

International Management

Electricity Trading in Germany



A presentation by
André Weber
(851056)

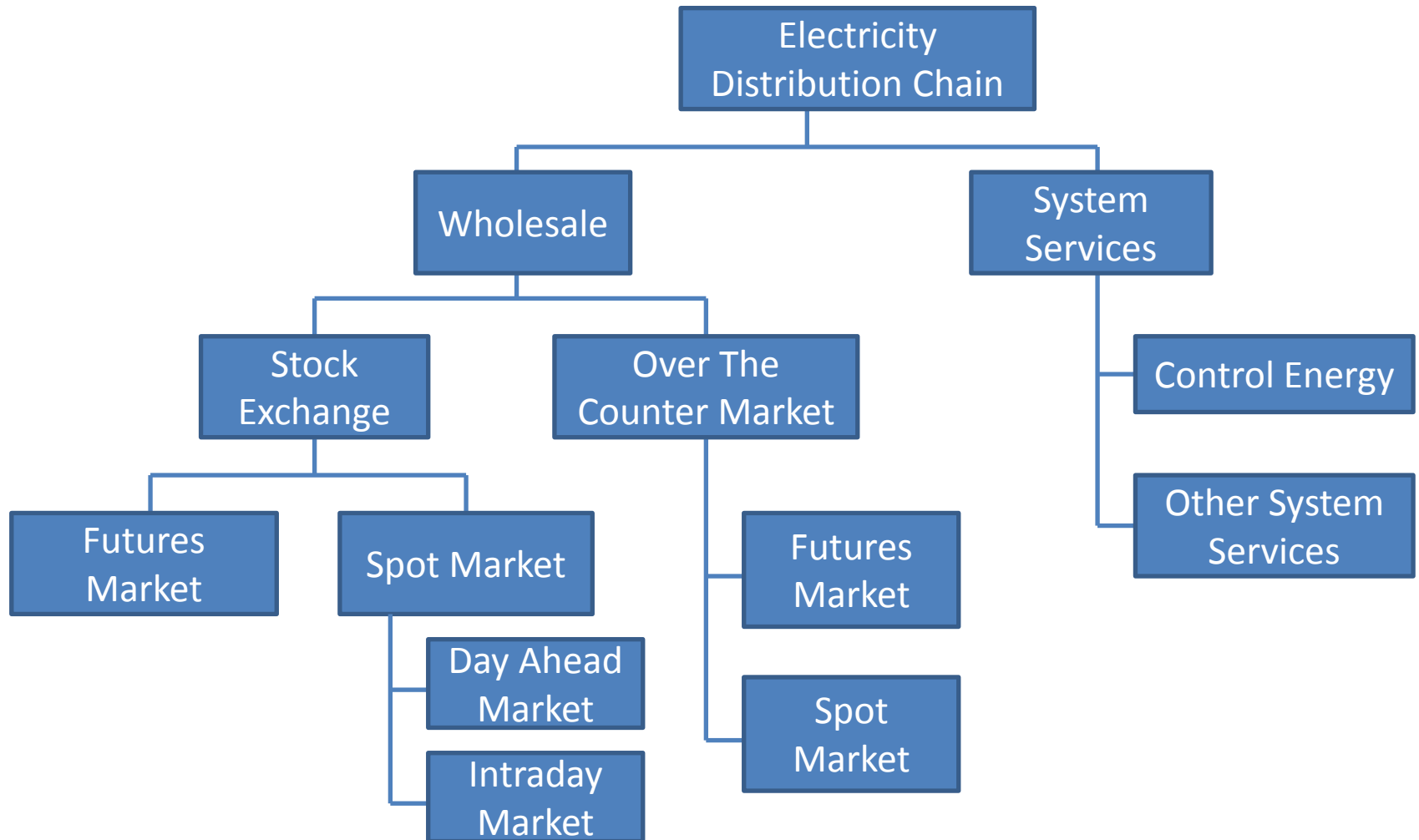
TABLE OF CONTENTS

Electricity Trading in Germany

1. Framework Conditions
2. Wholesale
 1. Over the Counter Market
 - Futures Market
 - Spot Market
 2. Stock Exchange
 - Futures Market
 - Spot Market
3. System Services

Bibliography

Electricity Trading in Germany



Source: Bundeskartellamt

TABLE OF CONTENTS

Electricity Trading in Germany

1. Framework Conditions
2. Wholesale
 1. Over the Counter Market
 - Futures Market
 - Spot Market
 2. Stock Exchange
 - Futures Market
 - Spot Market
3. System Services

Bibliography

- Electricity is only storable to limited extent
 - ➡ Only pumped storage hydro power station provide the possibility to store electricity profitable
 - ➡ Electricity generation in advance is restricted
- Offer and demand have to be identical at any time
 - ➡ Deviations would lead to variation in voltage and grid instability
- Electricity demand varies of the day and seasonal
 - ➡ Load control is managed by starting up or shutting down power plants or by operating in part load
- Electricity generation:
 - ➡ Base load: lignite, nuclear and hydro power stations
 - ➡ Medium load: hard coal and combined cycle power plants
 - ➡ Peak load: gas turbine power station

Main power plant operator



Main grid operator

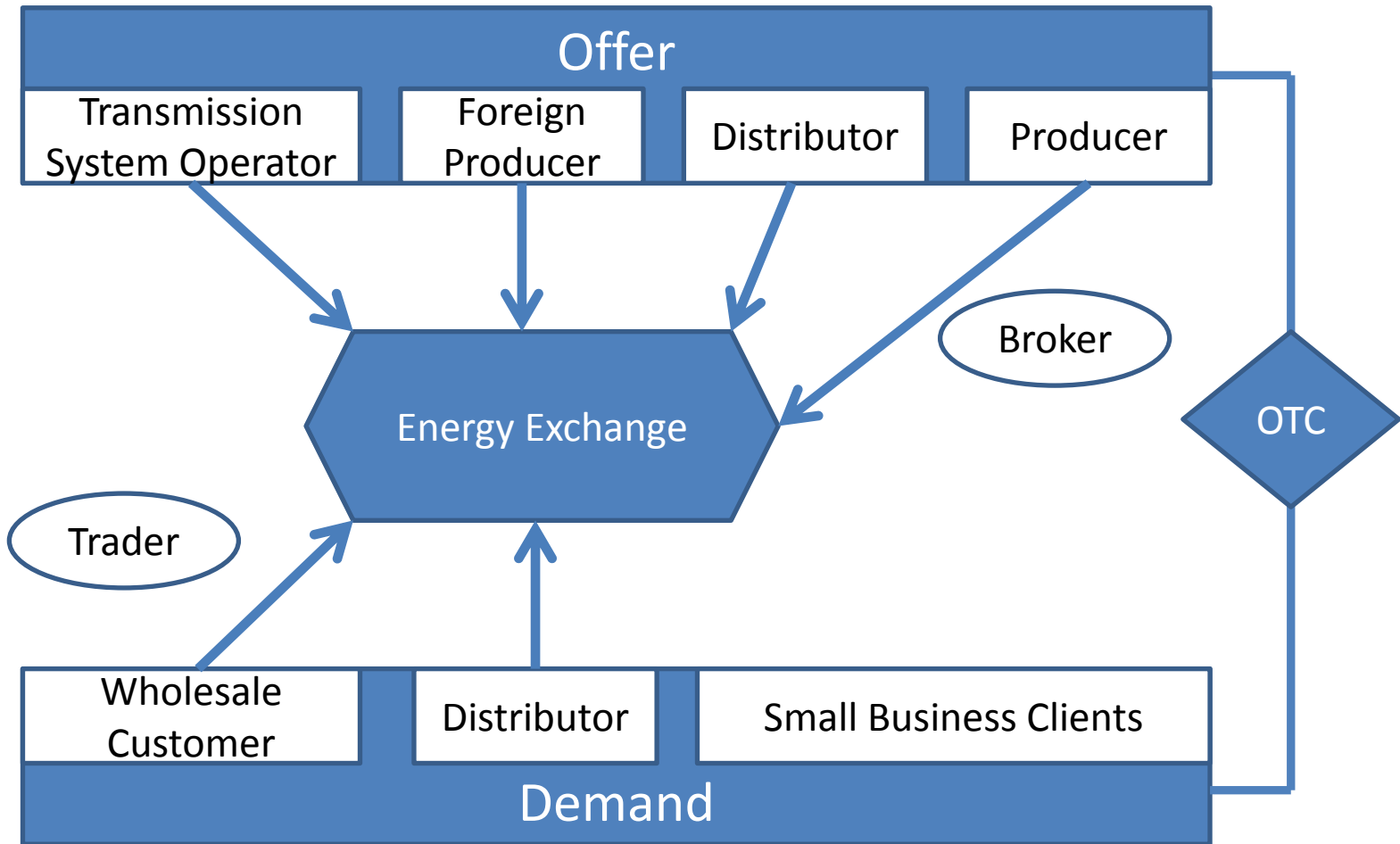


TABLE OF CONTENTS

Electricity Trading in Germany

1. Framework Conditions
2. Wholesale
 1. Over the Counter Market
 - Futures Market
 - Spot Market
 2. Stock Exchange
 - Futures Market
 - Spot Market
3. System Services

Bibliography



Source: Bundeskartellamt

- Electricity Distribution Chain differs
 - concerning time of sale
 - regarding handling procedures of the business
 - in terms of required flexibility of generation
 - regard to underlying pricing mechanism

- Over the Counter Market (OTC)
 - biggest share of electricity trade
 - bilateral treaty between business partners, also involving brokers
 - divided into Spot Market and Futures Market

- Spot Market
 - trade of contracts for a short-term completion
 - ➡ within the next hour of the current day, or within the next day
 - completion of business results directly in exchange of electricity against payment ➡ physical
- Futures Market
 - completion of traded “Forwards” will be in the future
 - typical Forwards refer to quarter or yearly supply with electricity
 - ➡ physical and monetary completion possible (exchange of items of property)

- Stock Exchange
 - European Energy Exchange (EEX)
 - important stock exchange
 - located in Leipzig
 - also divided into Spot Market and Futures Market
 - the 4 German control areas establish with the Austrian control areas a market range with uniform exchange prices
 - 250 active sellers and buyers  traders can influence the whole market
 - trade of standardised products
 - trade participants enter into a contract with the stock exchange
 - anonymous business
 - $\frac{1}{4}$ of the electricity in Germany is traded at the stock exchange

- Futures Market:

- ➡ Future = contractual obligation to buy/sell a certain amount of electricity in the future to a today's fixed price

- ➡ Option = right to buy a certain amount of electricity, time period and price is fixed in advance

- billing after delivery

- Spot Market:

- trade of electricity at EPEX SPOT SE

- ➡ Day-ahead spot price is important for the whole German electricity market

- ➡ functions as a reference price for electricity trade also influencing the operation of power plants

- Day-Ahead Market:
 - part of the Spot Market
 - at 12 o'clock hourly auctions for the next day
 - ➡ bids between -3000€/MWh and 3000€/MWh
 - also possible to buy blocks of hours
 - bids of sellers and buyers are summarized in charts
 - ➡ intersection point is the market price
- Intraday-Market:
 - also part of the Spot Market
 - continuous business for delivery the same day or on the next day
 - at 3 o'clock pm trade for the next day is possible
 - each hour of electricity or block can be traded till 75 min before delivery
 - ➡ bids between -9999€/MWh and 9999€/MWh

▪ Spot Market:

Trading Data

Power

Intraday | Spot

**Hour Contracts | Spot
Hourly Auction**

Phelix Futures |
Derivatives

Phelix Options |
Derivatives

German Power Futures |
Derivatives

French Financial Power
Futures | Derivatives

French Power Futures |
Derivatives

Natural Gas

Emission Rights

Coal

Market Information

Data Usage

Hour Contracts | 2012/04/18 | Prices and Trading Volumes | EPEX Spot

Table

Chart

Area prices

Chart Settings

PHELIX

30 days

Market area

Average

Scale: ☐ Intraday ☐ Week ☐ Month ☒ Quarter ☐ Year ☐ All

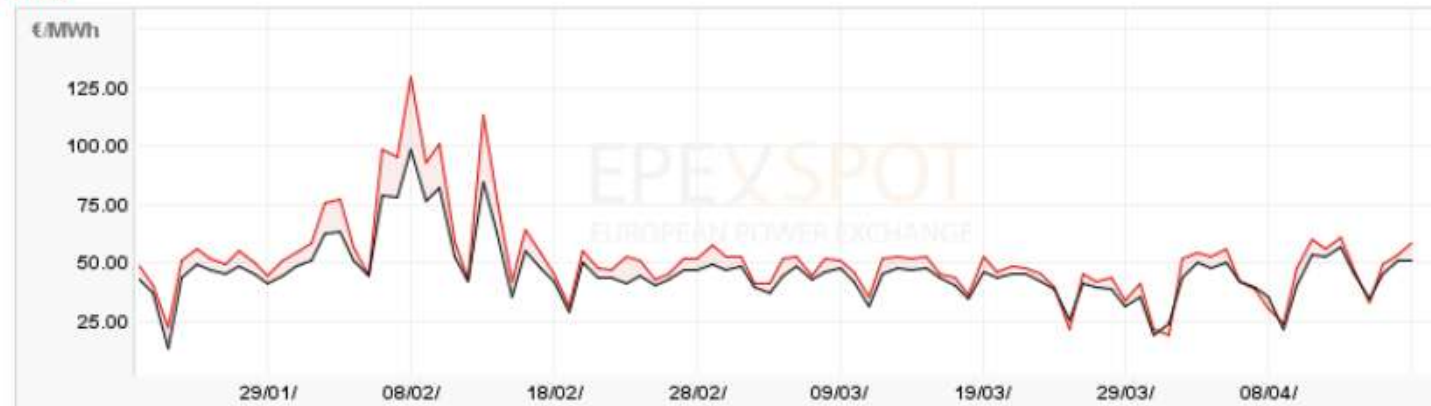
2012-04-18



Update

Market data as RSS feed

Price



Legend

PHELIX Peak PHELIX Base Volume Peak Volume Base

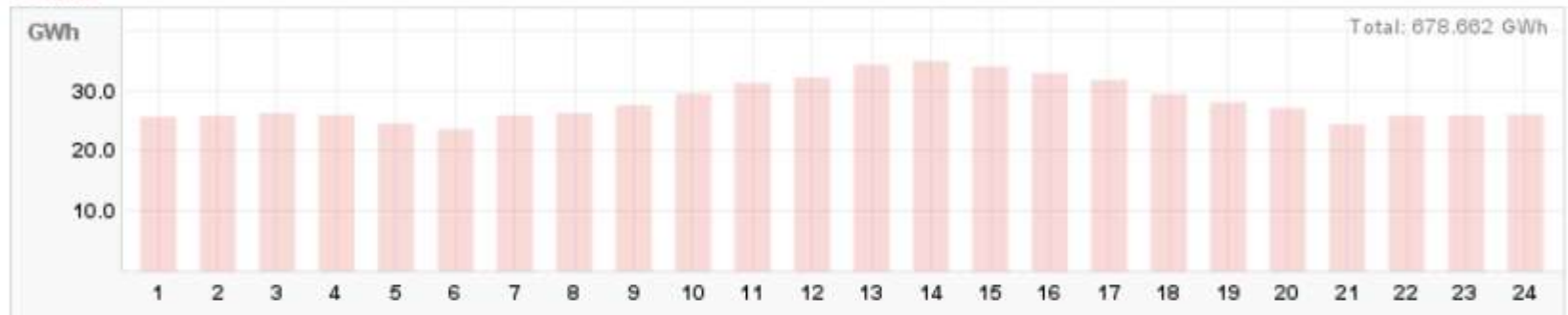
www.eex.com/en/Market Data/Trading Data/Power

▪ Spot Market ➡ Intraday

Price



Volume



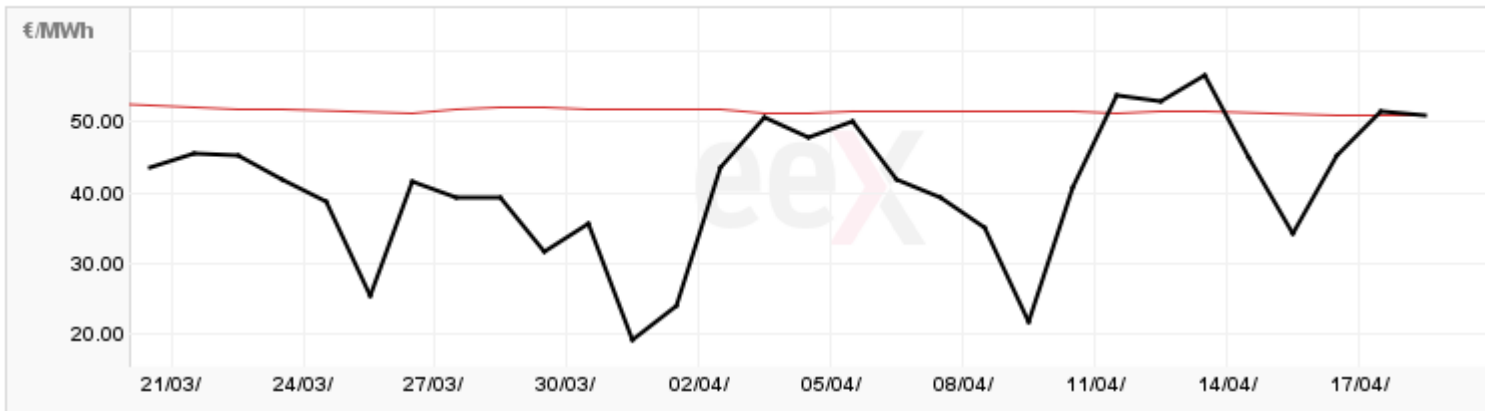
Legend



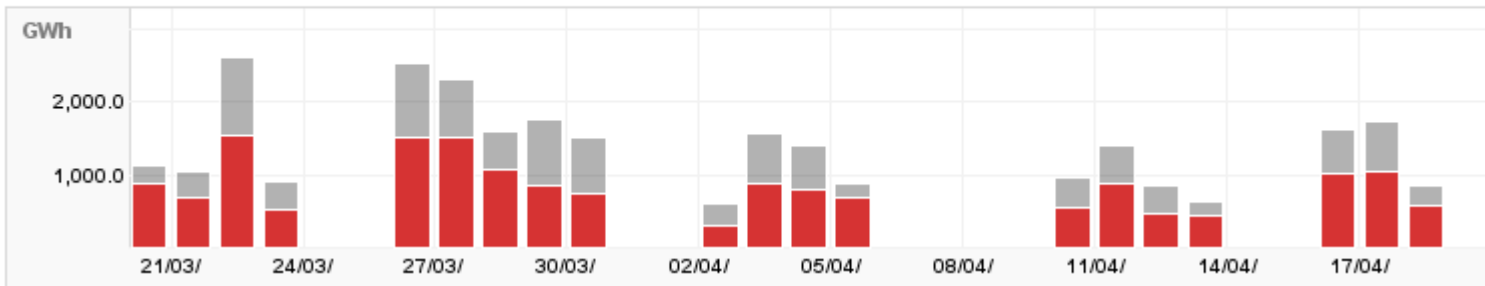
[www.eex.com/en/Market Data/Trading Data/Power](http://www.eex.com/en/Market%20Data/Trading%20Data/Power)

■ Futures Market: for 2013

Price



Volume



Legend



- Futures Market: for 2013

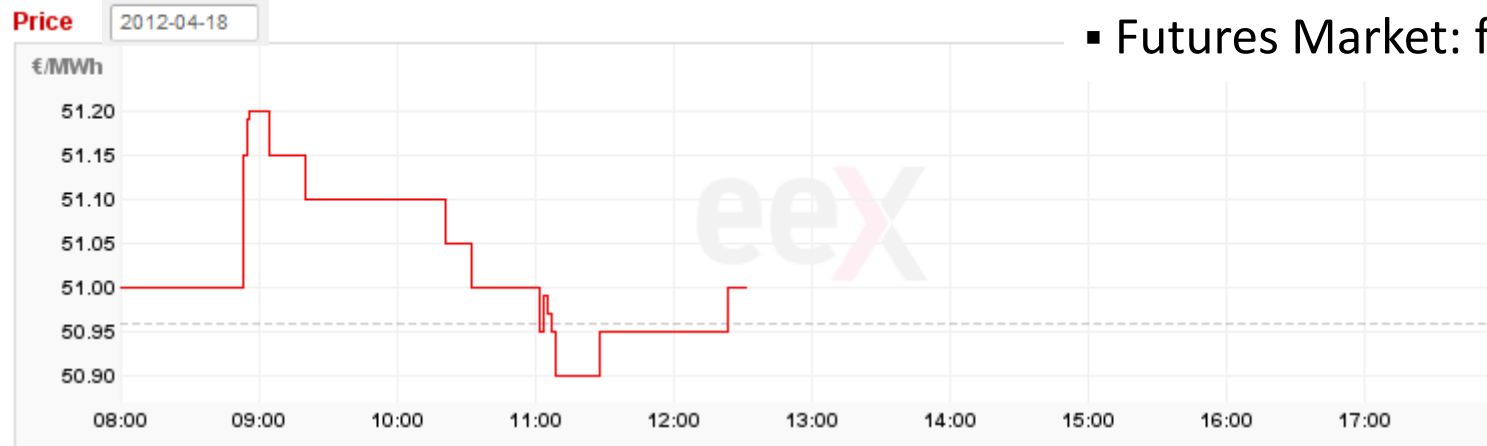
Phelix Futures | Contract information | Phelix Baseload Year Futures, Cal-13 | EEX Power Derivatives

[Overview](#)
[Chart](#)
[Data table](#)
Contract information
 [Market data as RSS feed](#)

Contract	Cal-13	Short Code	F1BY (Cal-13)	Long Code	Phelix Baseload Year Futures
ISIN Code (WKN)		DE0006606064 (660606)		Min. Tradable Unit	
Settlement Type		Cash Settlement		Delivery Rate	
Tick Size		0.01 €		1 Contract	
Contract Volume		8,760 MWh		Traded Volumes	
Minimum Price		49.95 €		304,033,320 MWh	
Open Interest		16,032		Maximum Price	
				96.00 €	
				Settlement Price	
				50.96 €	
First Delivery Day		2013/01/01		First Trading Day	
Last Delivery Day		2013/12/31		2006/12/28 08:00:00	
Cascading Day		2012/12/21		Last Trading Day	
Expiry Day		2012/12/21		2012/12/21 18:00:00	
				Delivery Period	
				Year 2013	

www.eex.com/en/Market Data/Trading Data/Power

▪ Futures Market: for 2013



Trading Overview

Last Trade	51.00	Vol. Last Trade (MWh)	43,800	Time Last Trade	12:24:20	Change +/-	0.04
Open	51.15	High	51.20	Low	50.90	Close	–
Total Volume	884,760	Traded Contracts	101	Settlement Price	–		

Legend

Last Price Cal-13
 Settlement Price Last Trading Day
 Volumen EEX
 Volume OTC

www.eex.com/en/Market Data/Trading Data/Power

- Summary of stock exchange
 - purpose of Futures Market is to secure both sides of the market
producer  distributor, big consumers
 - most producer sell their electricity well in advance
 become independent from price differences on the Spot Market
 - banks also take part in Futures Market as speculators
 risk for consumers

TABLE OF CONTENTS

Electricity Trading in Germany

1. Framework Conditions
2. Wholesale
 1. Over the Counter Market
 - Futures Market
 - Spot Market
 2. Stock Exchange
 - Futures Market
 - Spot Market

3. System Services

Bibliography

- part of the generated electricity is used as control energy
 - not traded at wholesale, but traded directly with the transmission system operator (TSO)
 - task of transmission system operator: keeping a balance between generation and consumption
 - ➡ stabilizing the grid
 - unbalance: imprecise capacity forecast, failure of power plant, varying feed-in of renewables
 - ➡ positive and negative control energy
 - quality of control energy:
 - ➡ primary control
 - ➡ secondary control
 - ➡ minute reserve

- primary control:
 - in case of frequency deviations bigger than 10 mHz
 - automatic operation with a controller which is placed at the control energy supplier
- secondary control:
 - within 5 min frequency shall be brought back to the set point
 - secondary control replaces the primary control
 - activation due to a capacity- frequency controller
- minute reserve:
 - in case of longer disturbances in the grid
 - complete activation within 15 min
 - has to be requested by the transmission system operator
- trade of reserve has to be done by a request for proposal
 - electricity can be offered by power plants operators as well as electricity consumers which can go without electricity for a certain time

- Bundeskartellamt: Sektoruntersuchung Stromerzeugung Stromgroßhandel, Bericht gemäß § 32 e Abs. 3 GWB, Januar 2011
- <http://www.tagesschau.de/wirtschaft/stromboerse104.html>
- Strommarktdesign: Preisbildungsmechanismus im Auktionsverfahren für Stromstundenkontrakte an der EEX, Prof. Dr. Axel Ockenfels
- <http://www.eex.com/en/Market Data/Trading Data/Power>

Thanks for Your Attention



Hours		Wed, 04/11	Thu, 04/12	Fri, 04/12	Sat, 04/14	Sun, 04/15	Mon, 04/16	Tue, 04/17	Wed, 04/18
00-01	€/MWh	42.10	44.08	48.00	44.95	42.52	32.02	40.79	39.40
	MWh	25,594.7	25,818.3	26,405.3	25,347.1	26,422.8	25,919.9	25,256.1	25,685.5
01-02	€/MWh	38.20	41.07	44.01	41.07	37.12	30.87	40.37	38.24
	MWh	26,171.8	26,338.5	26,327.9	25,475.2	25,835.6	24,782.6	24,507.2	25,798.8
02-03	€/MWh	37.15	41.67	42.81	41.12	31.64	29.56	41.92	35.79
	MWh	26,587.7	26,181.1	26,201.1	25,826.5	24,848.8	24,104.5	25,489.9	26,288.6
03-04	€/MWh	35.03	38.15	41.73	40.35	30.47	28.00	38.87	34.83
	MWh	25,885.8	24,968.1	24,771.8	25,827.7	24,429.5	23,808.5	24,182.3	25,821.7
04-05	€/MWh	35.83	39.06	40.75	39.35	30.88	28.06	38.44	34.40
	MWh	24,804.8	24,091.9	24,089.5	25,264.1	24,664.7	23,763.7	22,838.5	24,589.8
05-06	€/MWh	40.93	43.06	42.52	39.32	36.58	32.06	42.87	38.17
	MWh	24,336.2	23,834.7	24,158.9	24,933.4	24,382.5	23,910.7	23,060.4	23,686.8
06-07	€/MWh	54.38	58.03	55.18	38.88	28.76	41.82	61.19	42.44
	MWh	25,140.5	23,582.9	24,541.7	24,988.7	23,575.7	27,353.8	23,748.7	25,872.5
07-08	€/MWh	59.22	56.79	72.98	42.34	30.00	60.98	74.94	57.91
	MWh	26,547.4	24,588.3	26,950.4	24,485.2	24,693.5	28,133.8	26,554.2	26,243.3
08-09	€/MWh	77.79	64.00	81.19	47.84	30.89	62.80	78.19	79.89
	MWh	29,297.0	30,018.5	30,977.8	26,634.7	25,822.0	29,084.8	32,158.1	27,553.0
09-10	€/MWh	79.24	82.06	76.50	51.00	35.00	61.18	61.97	74.00
	MWh	38,906.9	32,864.7	32,931.9	29,297.2	27,378.8	31,150.1	35,411.4	29,477.2
10-11	€/MWh	79.33	61.09	74.48	50.78	36.10	60.92	52.91	76.41
	MWh	31,371.4	34,862.3	34,713.8	29,485.1	29,289.0	32,957.9	37,043.8	31,287.1
11-12	€/MWh	64.89	83.44	68.03	51.51	40.70	65.14	60.76	87.04
	MWh	32,421.8	36,425.9	35,857.8	30,587.9	31,371.1	34,082.9	38,682.2	32,149.6
12-13	€/MWh	60.12	57.38	66.28	53.91	41.03	42.79	47.68	61.81
	MWh	32,948.5	37,307.5	36,277.8	31,538.1	31,866.8	35,459.9	38,887.5	34,267.4
13-14	€/MWh	59.93	52.87	57.20	47.42	33.13	41.58	45.42	58.93
	MWh	33,033.9	37,023.8	36,184.8	31,786.5	31,171.8	35,587.2	38,888.3	34,875.1
14-15	€/MWh	52.00	50.86	47.17	43.83	29.49	40.38	43.15	52.22
	MWh	32,136.5	36,157.8	36,117.1	30,818.8	30,326.8	34,342.9	37,742.5	33,804.6
15-16	€/MWh	49.25	48.44	44.93	41.81	29.10	39.75	43.34	48.25
	MWh	31,317.2	34,200.4	35,209.3	27,879.3	29,837.8	34,106.4	36,488.8	32,888.8
16-17	€/MWh	46.53	45.46	44.08	38.93	27.74	38.00	44.91	43.73
	MWh	30,018.7	32,021.8	33,856.7	26,483.3	28,837.8	32,626.2	33,790.1	31,737.8
17-18	€/MWh	48.06	48.96	48.25	41.32	29.42	41.84	52.95	40.07
	MWh	30,983.4	30,961.4	31,625.4	25,021.4	27,368.7	32,042.4	31,241.0	28,387.8
18-19	€/MWh	57.12	68.04	60.32	48.11	32.96	61.08	65.12	61.52