ROLE OF AN ORIGINATOR IN POWER TRADING

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<table>
<thead>
<tr>
<th>Trading</th>
<th>Origination</th>
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</thead>
<tbody>
<tr>
<td>timing is everything</td>
<td>price is everything</td>
</tr>
<tr>
<td>on screen</td>
<td>off-screen</td>
</tr>
<tr>
<td>over the phone</td>
<td>face to face negotiation</td>
</tr>
<tr>
<td>exchange, broker</td>
<td>direct between counterparties</td>
</tr>
<tr>
<td>existing (approved) counterparties</td>
<td>also not yet approved counterparty</td>
</tr>
<tr>
<td>existing master agreement (EFET, ISDA)</td>
<td>need to enter the whole contract</td>
</tr>
<tr>
<td>strict limits</td>
<td>transaction has to be approved</td>
</tr>
<tr>
<td>liquid products</td>
<td>non liquid products</td>
</tr>
<tr>
<td>mostly &quot;plain vanilla&quot; standard contracts</td>
<td>mostly structured contract</td>
</tr>
<tr>
<td>short to mid term analytical</td>
<td>mid to long term analytical</td>
</tr>
<tr>
<td>price is known in advance</td>
<td>price is not known in advance</td>
</tr>
<tr>
<td>takes open position short/long</td>
<td>hedge position</td>
</tr>
<tr>
<td>mostly individual result to close deal</td>
<td>mostly collective result to close deal</td>
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The products negotiated are similar to those traded in other commodity markets, Futures and forwards:

- Swaps
- Options: CALL if the buyer has the right to BUY
  PUT if the buyer has the right to SELL

...and any combination of all of them.

Leading to more complex structures: extendable, interruptible price, tolling agreement (spread option), etc.
EXAMPLE OF ORIGINATION CONTRACT

First Idea: The plant owner should buy gas, produce power, and sell it only when it is profitable. Otherwise the plant owner should shut down its operation.

Further Ideas: When is shutting plant more profitable than running it with long term hedge of gas and power (buy gas, sell power)? If plant owner has right but not obligation to run power plant - is it possible to “replicate” (and valuate, trade) such option financially? What about hedging (locking up profit in advance)?

Any power plant is basically a spread option, i.e. an option on the difference between the values of two indexes. However, for the individual power plant it is a bit more complicated. To evaluate such spread option correctly, the specific operation characteristics like minimum/maximum capacity, startup time, number of startups, minimum run time, startup costs, non-maintenance and variable operation maintenance, etc. can not be ignored.

In the commodity markets, a strip of spread options with operation constraints is called Tolling agreement. Tolling agreements are non-standard in nature, contracts to be typically agreed by originators.

The power generator "rents" a whole/part of the generation capacity for a short term (1-5 years) and receives a capacity price.
- The toller receives the right to operate the plant.
- The toller is responsible for the fuel input (gas) and electricity (output) offtake.

*Note
Such structures can be financial and physical. Compared with the power plant simply producing power when spot power prices are higher than power marginal cost, the tolling agreement provides regular (fix and variable payment) income (known in advance, lock-up profit, i.e. hedge) to plant owner. The strike-price is the spread between the variable cost (fuel cost) and the electricity price paid by the Toller to the plant owner. The premium of the option represent the fixed cost of the Power Plant.
Graph shows the development of the “peak - clean spark” spread for the calendar year 2013 in Germany. Calculation assumes 50% efficiency.

The spread gradually declined from about 9 €/MWh at the start of 2011 to below 0 at the end of 2012.
The maximum capacity is 800 MW with a minimum stable generation level of 450 MW. In between both output levels the efficiency increases from 56 to 59%.

The power plant is initially in 2011, assuming it will produce during 2012. At the time, the power plant was “in-the-money” (positive intrinsic value).

*Note:
A trader could lock-in 29.08 mln € (by selling forward power and buying forward gas and CO2 = gross margin of 38.5 mln minus start costs of 3.15 mln € and variable O&M costs of 6.26 mln €). Total option value (including extrinsic value) is estimated 46.50 mln €.
The total combined performance of the trading strategy to 6.43 (spot result of running plant) plus 53.94 (forward delta hedging) = 60.37 mln €.
ORIGINATION IS ABOUT:
TO FIND A GOOD IDEA
(AVOID ALL BAD ONES)
AND DO THE DEAL.

There is no deal done until the deal is signed!!
GOOD IDEA?
Velkoobchodní ceny elektřiny
na rok 2017 v Evropě
(v EUR/MWh)
THE DECLINE OF EUROPE’S UTILITIES

Over the last five years, the EU power sector has been hit by a “perfect storm” of macroeconomic and industry-specific factors that have led to overcapacity and low prices. As a result, the region’s large publicly traded utilities have, on average, lost half of their market capitalization since 2008, destroying around EUR 500 billion of shareholder value.

The decline of Europe’s utilities has certainly been startling. At their peak in 2008, the top 20 energy utilities were worth roughly €1 trillion ($1.3 trillion). Now they are worth less than half that. Since September 2008, utilities have been the worst-performing sector in the Morgan Stanley index of global share prices.

In 2008 the top ten European utilities all had credit ratings of A or better. Now only five do.

The companies would have been in trouble anyway, whatever happened to renewables. During the 2000s, European utilities overinvested in generating capacity from fossil fuels, boosting it by 16% in Europe as a whole and by more in some countries (up 91% in Spain, for example). The market for electricity did not grow by nearly that amount, even in good times; then the financial crisis hit demand. According to the International Energy Agency, total energy demand in Europe will decline by 2% between 2010 and 2015.

THE DECLINE OF EUROPE’S UTILITIES
THE DECLINE OF EUROPE’S UTILITIES
BUSINESS AS USUAL OR GAME OVER?

The power price development over the last 14 years in Germany shows...
HISTORIC SPOT (DAY AHEAD) PRICES GERMANY
ROLLING DOWN A HILL
MERIT ORDER

Marginal costs for new gas, lignite and old hard coal power plants 2008-2015

- Lignite old, (31%)
- Hard coal (old, 35%)
- Gas (gas and steam) (new, 58%)

Merit order of the German wholesale portfolio, 2012 versus 2005

Operating costs: Euro/MWh

Electricity price due to merit-order-effect

- HIGH electricity price during times of low input from renewables
- LOW electricity price during times of high input from renewables

Note: The costs for nuclear power generation have risen as since 1 January 2011 utilities have been required to pay a tax on fuel elements.
Renewable energies development has heavily modified the power plants merit order

While renewable energies are heavily subsidized, their operational costs are almost zero. Therefore they are used as base load.

Gas plants utilization rates are dramatically decreasing, leading to their partial closure.
Note
In 2009, for example, the turbines in Niederwartha were in operation for 2,784 hours. In 2012, Vattenfall ran the facility for only 277 hours. "Price peaks that last only a few hours aren't enough to utilize the plant to full capacity," says Vattenfall.
The spark spread is the difference between the price received by a generator for electricity produced and the cost of the natural gas. The dark spread is difference between cash for electricity for coal-fired power plants. Clean spread include the price of emission allowances.

All other costs (operation and maintenance, capital and other financial costs) must be covered from the spark spread.
The LCOE calculations are based on a levelised average lifetime cost approach, using the discounted cash flow (DCF) method. The calculations use a combination of generic, country-specific and technology-specific assumptions for the various technical and economic parameters, as agreed by the EGC Expert Group. The analysis was performed using three discount rates (3%, 7% and 10%). Costs are calculated at the plant level and therefore do not include transmission and distribution costs.
ACHILLES' HEEL(S) OF THE ENERGY TRANSITION?
DĚKUJI ZA POZORNOST

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