Power Trading
# RWE Trading as operating company within the RWE Group

RWE AG (Group Center)

<table>
<thead>
<tr>
<th>RWE Power</th>
<th>RWE Dea</th>
<th>RWE Gas Midstream</th>
<th>RWE Trading</th>
<th>RWE Energy</th>
<th>RWE npower</th>
<th>RWE Systems</th>
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<tbody>
<tr>
<td>Upstream (Production)</td>
<td>Gas and oil production</td>
<td>Gas Midstream (commercial optimisation of procurement, transport, storage)</td>
<td>Energy trading</td>
<td>Supraregional and regional electricity and gas networks</td>
<td>Electricity and gas supply</td>
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**Continental Europe**

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**UK**

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<th>RWE npower</th>
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**RWE Trading**
The power wholesale market

Trading
"Wholesale" market

OTC market
- Spot market
  - Physical

Futures market
  - Forwards / options / structured products
    - Settlement: physical and financial

Exchange
- Spot market
  - Physical

Futures market
  - Futures / options
    - Settlement: mainly financial
Four core statements by RWE Trading on power wholesale markets

- Functioning wholesale markets are the prerequisite for competition and the ensuing economic benefits for the European industry
- The European wholesale market for electric power has shown a very positive development: Just look at the growth rate for traded volumes or the increasing number of market participants
- RWE Trading is one of the leading market participants in Europe and plays an active part in shaping the wholesale markets
- Markets require a framework and regulation, but overregulation stifles trust in the markets! Regulation should always focus on supporting competition
European power markets with outstanding development

- More than sufficient liquidity in the core markets
- Diversified and numerous market participants
- High correlation between futures and spot market prices
- Convergence of power prices in Europe
- Price peaks are also a European phenomenon
- Market position of individual producers effectively limited in the European market
Power trading volumes in Continental Europe: Increasing liquidity*

*(in bn kWh; measurable trading volume at exchanges and via electronic broker platforms OTC)
Deregulation has separated the different value-added levels - that is why the power price forms on different markets.

Regulation of network access and network access charges (Federal Network Agency)

End-customer price
Major fundamental factors influencing power prices on the wholesale market

Futures markets reflect the expectations of market participants regarding future fundamental factors of influence.

- Precipitation
- CO₂ price
- Gas price
- Oil price
- Coal price
- Uranium price
- Wind
- Storage & run-of-river hydroelectric power
- Wind-powered devices
- Thermal power stations
- Power stations / grids
- Technical outages
- Revisions
- Temperature
- Air conditioning
- Electric heating
- Consumer lighting usage
- School holidays
- Public holidays
- Time of day
- Lighting
- Cloud

Long-term influences:
Changes relating to market conditions
Political decisions
Changes in capacity
"Marginal power plant" principle: Decisive for price formation on the wholesale market

- The daily demand on the EEX is countered by a multitude of offers for electricity from different generation sources. Each power plant type (nuclear, gas, coal, etc.) has marginal costs for its utilisation.

- Marginal costs are mainly determined by "variable costs" for fuels (incl. CO₂) and operating resources - costs that are incurred during power plant operation and have to be earned as a minimum.

- Starting with the most favourable offer, power plants are successively called upon on the EEX until demand is met.

- The offer price of the last power plant needed to meet this demand ("marginal power plant") determines the market price for all other power plants.

- The power price thus results from the intersection of supply and demand. That is why in case of high demand prices will be rather determined by a gas-fired power plant with relatively high marginal costs whereas in case of low demand they will be rather determined by a lower-cost coal-fired power plant.
Forward price development in Europe

Marked price increase throughout Europe in 2005 and 2006. Since mid-2006, stable price level for Germany at around 55 €/MWh.
Price increase for 2008 since 2005

Germany shows the slightest price increase by European comparison at 48%.
European networking effectively limits the market position of individual producers

Relevant production for Germany is 192 GW.

Share of the "large four": 43 %

Conclusion of the "EU Sector Inquiry" regarding networking*:

"Pivotal Supplier Index (PSI) for Germany is small"

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<th>Region</th>
<th>Share</th>
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<tr>
<td>F</td>
<td>100.0 %</td>
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<tr>
<td>BE</td>
<td>97.2 %</td>
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<tr>
<td>E</td>
<td>8.2 %</td>
</tr>
<tr>
<td>NL</td>
<td>0.0 %</td>
</tr>
<tr>
<td>DE</td>
<td>0.0 %</td>
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* Source: EU Sector Inquiry 2005/2006, study by LE-GED
Power price effects on new power plant construction

"Spark" and "Dark Spread" products for 2007 traded in 2006
Economic reality:
High market price level needed for investment

- Free market price formation ensures that electricity supply and demand are always balanced.

- Growing shortages on the market lead to higher prices; higher prices provide incentives for corporate investments in new power plant capacities. Construction of new capacities will result in price competition and will thus have a price-curbing effect in the future.

- The current power price level is necessary for investors to build the new power plants required.

- Only when prices exceed full costs, there is an incentive for investors to build new power plants. If prices are lower, there will be no new plant construction. (Full costs of a hard coal-fired power plant: 50-60 €/MWh; current wholesale price: 57 €/MWh).

- In a normal market cycle, profits are also countered by bad times with low proceeds or losses.

- Profits must always reflect the risk involved in such long-term investments.
Rising exports are a sign for functioning competition: Electric power also "looks for" a way to the highest price, where possible. If a trader can sell electricity at a higher price in a neighbouring European country than at home, he will try to use this opportunity. Different production structures and different fundamental influences result in growing cross-border trading (but not necessarily to growing physical electricity flows).

**Northern Europe**
- Strongly dependent on hydropower and thus largely influenced by other fundamental influencing factors than other European regions
- Presently "normal" water levels

**Southern Europe**
- Increased use of air conditioning and electric heating
- Failing hydropower production
- Generally increasing demand due to economic development

**Eastern Europe**
- Partly subsidised cheaper electricity
- No open wholesale markets
- CO₂ not as fungible as in open energy markets

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Price level regularly higher than in Germany
Price level regularly lower than in Germany
Power wholesale markets and market deregulation - status quo regarding cross-border network capacities

Germany already complies with all requirements for cross-border network capacities.

- Non-compliant
- Compliant with most requirements
- Compliant
- Long-term agreements are available (no publicly accessible information)

Last amended: April 2006
RWE Trading
European external power trade 2006

The cross-border trade with electric power aligns European wholesale prices and balances insufficient and excess capacities.

Figures in TWh

- **Denmark**
  - Import: 5.8 TWh
  - Export: 4.0 TWh

- **Sweden**
  - Import: 2.0 TWh
  - Export: 1.5 TWh

- **Netherlands**
  - Import: 0.3 TWh
  - Export: 22.3 TWh

- **Luxembourg**
  - Import: 0.8 TWh
  - Export: 5.1 TWh

- **France**
  - Import: 16.2 TWh
  - Export: 0.9 TWh

- **Poland**
  - Import: 0.7 TWh
  - Export: 2.6 TWh

- **Czech Republic**
  - Import: 0.6 TWh
  - Export: 12.1 TWh

- **Switzerland**
  - Import: 2.9 TWh
  - Export: 13.7 TWh

- **Austria**
  - Import: 5.8 TWh
  - Export: 14.8 TWh

*physical


RWE has increased the capacity of its connections to the Netherlands and France by 40% since 2000.

There are plans for a further extension of the RWE network; long-winded licensing procedures, however, require a lot of time.
Back-up
RWE Trading is „the eye on the market“

- RWE Trading functions as the wholesale-driven benchmark for the generation and supply sides of the RWE Group.
- RWE traders not only deal with commodities such as power, gas, coal and oil, they also actively trade physical and financial derivatives as well as environmental certificates.
- The asset based commodity positions of RWE Group are sold to or bought from RWE Trading at wholesale market prices. We consolidate these positions through proprietary trading. This hedging helps us to manage the risks of having very large open positions in each of the physical commodity markets.
- This business model unites the natural focus on obtaining the best potential value from the RWE Group´s physical assets with the benefits of financial (proprietary) trading.

* STPM = Short-Term Position Management
RWE Trading is one of the largest and most important European energy commodity traders.

With a workforce of over 500 employees, RWE Trading operates trading floors in Essen, Swindon and London, as well as representative and agency offices across Europe.

RWE Trading is active on leading international exchanges. Besides our activities in Europe, RWE Trading actively trades at the NYMEX and in the global commodity markets

**Oil:** USA, Europe, Asia, Middle East

**Coal:** ARA, Newcastle, Richards Bay

RWE Trading currently forms the backbone of the European OTC power and gas trading business.
Our power trading volumes have seen consistent growth in recent years. This is just one indication of RWE Trading’s successful market approach. Slight decline in 2006 was due to politically influenced market distortions in France and Spain.
RWE Trading also has a great number of trading partners - "strategic behaviour"?

The wholesale market in Germany is not a "private function".

In the first 8 months of 2006, for instance, the share in the trading volume of RWE Trading with the "3 large Germans"* accounted for only 6% of the total volume traded by RWE.

The wholesale market has an international focus and - with the exception of industrial customers which still "abstain" - is a cross-industry market.

* e.on, Vattenfall, ENBW

RWE Trading