RIETI BBL Seminar

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The Liberalization process in the Power Industry in Norway and the Nordic countries

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Energy Policy

- Organization model for the electricity sector
  - A challenge for the politicians which will have direct impact on all parts of a modern society

If you want to change how to organice the power industry

- Why should you do that
- What options do you have
- Who should primarily benefit from the changes
- How should you do it
- What could be the implications

Process in Norway

- Reorganize the Electricity sector
- Why
  - Too law efficiency
  - Too high overcapacity in production and transmission
  - Too much “fat” in the power companies
  - No incentives to change the situation
- The initiative came from
  - The Government (Ministry of Finance)
  - Some economic research centers

The changes

- From: a monopolized systems
  - All power companies had monopoly in a geographical area to supply “their customers” with electricity
- To: a Liberalized Power Market
  - Open competition where possible
  - The grid operated as a monopoly

The Goal

- Efficient utilization of the total power system
- Beneficial for the end customer

Liberalized Power Market

- Political decision
- Tool

Changes which was done

- New legislation, from January 1st, 1991
- Restructuring the power industry, from January 1st, 1992
  - Unbundle monopoly, high voltage grid, Statnett SF and competition, production, Statkraft SF
  - Many producers
  - Appoint Statnett as TSO company
- Appoint a regulator, NVE
- Changed The Power Pool (only for the producers) in to a power exchange, today known as Nord Pool

The actors in the whole sale market

- Producers
  - In a well functioning market it should be at least 5 – 6 independent producers in one market area, in the Nordic system approximately 100 producers.
- Regional companies
  - Some production
  - Operating in the whole sale market and over the power exchange
  - Selling to industry, end consumers and customers in retail market
  - In most distribution areas it is many retail sale companies
- Traders,
  - purchase and selling in the whole sale market, but can also sell to retail/residential customer

Distribution companies

- Responsible for connecting all customers in their geographical area to the grid (monopoly)
- Owns, operates and develop the distribution and regional grid
- Responsible (to some extent) for Security of Supply to their customers
- Regulated economy, the regulator set a revenue cap each year.

Power exchanges

- Setting the price in whole sale market for each hour the next 24 hours (not mandatory)
- Operates in close cooperation with the TSO companies (the intra day and spot)
- Have to be independent from any marked actors
- Will be in competition with brokers who operates an OTC function
- Different kind of power exchanges
  - Intra day, physical
  - Day ahead, physical (spot)
  - Forward or future markets (weeks, months and years), derivative, financial

Transmission System Operator

- Facilitate an efficient electricity market
- Own, operate and develop the high voltage transmission grid
- Responsible for system operation of the total system, which include Security of Supply
- ***Not*** an actor in the market
- Has to be neutral and independent from all market actors
- Regulated economy, revenue cap.

Business Idea

- **To facilitate an efficient electricity market**
- **Security of Supply**

What it means

Facilitating a well functioning Market

Security of Supply

Efficient utilisation of existing capacity

- Power flow - grid code
- Market design, efficient exchanges
- Neutral TSOs – international cooperation

Efficient investments and development of the grid

- Development of the Norwegian grid
- Development of interconnectors
- Cooperation between TSOs

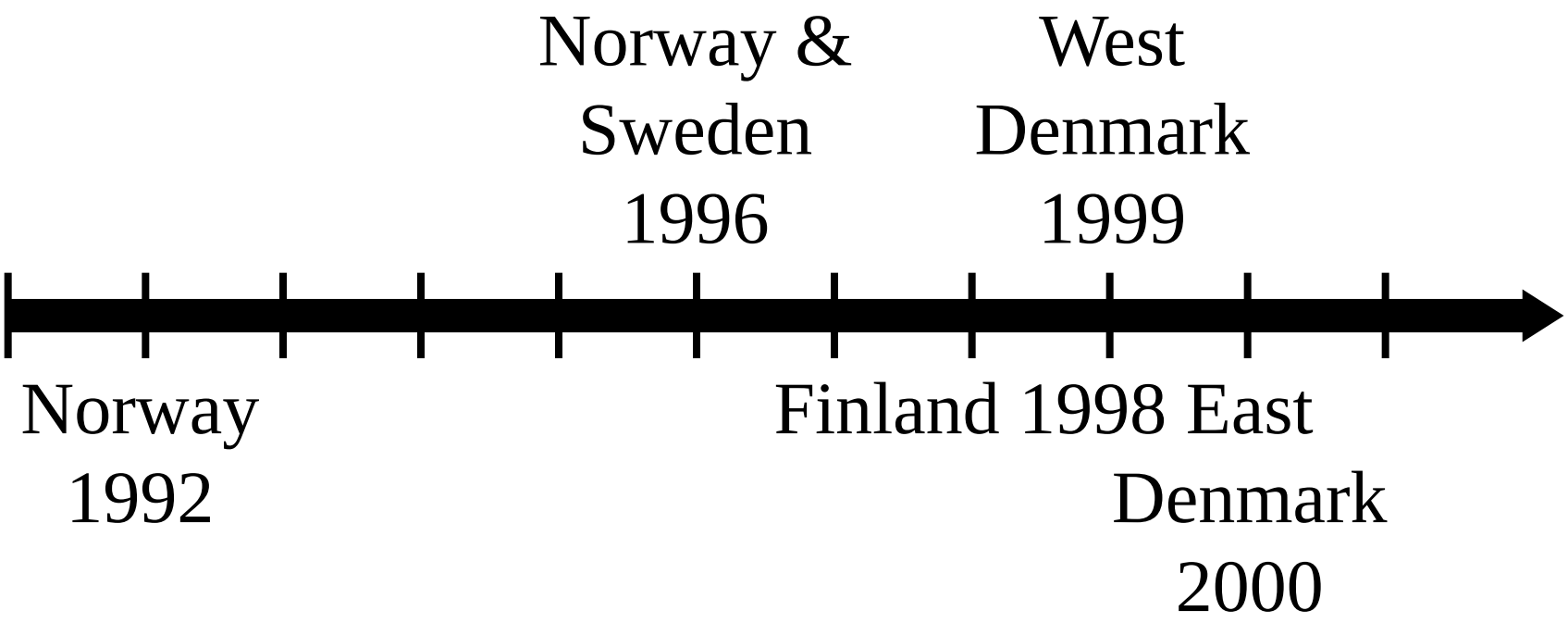
The TSOs responsibility

- High voltage grid
  - Operation and development
- System operation
  - Power balance in operation hour

- TSOs are ***not*** responsible for
  - Energy balance
  - Long term power balance

An independent TSO is the backbone of a liberalized electricity market

Deregulation in the Nordic countries



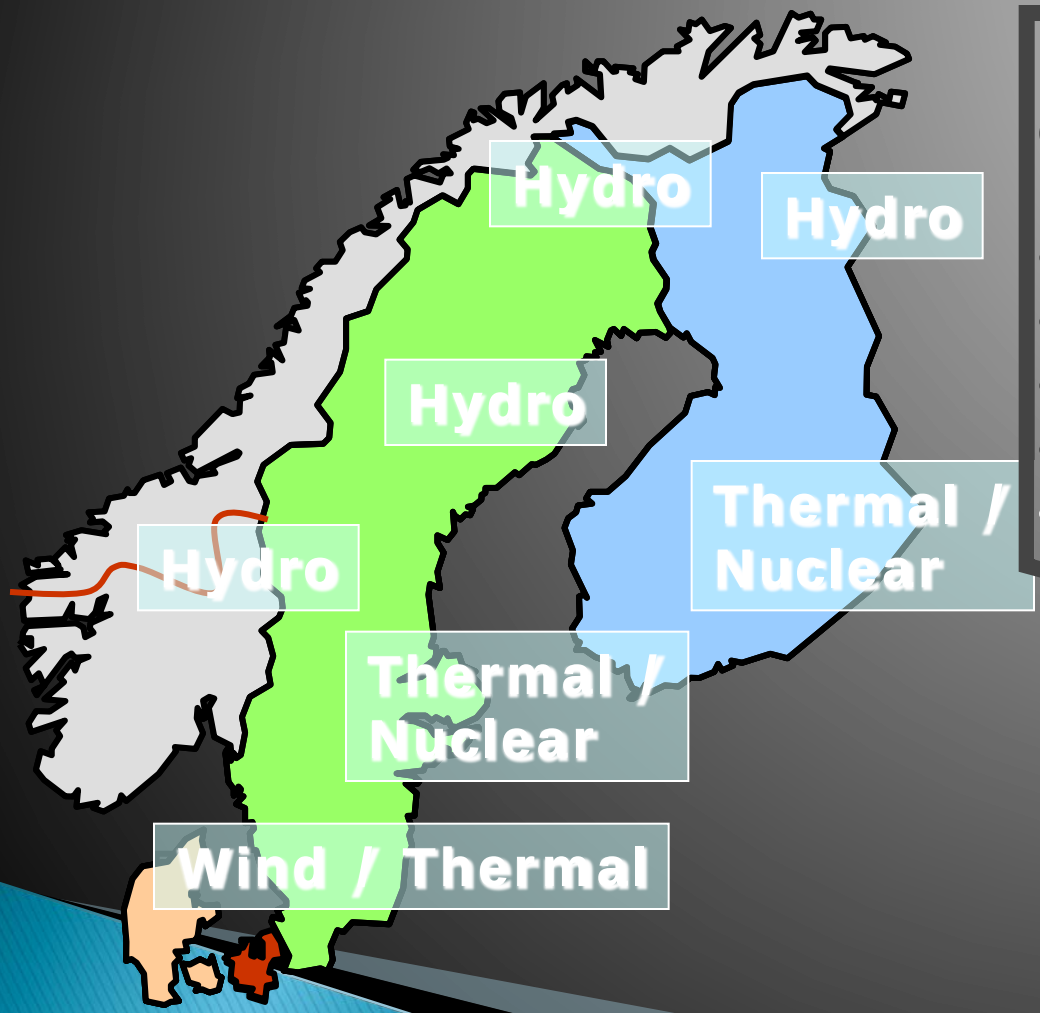
Key success factors

- New legislation
- Independent and neutral TSO (at least in the long run)
- Regulator
- Many independent producers in the market area
- A power exchange

The Nordic Power System


ISLAND
ICELAND
Reykjavik
65° N
19° V
SVERIGE
SWEDEN
NORGE
NORWAY
FINLAND
FINLAND
Oslo
Stockholm
Helsinki
DANMARK
DENMARK
København
ESTONIA
LATVIA
LITHUANIA
RUSSIA
POLAND
GERMANY
HOLLAND
Vannkraft
Hydro power plant
Varmekraft
Thermal power plant
Transf. el. kopl. stasjon
Substation
750 kV ledning
750 kV line
400 kV ledning
400 kV line
300 kV ledning
300 kV line
220 kV ledning
220 kV line
132 kV ledning
132 kV line
Likestrømsledning
DC line
Dobbeltledning
Double line System
Omformerstasjon
Omformerstasjon Back-to-back
Samkjøringsforb. for lavere spenning enn 220kV
Interconnection for voltage lower than 220 kV
Midlertidig driftsspenning
Temporary voltage
I drift
In operation
Besluttede og planlagte utbygginger
Decided and planned expansions
0 50 100 150
STATENS KARTVERK

The Nordic Electricity Production



Production characteristics varies:

- Investment cost
- Fuel type/cost
- Maintenance cost
- Flexibility of production
- Environmental issues

The Norwegian and Nordic Electricity Market

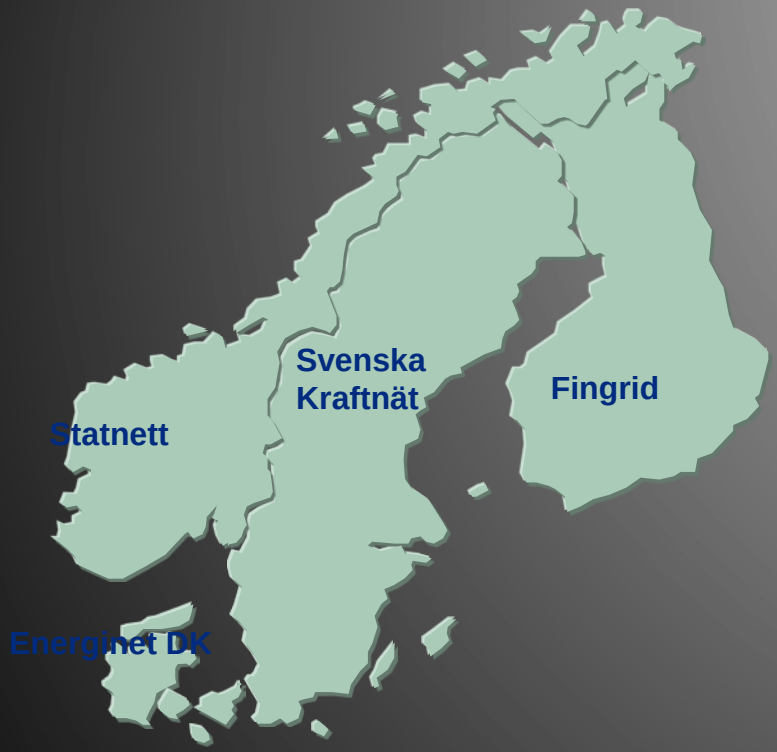
Norway:

Consumption:	131 TWh
Peak load:	23 993MW
Installed capacity:	30 000MW
Available capacity during winter:	26-27 000MW
Hydro:	98 %

NORDEL:

Consumption	400 TWh
Peak load:	70 000MW
Installed capacity:	90 000MW
Hydro:	55 %
Nuclear:	23 %
Thermal:	20 %
Wind:	2 %

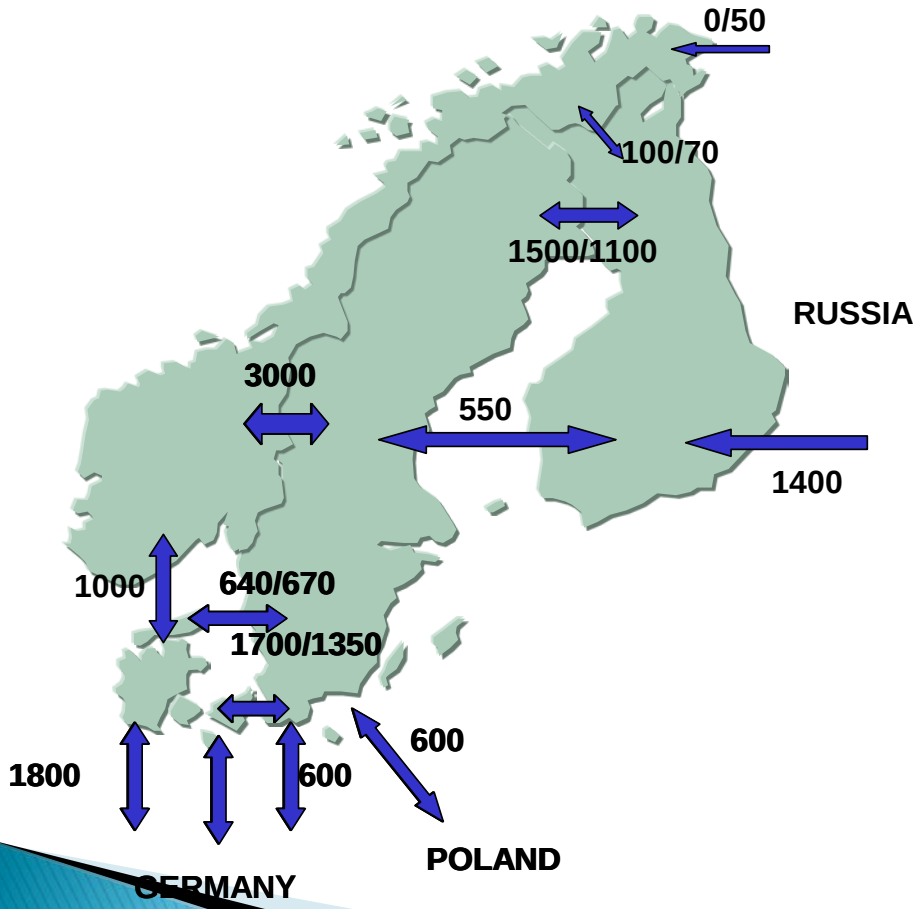
The Nordic TSOs have established an efficient marketplace



- Offering third party access (TPA) to the main grid on a non-discriminatory basis
- The Nordic Power Exchange - Nord Pool
- Basic principles for Nordic system operations

Source: Nord Pool

The Nordic power system



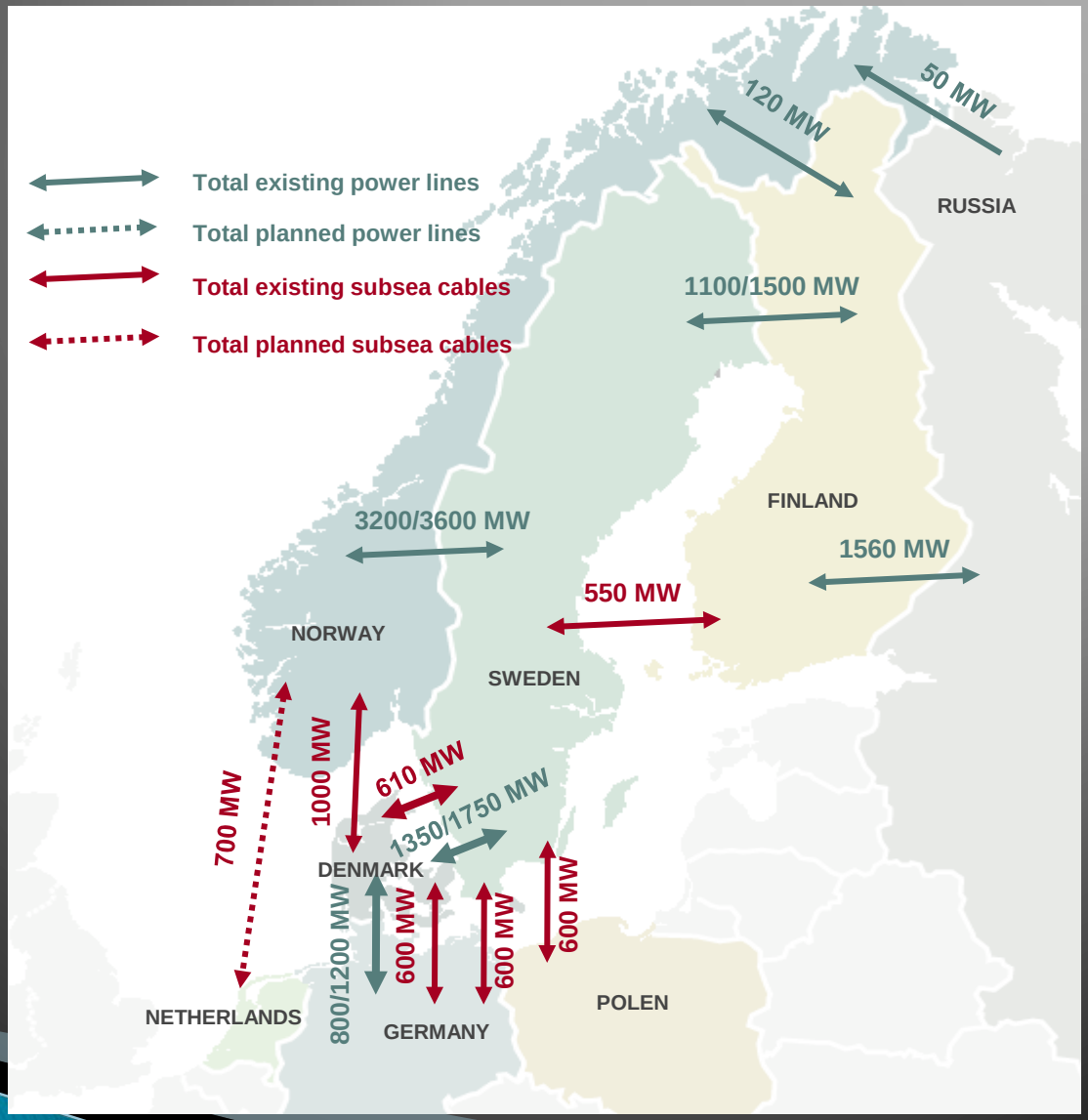
- ✓ 4 countries
- ✓ 4 regulators
- ✓ 4 TSOs

- ➢ **One market**

INTERCONNECTORS

INTERCONNECTORS

Making power supply more robust



INTERCONNECTORS

Making power supply more robust

Connecting several smaller and vulnerable systems into a larger one

- ✓ The weakness of one system becomes a strength of another
- ✓ Cost savings and value creation
- ✓ Increased security of supply
- ✓ More efficient use of resources reduce environmental impact of the power supply

Interconnectors play a crucial role

- Security of supply
- Increased cost efficiency across nations
- Synergies (diversification) between different production systems
- Establish a level playing field
- Enlarging the market area
- Stabilising power prices

The role of the TSO in the development of interconnectors

- **Analyse the need for capacity in transmission and generation and to optimize investments in transmission**
- **Present a ten year development plan for transmission**
- **Negotiate with the neighbour TSO**
- **Build the interconnector**

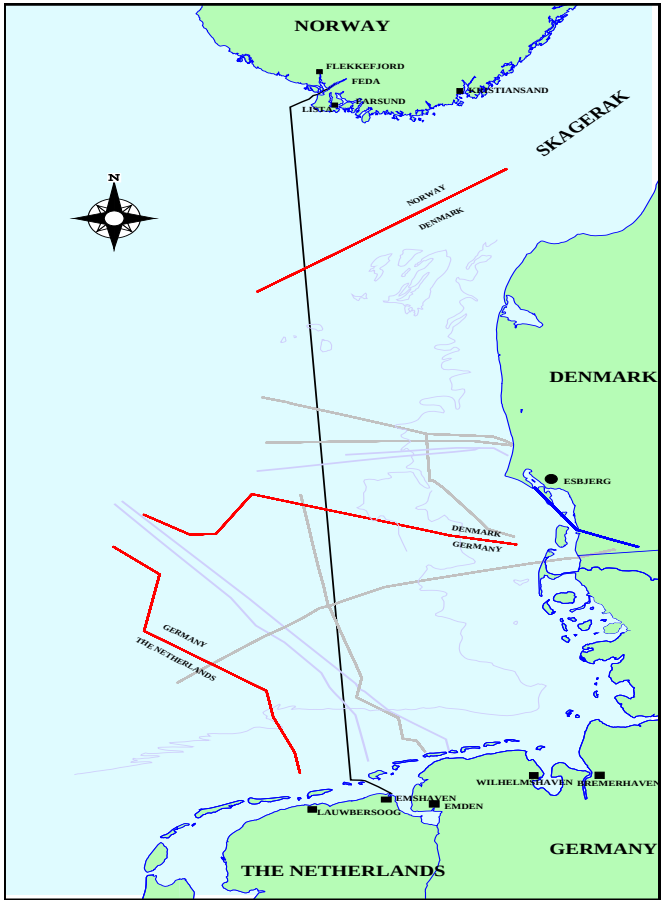
- **The TSO has no commercial interest**

CASE - NORNED

From Norway to the Netherlands

Realising the value of differences

Hydro power	Thermal power
Dependent on precipitation	Sensitive to short term changes in consumption
Dry years are difficult	Challenge to balance the system with wind power production and production with limited flexibility
Excess power in wet years	
Short term balance usually not a challenge	



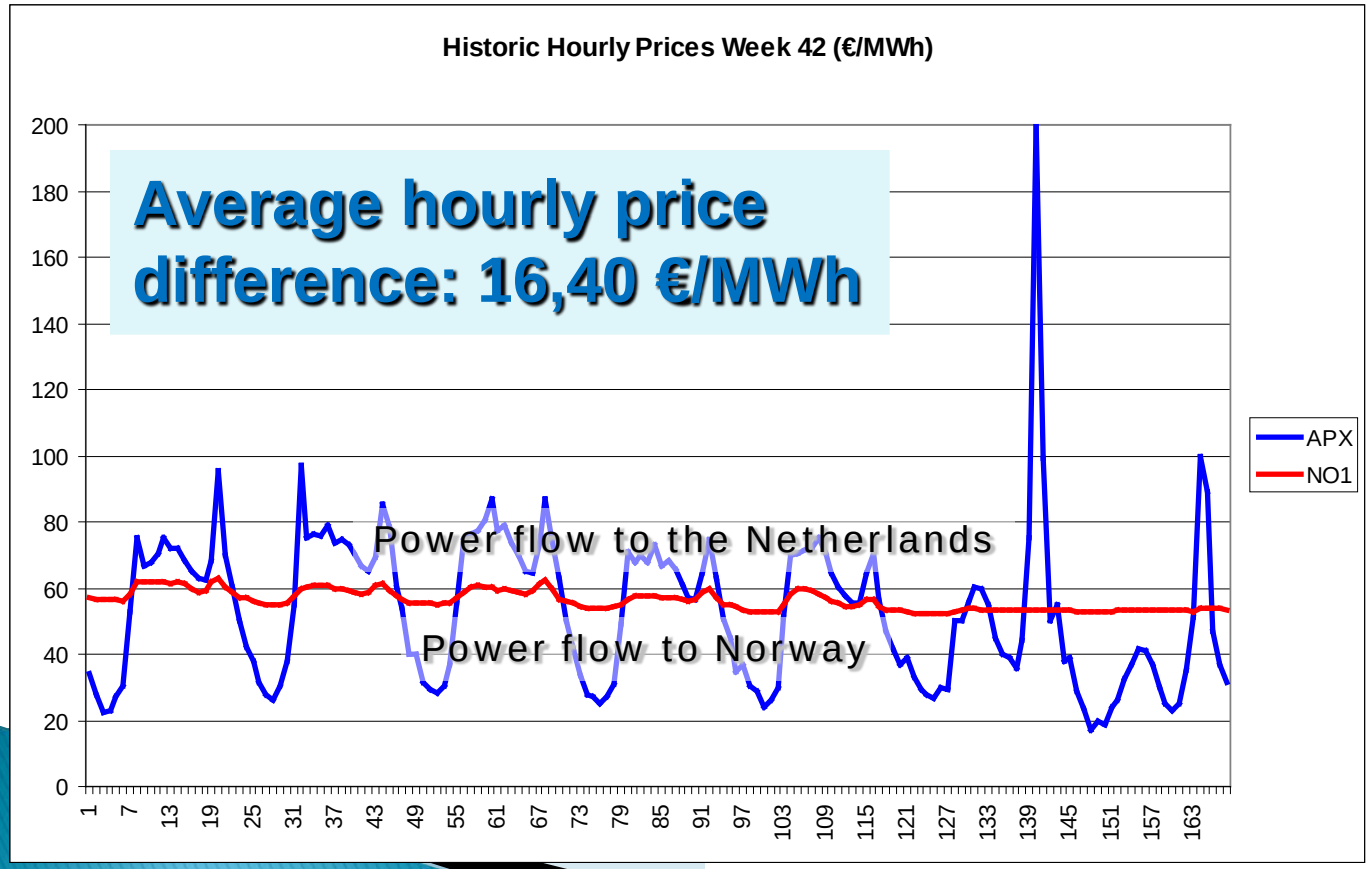
CASE - NORNED

Realising value hour by hour

CASE: NorNed

Week 42/2006

Average price APX:	53,43 €/MWh
Average price NO1:	56,23 €/MWh
Price difference:	3,20 €/MWh



The European Electricity Market

European legislation

- First electricity market legislation package
  - Presented December 1996
  - Implemented February 1999
  - Key point: **economic** unbundling
- Second electricity market legislation package
  - Key point: **legal** unbundling
- Third electricity market legislation package
  - Presented September 2007
  - Implemented July 2009
  - Key point: **ownership** unbundling

Consequences

- Electricity market enlarged from a Nordic to North European, or may be European
- Restructuring the TSOs
  - Vattenfall Europe Transmission for sale, acquired by Elia
  - E-on Netz, split in two, TSO and DSO
    - TSO for sale, acquired by Tennet
  - Fingrid shares hold by Fortum and PVO for sale
- TSO organization, December 19th 2008, from ETSO to ENTSO-E
  - ENTSO-E is given power to decide the framework for operation, market and plans for further investments in the grid.

Objectives

Promote the reliable operation, optimal management and sound technical evolution of the European electricity transmission system in order to ensure security of supply and to meet the needs of the Internal Energy Market.

Purpose:

- Pursue the co-operation of the European TSOs both on the pan-European and regional level.
- Promote the TSOs' interests.
- Have an active and important role in the European rule setting process in compliance with EU legislation.

Roles, responsibilities and organization

Stronger TSO responsibility in Europe

European Network of Transmission System Operators (ENTSO - E)

Organization

- ✓ The TSOs have established an organization structure
- ✓ A new European Agency shall supervise this organization

Duties

- ✓ Develop technical standards and market design
- ✓ Coordinate system operation
- ✓ Investment plans

Working processes

- ✓ Involvement of players should be standard procedure
- ✓ ENTSO-E have a permanent administration with skilled people

Power Exchanges

The European perspective

Development of the market

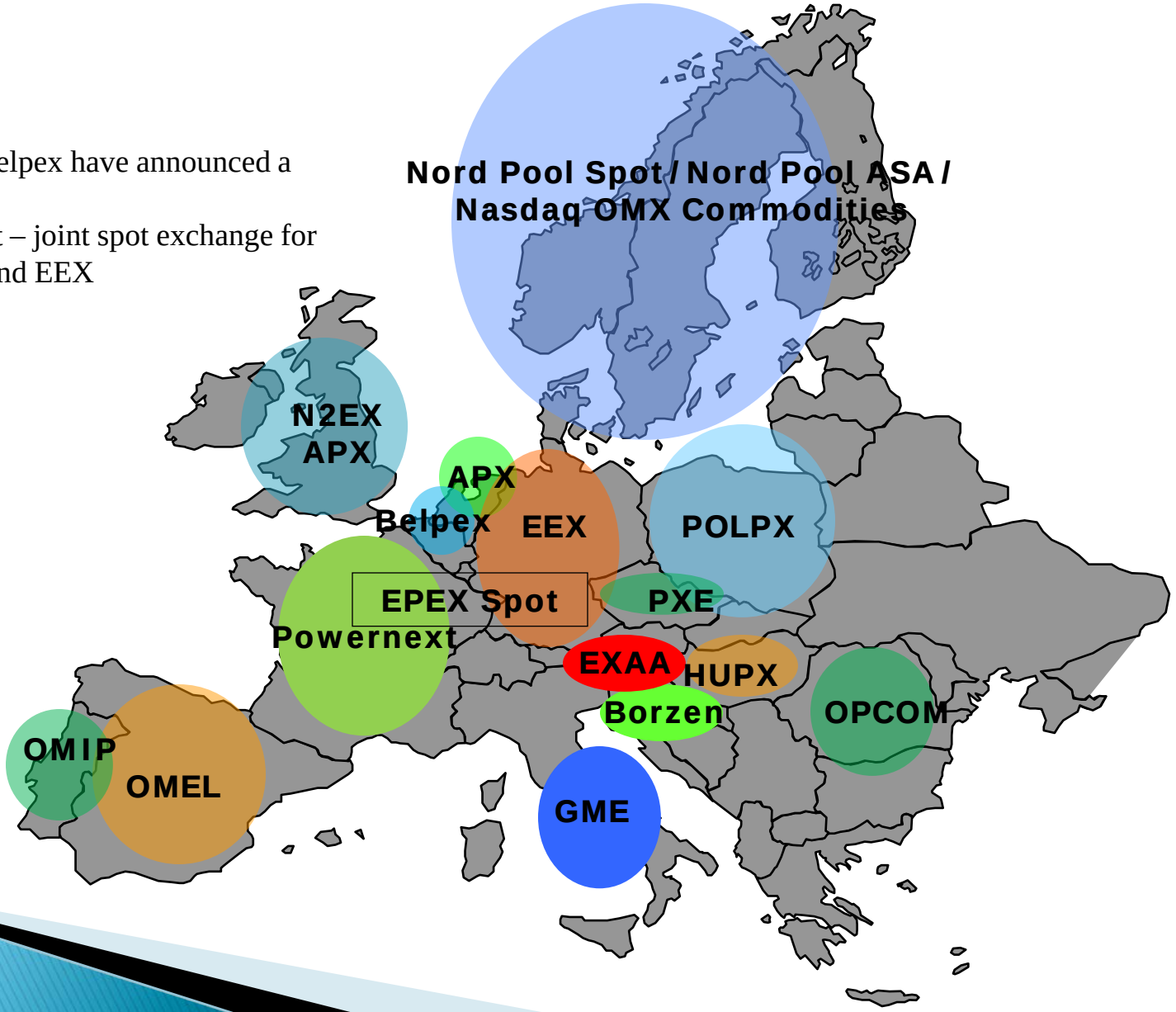
- “Everybody” want one common European market, or at least a North European, market
- They all agree on that one common power exchange will be the best for the market
- Most people agree that one European TSO probably would be the best for Europe, at least ownership which is crossing some borders
- *BUT*
- Everybody is working for their own solution, like philosophy, ownership, software, headquarter and “everything else it is possible to disagree about”

Power exchanges

Comments:

•APX and Belpex have announced a merger

• EPEX Spot – joint spot exchange for Powernext and EEX



Development the last year

- EMCC
  - Market coupling between Denmark – Germany in operation since Nov 2009
  - Baltic cable open for third party access from 11th May 2010
- CWE
  - Signed agreement in June 2007
  - Should been in operation 1st January 2009, but delayed
- Coordinated price setting between EMCC and CWE
  - In operation between Denmark/Sweden and the continent from 9th November 2010
  - Between Norway and the Netherlands (NorNed Cable) from 14th December 2010

Power exchanges

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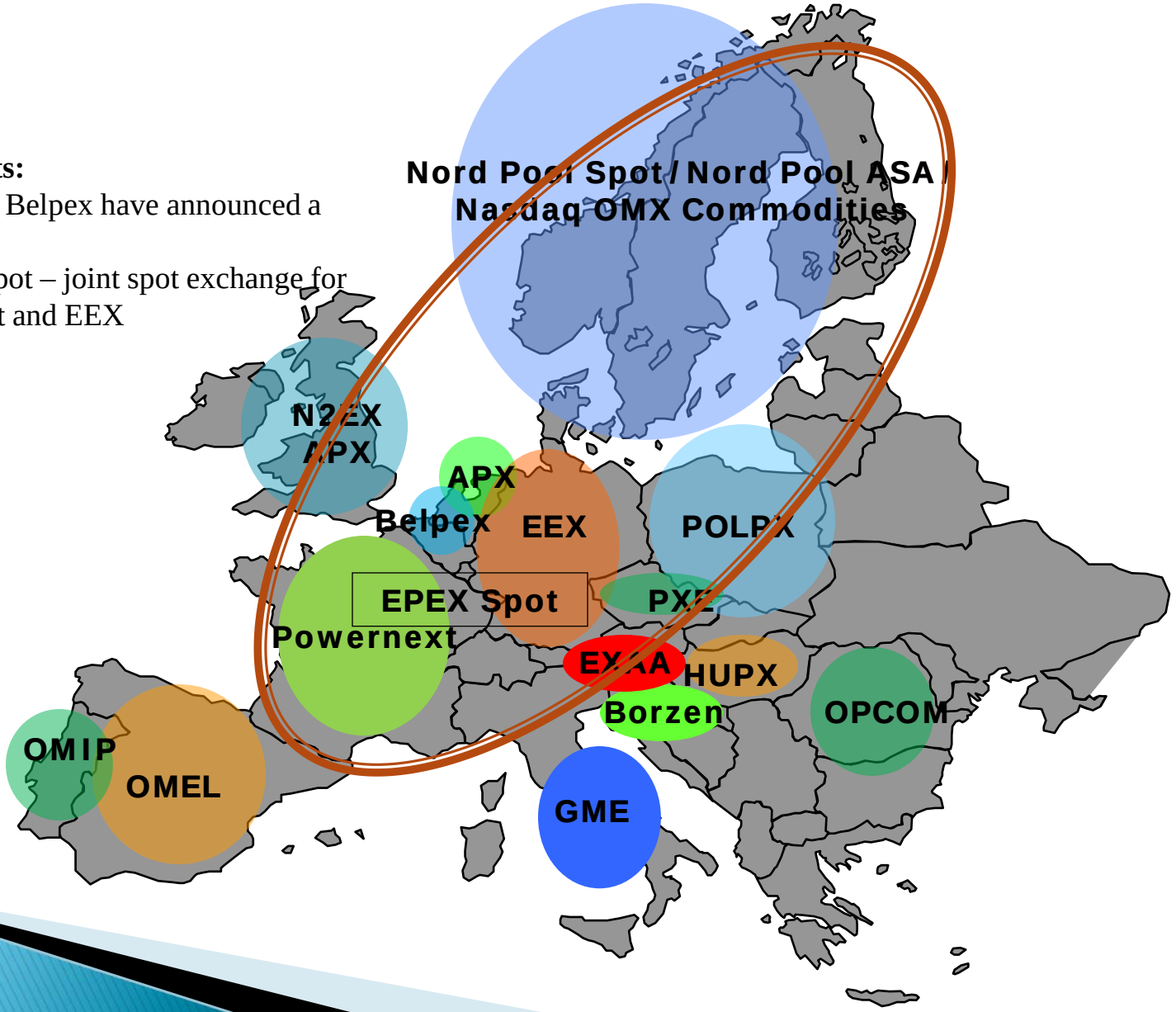

An Efficient European Electricity Market

- Depends on:
  - European, not national, perspectives
  - Common codes and rules
  - Independent TSOs
  - Sufficient transmission capacity, incl interconnectors
  - Openness and transparency
  - Well functioning power exchanges
  - A sufficient number of market players
  - A European competition policy

Thank you for your attention!