UNIVERSITÄT DUISBURG ESSEN

Chair for Management Sicences and
Energy Economics
Prof. Dr. Christoph Weber

European approach to balancing markets – spotlight on Germany

Brussels
10 June 2010

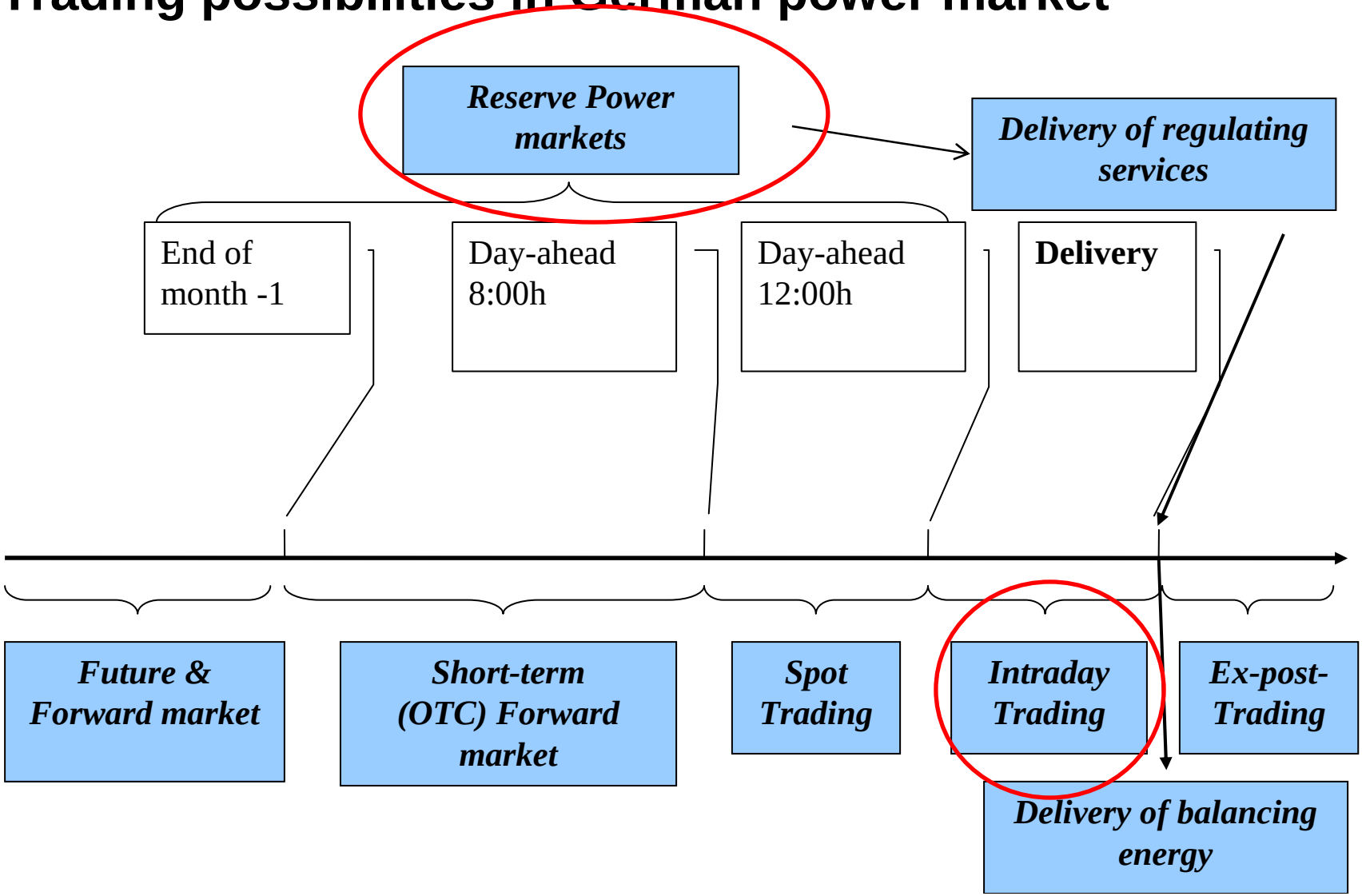
Stephan Spiecker
Christoph Weber

General alternatives for interaction between grids and markets

- ISO model
  - System operator is responsible for market and grid
  - Mandatory Power pool
  - System optimization by ISO covering both power plants and grid usage
  - Frequently used in the **US markets**, most well-known example: PJM

- Power exchange model
  - Separated responsibilities: grid operators and power exchanges
  - Trading both bilaterally and through Power Exchange
  - Decentralized optimization by market participants
  - Grid operation based on submitted schedules and management of deviations
  - Nowadays used in all liberalized **European markets**

Trading possibilities in German power market



Needs for Balancing Energy

New Information on / Changes in

- Load
- Wind
- Conventional Generator Outages

Assessment of Balancing Energy Needs

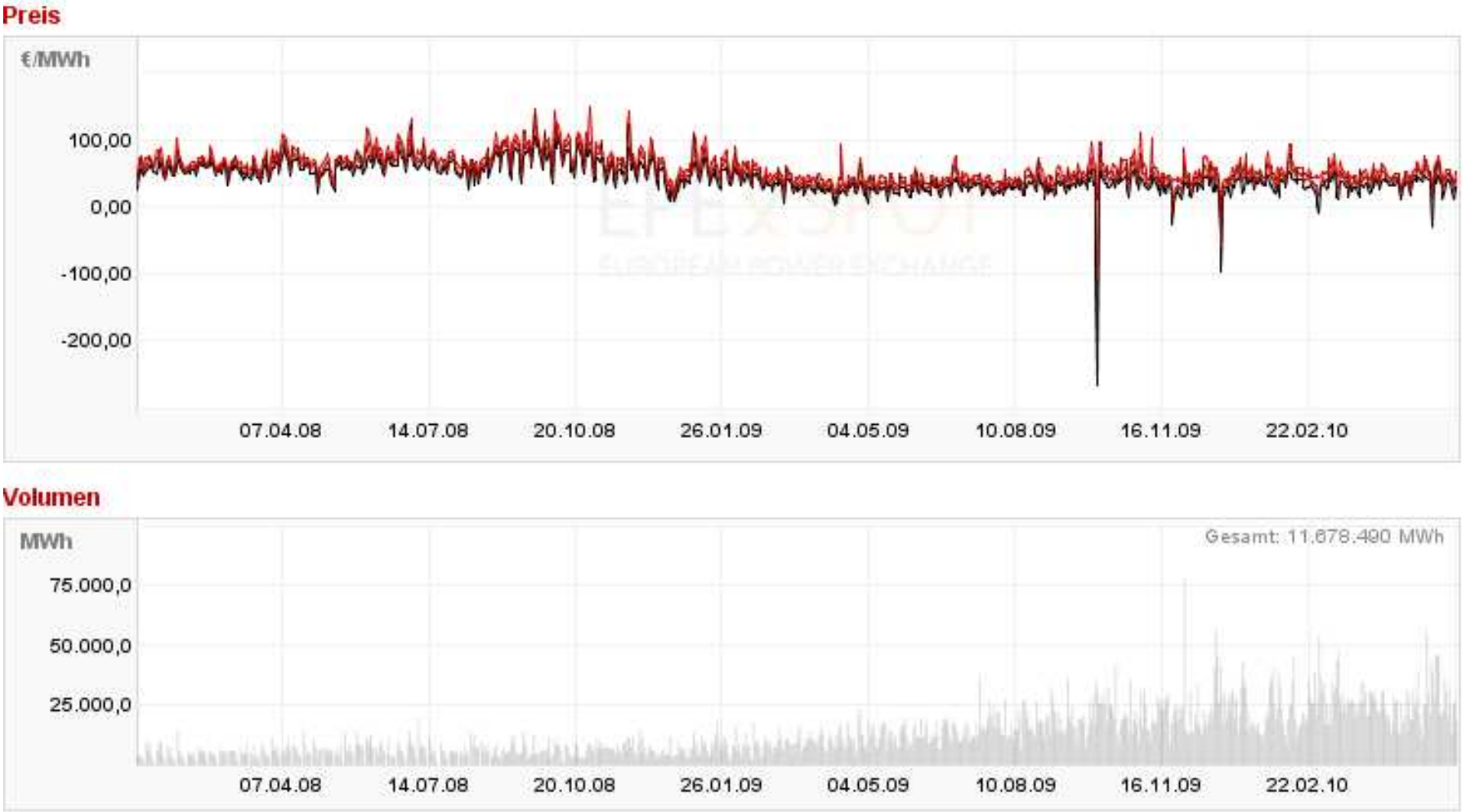
- Day-ahead load forecast
  - About 2 % forecast error
  - i.e. for Germany about 1200 MW MAE (Mean absolute error)
- Plant outages
  - About 25 per plant and year, 10 h per outage on average
  - i.e. for Germany about 1700 MW MAE (Mean absolute error)
- Wind forecast
  - 4 % RMSE of 25,800 MW
  - Own analysis 750 MW MAE for total German generation

→ euclidean sum yields 2250 MW corresponding to about 20 TWh

Intraday market characteristics

Country	Market Operator	Gate closure	Exchange traded volume (2009)	Share of national consumption
France	EPEXSPOT	75' before delivery	1.02 TWh	0.2 %
Germany	EPEXSPOT	75' before delivery	5.66 TWh	1.1 %
	IntradayS	Even ex-post trades	?	
Nordic Countries	Nordpool	60' before delivery	1.82 TWh (2008)	0.5 %
Spain	OMEL	6 auctions per day	31.34 TWh	12.1 %

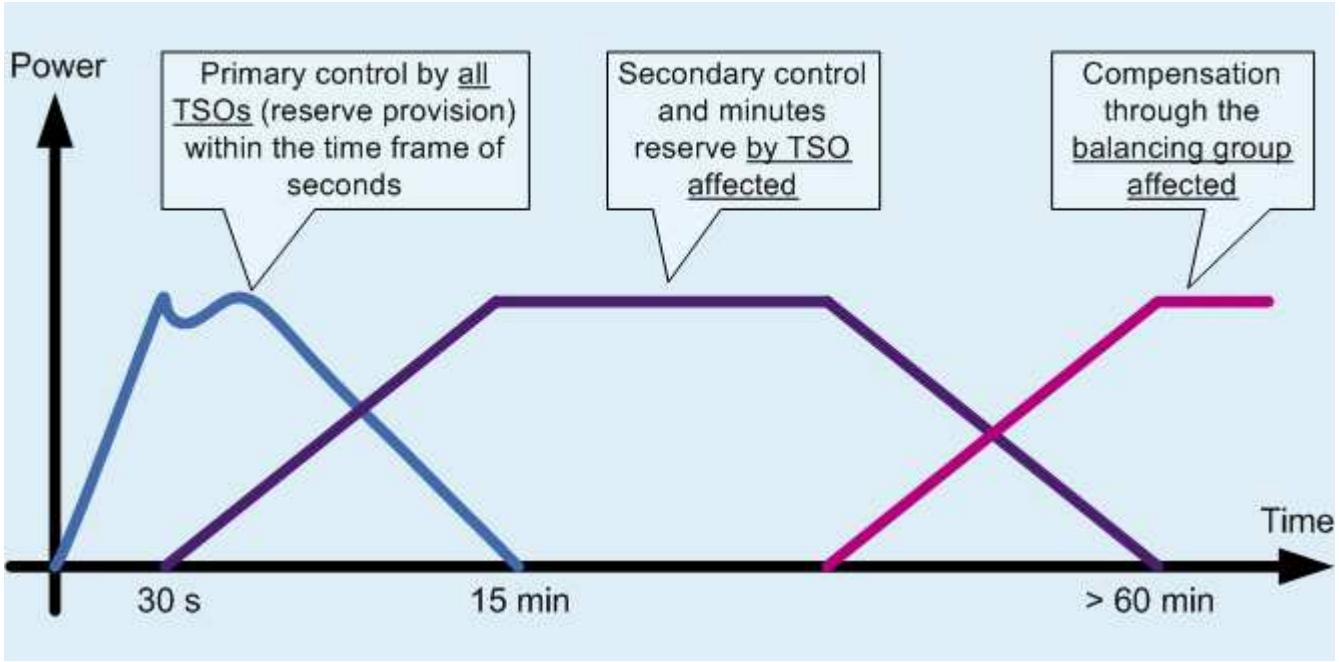
Intraday EEX – prices and volume



Why is liquidity much lower than expected?

- Large player are doing internal netting
- Downwards spiral of limited liquidity
- Market design – continuous trading
- Competition with regulation power market in the case of Nordpool

Reserve power – technical characteristics



http://www.amprion.net/en/control-energy

Reserve power – market characteristics

	Primary control	Secondary control	Minute reserve
Auction design	One-sided auction (monopsony of TSOs)		
Auction frequency	Monthly	Monthly	Daily
Auction volume	623 MW	~ 2300 MW (positive) ~ 2000 MW (negative)	~ 2300 MW (positive) ~ 2450 MW (negative)
Purchased/ delivered energy (2009)		1.3 TWh (positive) 2 TWh (negative)	0.2 TWh (positive) 1 TWh (negative)

Advantages and Disadvantages of the Power Exchange Model

Cons

- Market operation does not fully reflect technical constraints
  - Nodal pricing hardly possible
- Coordination efforts between power exchanges and grid operators necessary
- Lower liquidity in the power market
- Decentralised optimization may result in inefficient resource use

Pros

- Decentralised optimisation provides opportunities for innovations
- Market incentives to avoid inefficient market designs
- Larger market zones less prone to excercise of market power
- Derivative markets easier to establish
- Market prices more easily provide right incentives for investment in generation

Thank you!