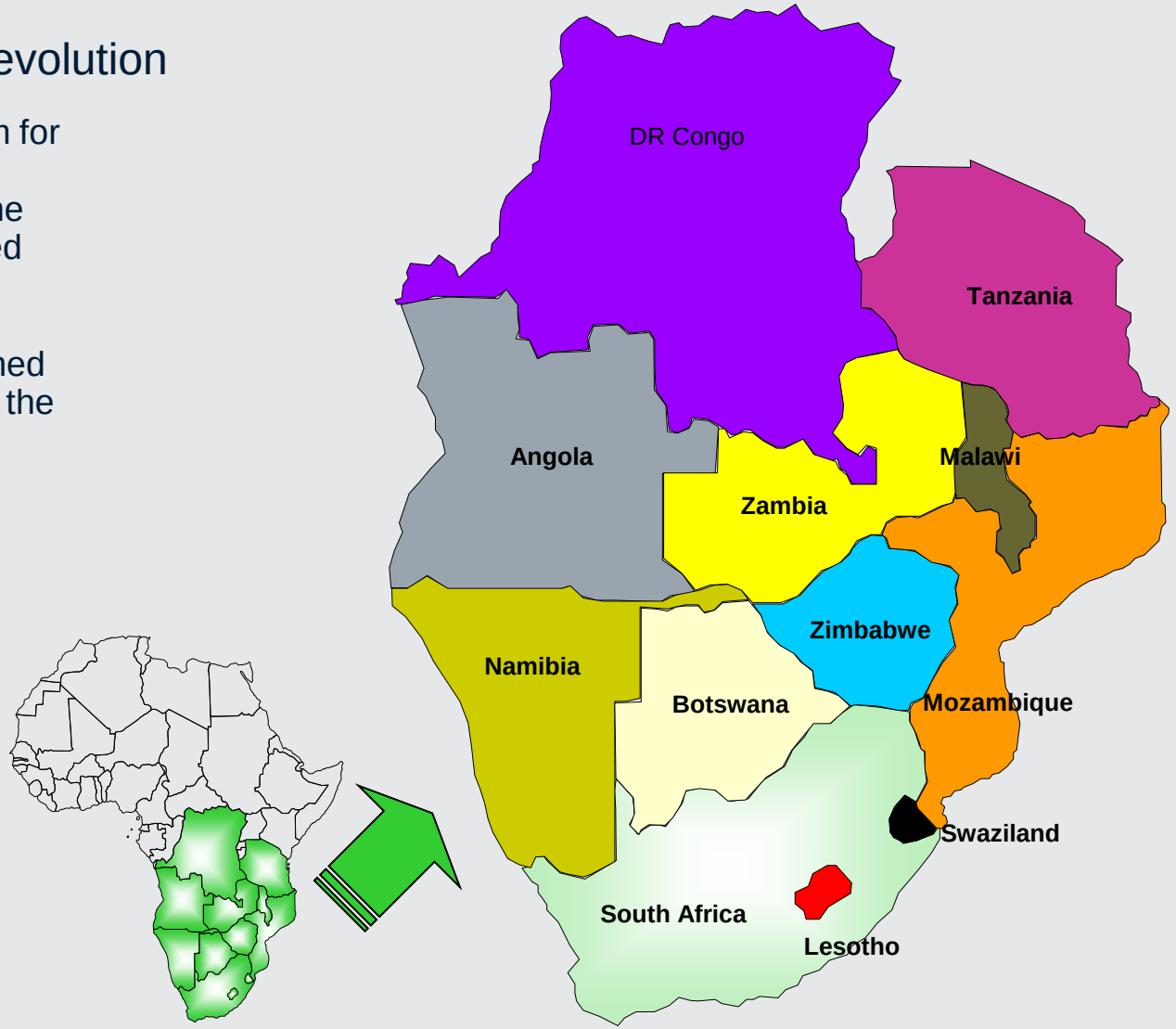
The auction market price algorithm for FPM and DAM is determine the unconstrained system price and the constrained area price for a defined market area.

The IDM market price is the matched price between buyer and seller on the market

Based on international experience applied for the SADC region

Stepwise implementation

- Develop new markets when ready

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# SAPP Market concept

## Southern African Power Pool

### FPM

Forward Physical contracts

Weekly and monthly
- auction trading -
**Forwards**
Week – peak load
Week – off-peak
Week – weekend

Monthly baseload

### DAM

Physical Contracts
Market equilibrium
one day ahead
- auction trade -


### IDM

Physical contracts
hours ahead
- cont. trade -

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

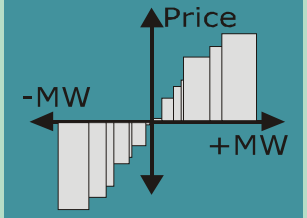
### SAPP Settlement and financial management

**Settlement of all physical contracts** **Settlement of wheeling and losses**
**Market monitoring and reporting**

## National TSOs

### Balancing Power Single buyer

National markets




Balancing generation and consumption in realtime

### System Operation

Real-Time Operation

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

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# The Southern African Pool: Does it Work?

Mr. Hans-Arild Bredesen, CEO, Nord Pool Consulting

NORD POOL

# Power to the people

## THE ADVENTURE IN AFRICA – ESTABLISHING A POWER MARKET FOR SOUTHERN AFRICAN POWER POOL

THE SOUTHERN AFRICAN POWER POOL (SAPP) was created on 28 August 1995, with the primary aim of providing reliable and economical electricity supply to consumers in each of the SAPP member countries, consistent with reasonable utilisation of natural resources and minimised negative impact on the environment.

Cooperation in the electricity sector is not a new phenomenon in the Southern African region; it has taken place at policy, planning and operational levels and involved governments, power utilities and financial agencies over a period of several decades. To formalise this cooperation, several of the utilities in the region came together to create SAPP. The members of SAPP have undertaken to create a common market for electricity in the Southern African region, the Southern African Development Community (SADC), and to let their customers benefit from the advantages associated with this market.

All utilities participating in SAPP have equal rights and obligations, and have agreed to act in solidarity without taking advantage of one another. Members have undertaken to share information and knowledge and to be politically neutral. The SAPP cooperation includes development, common planning and system operation.

The cooperation with the power industry in Southern Africa started with Nord Pool Consulting's involvement in 2004. Nordic authorities were involved in the project, with SAPP getting financial assistance from NORAD and SIDA.



*Working in Africa involves other obstacles than the Nordics were accustomed to*

**FACTS**

SAPP's Day-ahead market comprised the following countries: The Democratic Republic of Congo, Angola, Tanzania, Malawi, Mozambique, Zambia, Zimbabwe, Namibia, Botswana, Swaziland, Lesotho and South Africa – a total land area of 10 million square kilometres and a population of approx. 220 million people. Nine of the countries are electrically linked; only Angola, Tanzania and Malawi are not connected to the southern power network in Africa.



*The signing of the IT supply contract with SAPP in Harare*

With its experience from supplying similar systems in Europe, it was natural for Nord Pool to be interested in the project. The trading system Sapri was at the time being used in the Nordic, German and French power markets. The system was well tested, and SAPP's functional market requirements for the system supply were also based on the Nordic model. Nord Pool was accepted as a possible supplier in competition with a South African IT company, which had also shown an interest in the project.

Enerweb was a small company closely linked to system supplies for Eskom, which is the system operator in South Africa with the largest influence on the power industry in the region. Nord Pool made a strategic decision that it would be a good idea to cooperate with Enerweb. A system supply to Africa with good local anchoring was important for all parties involved – also for NORAD (The Norwegian Agency for Development Cooperation) and SIDA (Swedish International Development Cooperation Agency) as sponsors of the project. In January 2005, two hopeful employees from Nord Pool travelled to Johannesburg to meet Enerweb's management. A solution that included cooperation and the use of local resources was accepted by SAPP, with Nord Pool and Enerweb being invited to give a 'live' demonstration of Sapri's system to the SAPP executive committee in Victoria Falls in February. This was a challenge, since the Sapri system was installed on the Unix operative system, and the smallest server was relatively large com-



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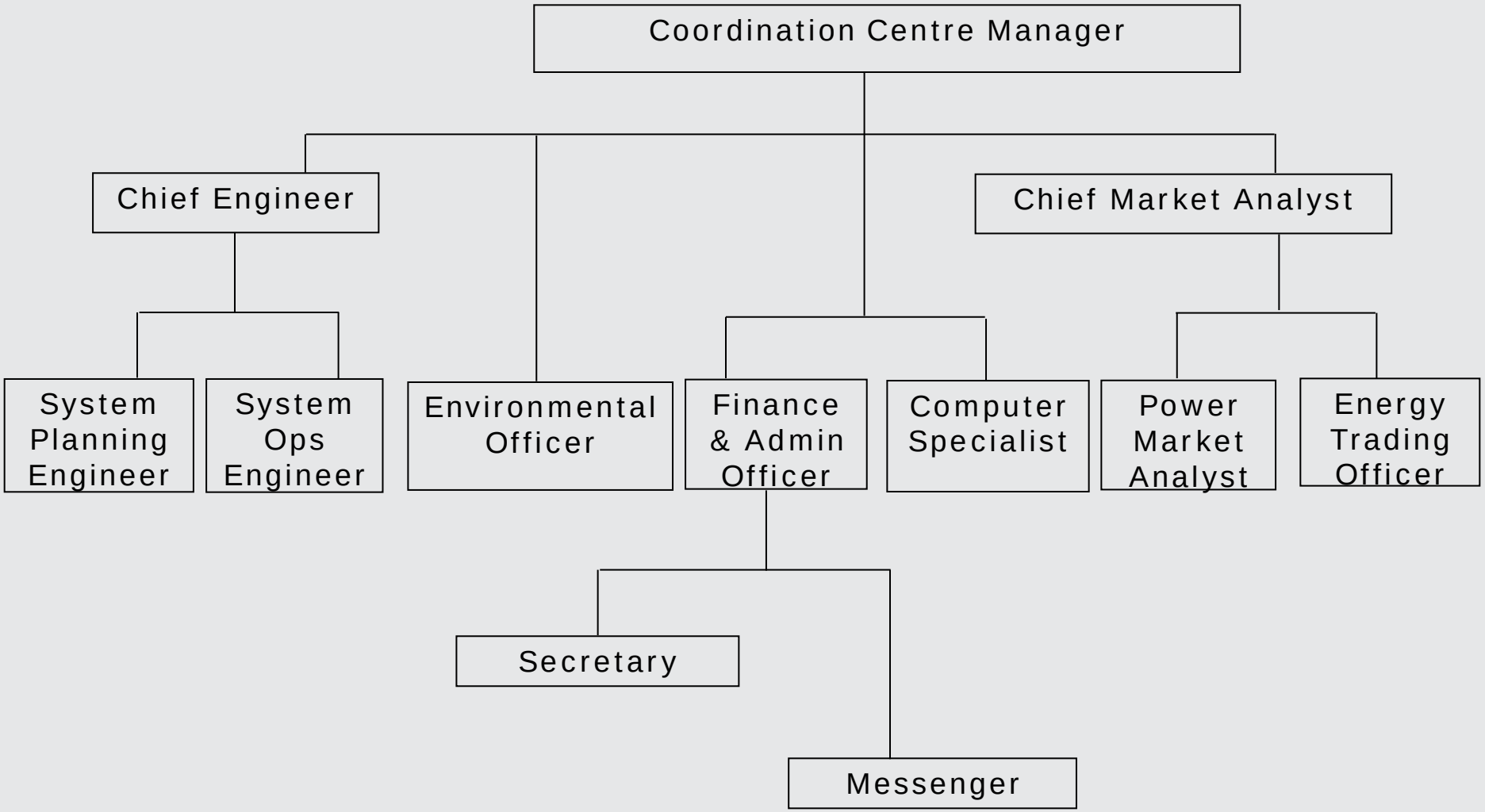
# SAPP organisation



# 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**

| Long term (Bilaterals & Forwards) | Short term (DAM) | Intraday/ PDAM | Operations |
|---|---|---|---|
| Challenge:<br>- Bilateral contracts<br>- Transmission capacity management | Challenge:<br>- Liquidity<br>- Transmission capacity management | Challenge:<br>- New requirement<br>- How to attract participation? | - Managed by TSOs<br>- New opportunities? |

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

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# 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.***

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# SAPP Market concept

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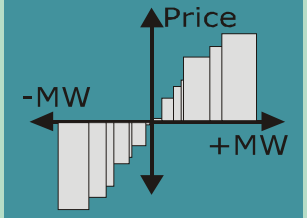


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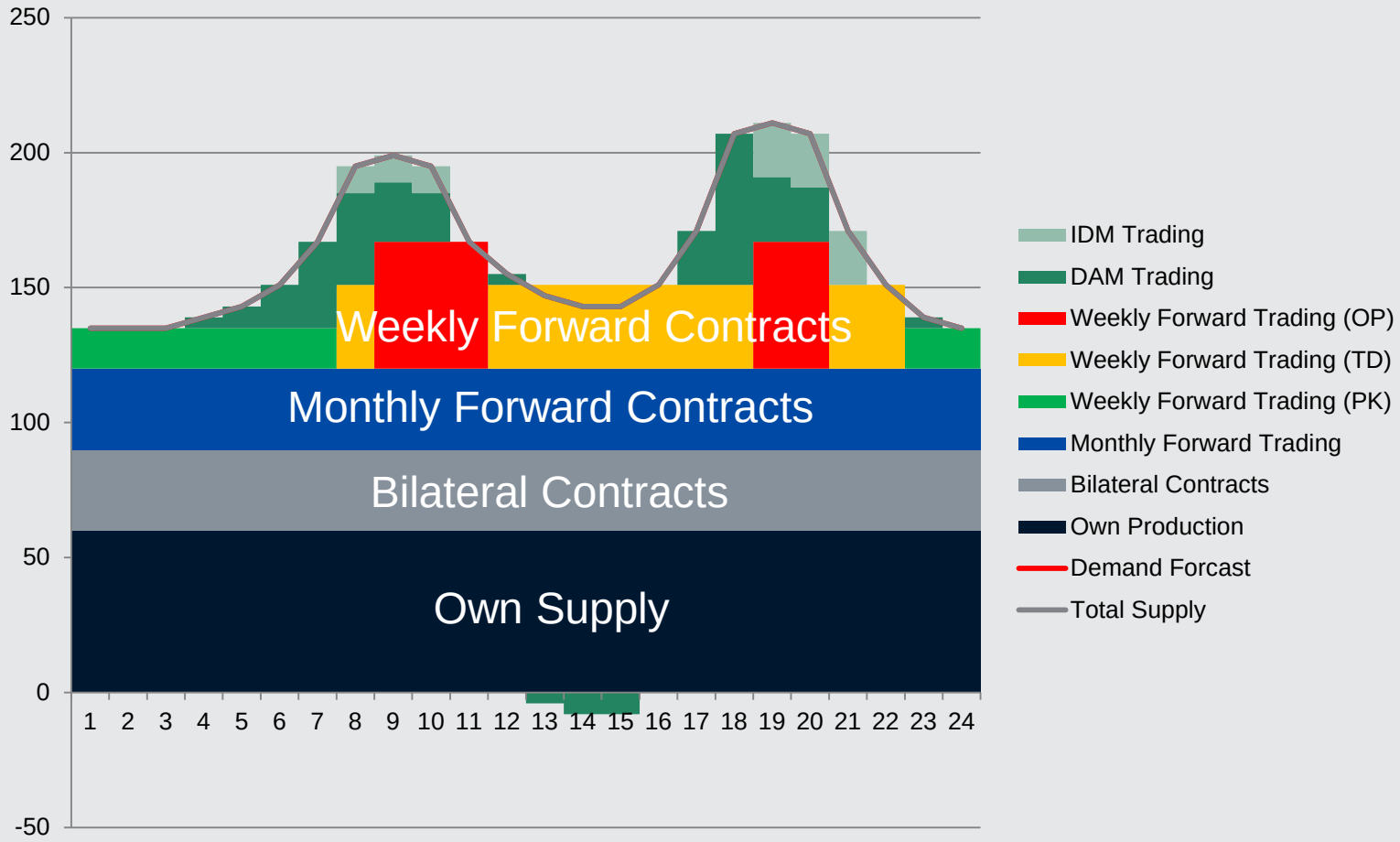
# Role of Different Markets in Supply

## Balancing on the Day – Hourly Contracts

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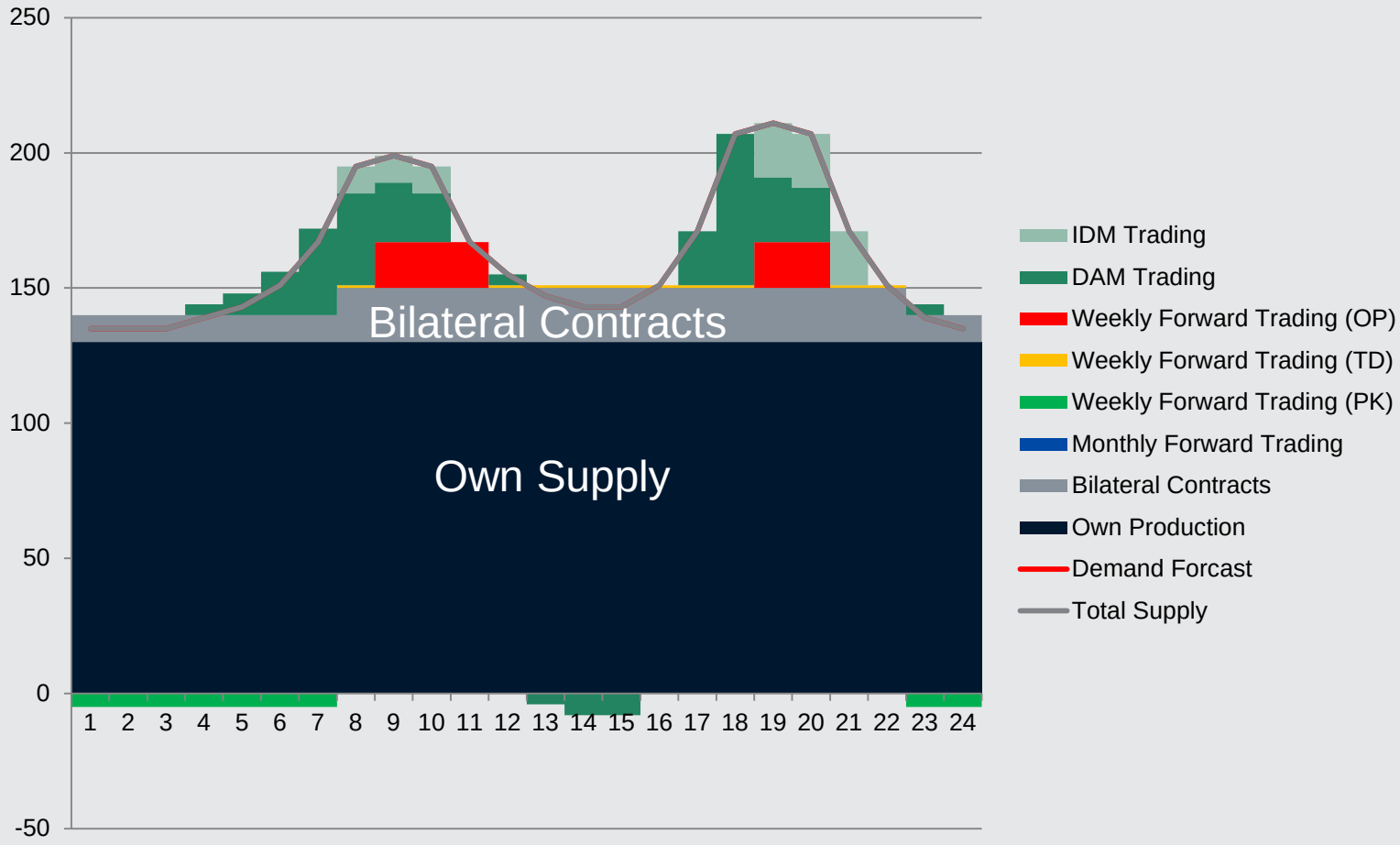
# A real example –with regulatory limitation

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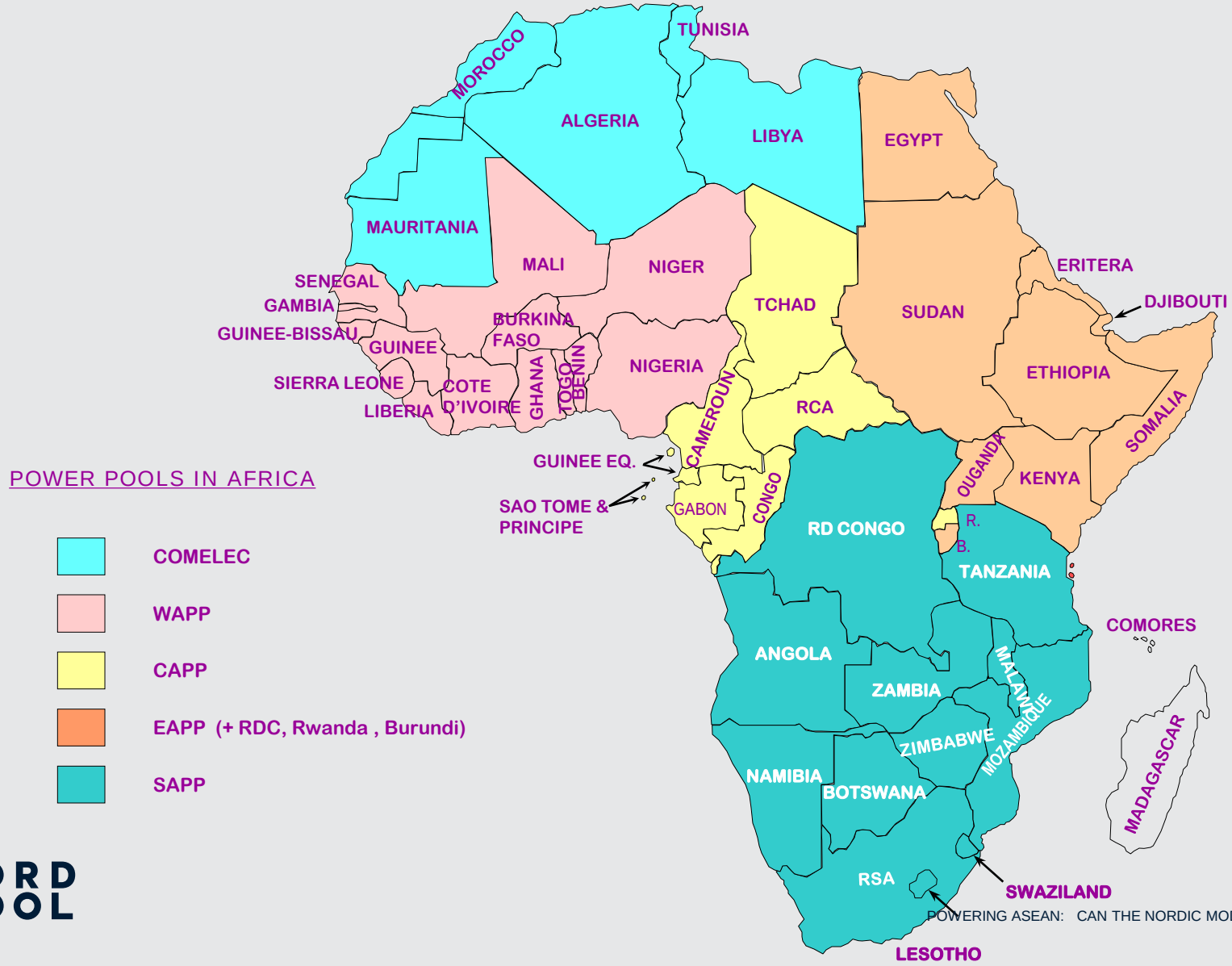
# Vision is to have an African market!

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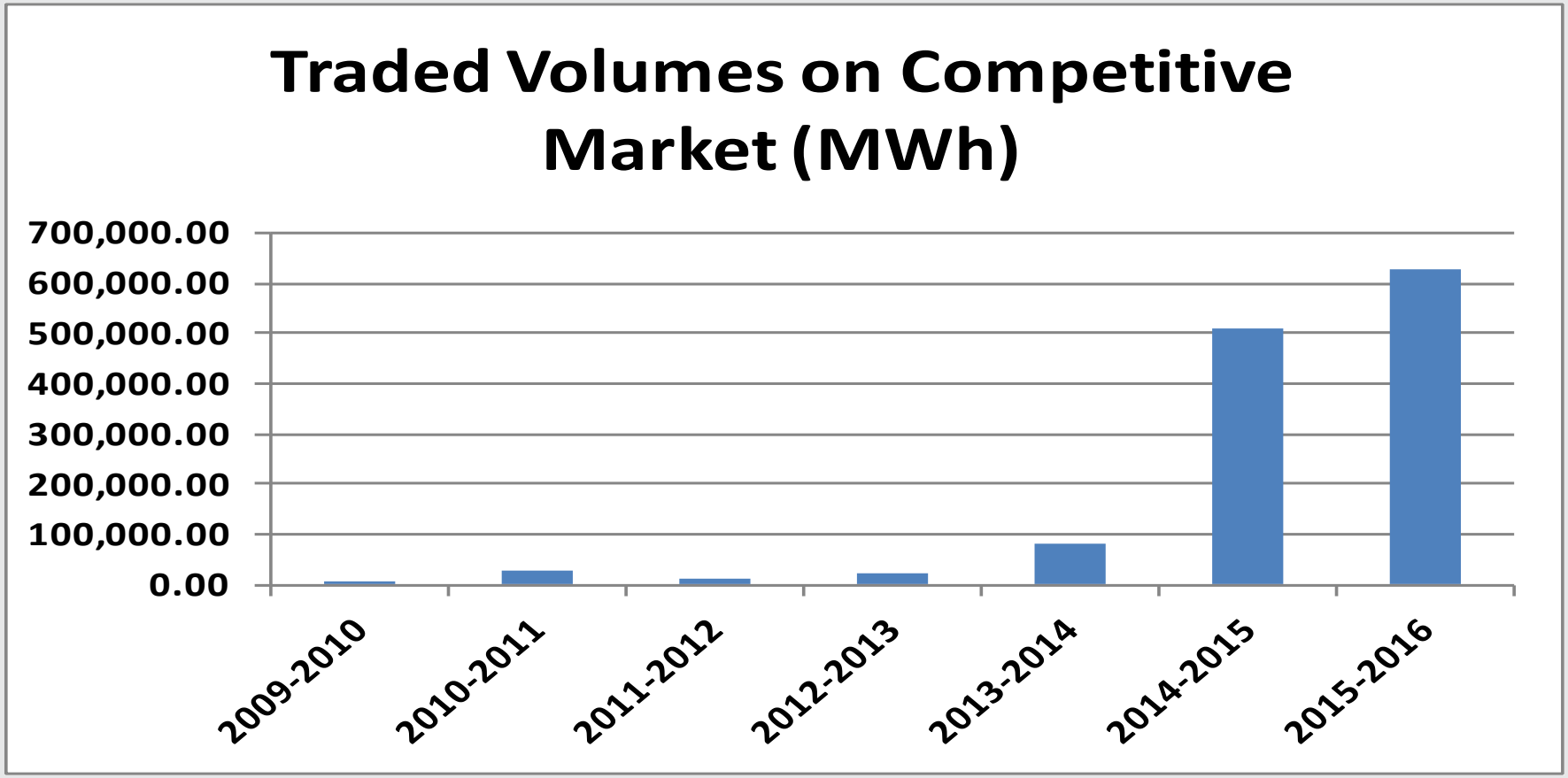
# Market Performance – Competitive Market




- 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

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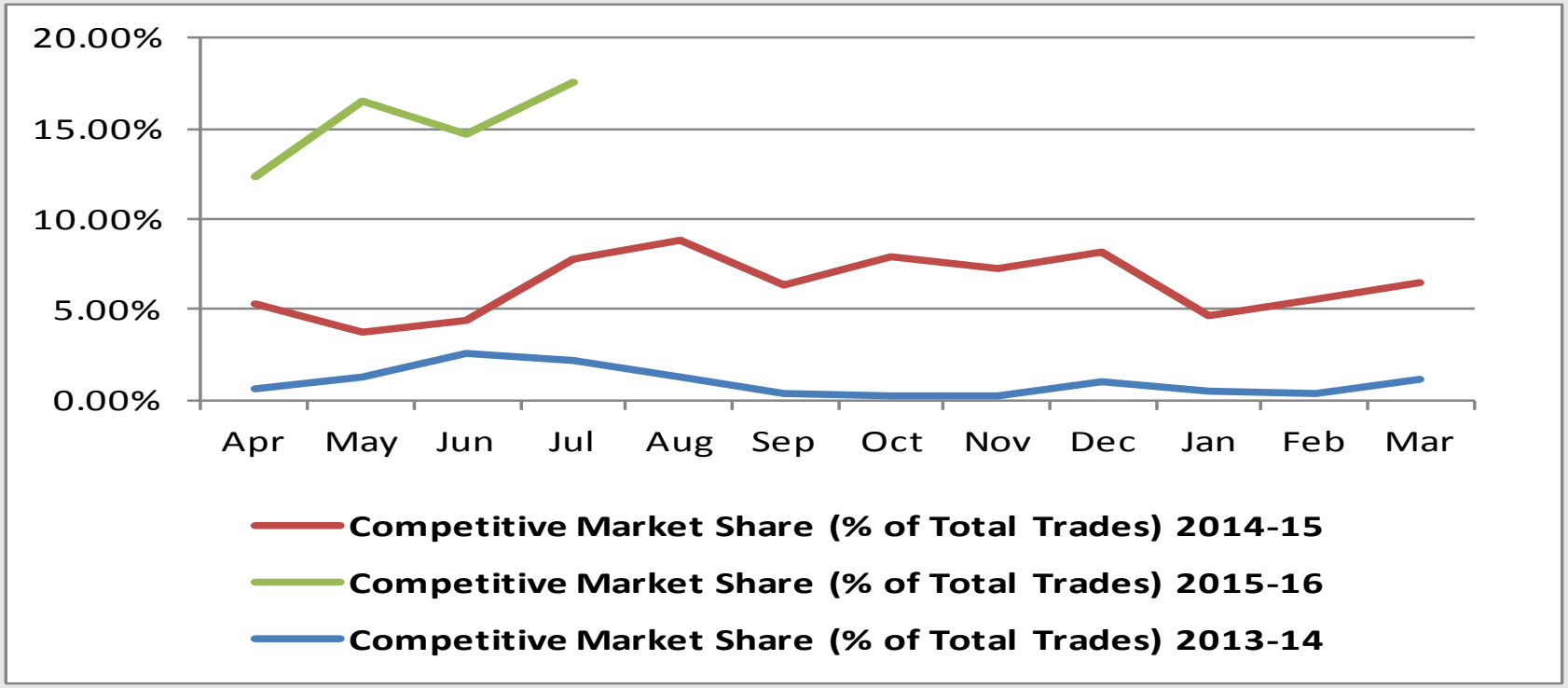
# Competitive Market – Market Share




- Competitive market share averages 15% so far for 2015-16
  - ✓ Target is to achieve an average of at least 10% in 2015
- 2013-14 & 2014-15 achieved averages of 1% and 6% respectively.

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# 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

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# 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.

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# Session Five

**Initial Steps towards an ASEAN Electricity Exchange (AEE)**

# Three Phases for the Creation of an ASEAN Electricity Exchange (AEE)

Mr. Hans-Arild Bredesen, CEO, Nord Pool Consulting

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# Three main phases – Staged approach

A clear recommendation is a staged approach to divide the project into three main phases:

- Feasibility phase
  - Ensure the feasibility of recommended *ASEAN Electricity Exchange (AEE) Feasibility Study* to inform a decision to start the detailed design and development of the market.
- Design phase
  - Contains all the preparatory tasks required to implement the market like e.g. required local and regional regulations, market rules, design of the power exchange organisation
- Implementation phase
  - where the implementation of the detailed design is put into force and the end is a market that is up and running.

Each phase will end up in a clear decision point – where the parties in the project can decide to continue or adapt the direction.

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# Feasibility phase – high level objective

This is a common phase allowing all parties to explore and understand the options and potential regional market designs applicable for ASEAN.

This phase shall be limited in both time and cost, but at the same time be extensive enough to inform the decision of starting with detailed design and implementations.

This phase will include three main tasks:

- Investigation and information gathering (e.g., requirements, regulatory framework, international experiences)
- Common workshops/meetings discussing the fundamentals of the potential market framework and agreeing on the main outcome of the feasibility phase
- Formulate the main recommendations in a report to be presented to the decision makers – *the AEE Feasibility Study*

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# Design phase – high level objective

This phase will have to consider various tasks like:

- Detailed product offerings
- Definition of the legal and regulatory framework for the market
- Development of the requirement for the AEE organization
- Development of a capacity building program
- Development of the required market rules for the regional market
- Creation of a detailed business case for the market

This is a phase that also could be divided into two stages;

- The fundamental part of the market design covering at least the three first bullet points above plus an indicative business case.
- Second part would cover the remaining bullet points

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# Implementation phase – parallel with Design phase

The implementation phase might start before the detailed design phase is finished, typically where there is a decision point in the middle of the design phase

The main reasons would be:

- To get the work on licenses and the process towards the regulatory authorities and other stakeholders.
- Verify and quality-assure the business case before making any long-term commitments (or investments).
- Hiring required resources for the AEE either internal or external

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# Implementation phase – High level objectives

This phase will contain the all tasks required to implement the market. This will included the following:

- Implementation of the power exchange organization including hiring the required staff, location for the market operator etc.
- Creation of detailed operational procedures for AEE market operation
- Capacity building of all relevant stakeholders including the power market organization, all potential market participants as well as other stakeholders like for instance the regulatory authorities, ministries etc.
- The main work would be establishing the required IT tools for the market, the communication infrastructure, and other required office tools
- Preparation for the market opening with market trials.
- Go live.

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