DAILY OFFER CALCULATIONS BASED ON STRUCTURED PURCHASING

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ABSTRACT

The deregulated energy market for electricity and gas is making big structural demands on the energy suppliers. Apart from fulfilling the necessary requirements at the IT level, the companies must also come to terms with the subject matter itself in order to be able to master their new daily responsibilities. To effectively make use of the advantages of the deregulated energy market, a series of steps are required for calculating offers. A consistent data structure and an accurate forecast of the expected load demand are necessary, and form the basis of structured purchasing. The options for diversified purchasing, from short to long term, and with a multitude of available products, varying in both price and delivery period, make the calculation of offers that form the basis for future supply contracts highly complicated.

In order to meet this challenge, the forecasting and timetable management system LoadManager, developed by the company lemLeipzig, and used at the Bad Kreuznach district utility company for several years now, has been expanded with new functions. While maintaining the consistent data structure and in keeping with the requirements posed by the unbundling guidelines, functions such as portfolio management, cost coverage calculations at a per-customer resolution and offer calculations have been added step by step. The basic principle is to minimise risks by structuring the customer base to be delivered to years in advance and to cover this demand in percentage blocks purchased at different times (tranches). The customer base has a hypothetical volume, which is only filled by firm supply contracts over time. The portfolio manager responsible for this is always up to date on the level of purchasing, for example on the amount which is available for supply, or on expected bottlenecks on the purchasing side as determined by contracts to be closed in the near future. The key account manager, meanwhile, receives currently fixed defaults for making offers, which may change in accordance with the relevant delivery period.

The advantage of this method is that both purchasing and sales departments can independently use the same software system. The database-orientated application forms a level IT field across the board, and replaces complex, hard-to-learn excel-based macro solutions plus redundant and inefficient data structures.

Introduction

Closing contracts for the further and future supply of customers is one of the responsibilities of the key account manager. The offer to supply customers contains average prices in Cent/kWh for the agreed supply period. Which criteria are necessary to calculate the delivery price for a load-measured customer and which price components must be taken into account? This paper makes clear the necessity of a continuous informational coordination between the key account manager and the portfolio manager in this task.

1. Basics of an offer calculation

The sales load of a trader is formed using demand forecasts for the customers to be supplied over the agreed delivery period. It is affected by the customer structure, the consumption behaviour of the customers and the weather, and is generally subject to customers entering and leaving the system.

1.1 Load curve analysis

The time-dependant load demand for the future delivery period is crucial in pricing a load curve. On the basis of existing archive data the load analysis identifies the most significant figures, such as annual energy demand, minimum and maximum load demand, the relationship between peak and off-peak tariffs, hours of use, weather factors and the relationship between summer and winter demand.

Customer information on future production expansion, and changes to shift operation uptake are further important influencing factors.

Figure 1.1 shows an example of a customer load curve for which a supply offer is to be made:

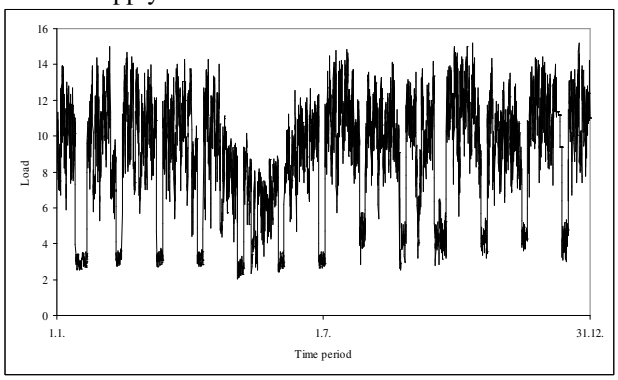

Fig. 1.1: Example of a customer load curve

1.2 Cooperation between portfolio manager and key account manager

To create a price offer the key account manager needs to know the currently calculated price for covering the load

demand, as well as quantified surcharges or reductions for handling and administration, bonus agreements, spot and reserve energy risks (fig. 1.2). This information is made available on a daily updated basis by the portfolio manager. The calculated price is then an orientation price for the key account manager when negotiating with the customer [1]. On a successful contract closure he/she enters the agreed price for supplying the customer into the database via the entry form provided.

Current segment price for acquisition period January - December 2006	Base	Peak	Total
Planned volume MWh			
Bought volume MWh			
Cost €			
Price €/MWh			
Sold to customers MWh			
free amount MWh			
Currently calculated price Cent/kWh:			

Risk-surcharges for segment:	
Spot market risk €/MWh:	
Reserve energy risk €/MWh:	
New price determination Cent/kWh	

17.08.2005 (current day)

Fig. 1.2: Selected components of an offer calculation

For the portfolio manager this means a reduction by this customer's load curve in the amount of work available for contract closure (free volume) in the acquisition portfolio.

2. Classification of the sales load

The sales load may be classified according to various criteria. One example for this is the splitting into customer segments.

Fig. 2.1 classifies the sales load according to real-load-measured (RLM) and non-measured customers (profile), whereby RLM customers have a medium to high load demand. Examples of these are industrial companies, department stores and petrol stations; their historic load demand is available as a 15' time series for a longish period of time. It is mainly technological processes which determine the time-dependant load demand, but there can be an element of weather-dependency too.

The share of load profile customers in fig. 2.1 is very high, so that a further structuring seems to be necessary.

Customer RLM1 in fig. 2.1 has a high energy demand and is classified as a key account, whilst RLM2 is composed of customers with a medium energy demand.

Fig. 2.2 shows a splitting of the load profile customers into weather-independent (SLP) and weather-dependent profile customers, whereby the weather-dependent profiles have been further split into temperature-dependent (TLP) and multi-factor weather-dependent load profiles.

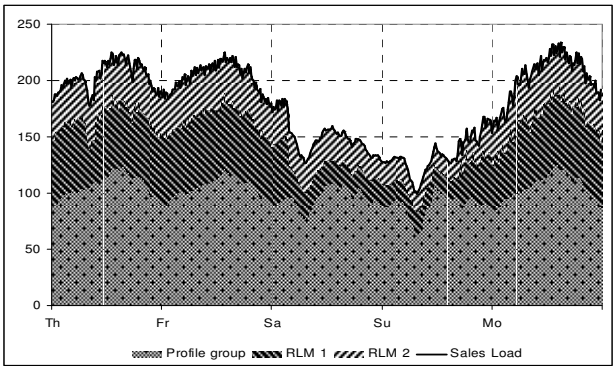

Fig. 2.1: Structure of a sales load

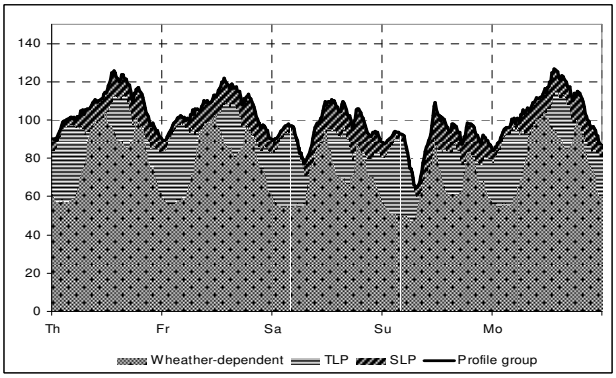

Fig. 2.2: Load demand of load profile customers

Fig. 2.3 shows the four customers in RLM2:

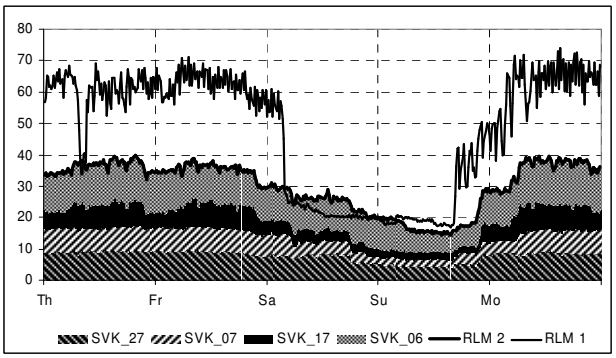

Fig. 2.3: Structure of the measured customers

2.1 EEG obligatory uptake

As a result of currently existing laws, every customer is obliged to take up its EEG share. This thus has a fixed share of the load coverage. The grid system operator sets the future monthly uptake quotas. There are currently three customer categories:

- general obligatory uptake
- obligatory uptake acc. to hardship provision 1
- obligatory uptake acc. to hardship provision 2.

This classification means that every customer must be assigned to the right EEG obligatory uptake category.

The obligatory uptake for the agreed delivery period is then calculated at the level of the individual customer.

2.2 EEG-adjusted sales load

The difference between the forecast customer demand and

the calculated obligatory uptake represents the EEG-adjusted load demand in the supply period. The sum of all EEG-adjusted customer load curves gives the EEG-adjusted sales load in the supply period.

3. Acquistion strategies for the sales load

3.1 Long-term acquisition

One of the responsibilities of the portfolio manager is the cost-efficient acquisition of the EEG-adjusted sales load. To do this he uses various strategies laid down by the company. He can, for example, buy in the EEG-adjusted sales load as shown in fig. 2.2 daily on the spot market or buy in for the following year as a timetable. Both extremes withhold great disadvantages:

- an acquisition only on the spot market is subject to large price risks
- a timetable acquisition all via the forward markets is inflexible and difficult to handle should customer behaviour change or customers change their supplier.
- the acquisition of the sales load in one go makes no price differentiation possible and thus no fair, cause-based allocation of costs.

It is sensible and necessary to structure the sales load according to customer segments and to carry out the acquisition within the customer segments.

One way of creating customer segments is shown in figs. 2.1 to 2.3. The EEG-adjusted sales load shown here consists of the customer segments RLM 1, RLM 2, SLP, TLP, as well as weather-dependent profile customers.

The load demand of each customer segment is either volume-neutrally or cost-neutrally hedged for the future acquisition period depending on the company strategy. The result recommends which forward products to purchase, split into base and peak for the coming years, 7 quarters or 7 months.

Generally the acquisition per customer segment is either in base or peak tranches or in timetable tranches or back-to-back. For the customer segments contained in the sales load shown in fig. 2.1, a possible means of covering their demand is shown in tab. 3.1. Each customer segment is acquired in an EEG-adjusted form and the EEG obligatory uptake is taken into account as a monthly band.

The sales load in tab. 3.1 consists of 5 customer segments. Each customer segment is separately hedged and has its own long-term acquisition strategy [2].

Customer segments:	Minus EEG-obliguptake	Neutral hedge acc: vol / costs	long-term acquisition strategy
Weather-dep.profile gp.	Monthly band	Base, peak for segment	in tranches
RLM 1	Monthly band	Base, peak per RLM1 cust.	back-to-back per RLM1 cust
RLM 2	Monthly band	Base, peak for segment	in tranches
SLP	Monthly band	Base, peak for segment	as timetable in tranches
TLP	Monthly band	Base, peak for segment	in tranches

Tab. 3.1: Acquisition strategies

3.2 Acquisition assessment in segments

Thus the load demand for customer segment RLM 1 is covered directly after contract closure with the ascertained base and peak forward products (back-to-back). All base and peak contracts are registered with their specific prices. The load demand for customer segment RLM 2 is split into tranches in order to spread the risks, whereby one tranch contains the acquisition volume for base and peak and the latest possible purchasing date. The tranches may be filled with contracts. Several carried out deals have their own specific price and may also be summarised as one contract. Through the acquisition in segments the portfolio manager gets an overview of the contract structure and the average price for each segment. If the amount so far sold by the key account manager is larger than the previously acquired amount, then this is a signal for the portfolio manager to buy in for the customer segment in which the customer with whom the key account manager has just closed a supply contract belongs.

Transactions from acquired contracts between the segments are permissible under consideration of the contract sum bookings. This leads to changes in the composition and the price structure of the affected segments.

3.3 Assess open positions

To make purchasing decisions in a segment the open positions are assessed.

The creation of a daily updated Hourly Forward Curve (HFC) from the current futures prices for base and peak products and the past spot market prices at the EEX (European Energy Exchange) is necessary for this assessment. The results create base and peak products with various time horizons, such as monthly, quarterly and yearly products for the customer demand.

The key account manager gets a price guide for the average price of the customer segment to be bought in for from the portfolio manager, using this current mark-to-forecast assessment in €/MWh.

4. Determination of risk surcharges

In the offer calculation there is the question of the quantification of the risk surcharges for the reserve energy and spot market stated in fig. 1.2.

Generally, values gleaned from experience are used in the choice of the level of risk surcharge. They serve as orientation markers. The following describes a method of a statistically justified quantification of the reserve energy risk [3]. The method described is analogous for the spot market risk.

4.1 Determination of reserve energy risk

As described in section 1.1, the time-dependent load demand is affected by various factors, so that the forecast time series contains errors. These forecast deviations cost money and thus form the risk position of the customer. Fig. 4.2 shows the customer load curve from fig. 1.1 with its

long-term forecast:

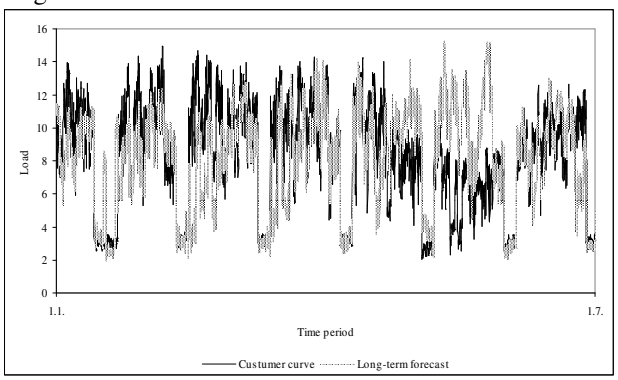

Fig. 4.2: Comparison of long-term forecast and measured load curve

The grid zone operator publishes the price-time series for reserve energy after the fact. These price-time series and the forecast deviation can be statistically analysed.

4.2 Statistically justified quantification

To carry out this analysis a comparison period with forecast and measured load curves is selected.

For each 15' interval the reserve energy in MWh is calculated and then assessed using an ensemble of reserve energy price-time series (e.g. 1000).

With the resulting frequency distribution curve for reserve energy costs a quantile, e.g. 95% may be chosen, which defines the reserve energy risk [4]. In fig. 4.3 this frequency distribution curve is shown for RLM 1 with 1000 runs:

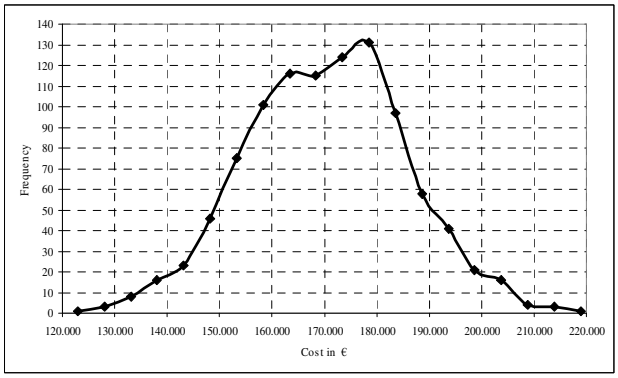

Fig. 4.3: Frequency distribution for segment RLM 1

As a result of this and the displayed distribution in fig. 4.4 the 95% quantile gives reserve energy costs of 190,000.-€:

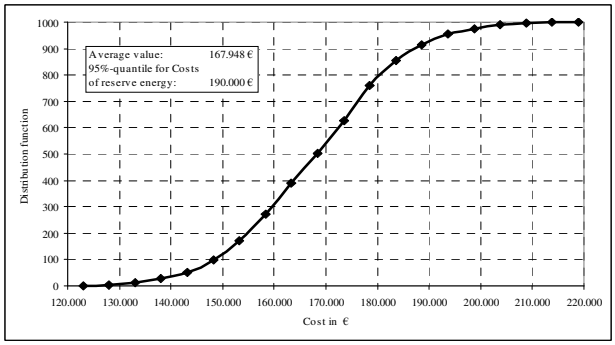

Fig. 4.4: Reserve energy costs for RLM 1

For a consumption of 96,608 MWh a risk surcharge of 1.97 €/MWh is incurred.

5. IT SOLUTION

Offer calculations are commonly carried out using Excel. This method is very risky because of the high dependence on individual employees caused by the developed macro solutions and is not able to meet future demands.

The emerging increase in time pressure between offer request and proposal submittal is making a consistent solution at an IT level necessary.

The method presented was developed as a database orientated software application and the solution steps are comprehensible at all times.

The portfolio manager and the key account manager use the same information base and the same software functions. If necessary, a rights management concept which meets the demands of unbundling guarantees that the functions and data necessary for carrying out the tasks are made available to the relevant team.

6. RESUME AND OUTLOOK

The database based software solution presented here is highly flexible in calculating offers. We recommend a segmented acquisition of the EEG-adjusted sales load, whereby an exchange between the allocated acquisition contracts from within the segments is possible at any time. Many different ways of covering the open positions is made possible. They can thus be calculated, hedged and acquired overall and allocated to segments or they can be dealt with in a totally segmental way.

This method requires a comprehensive, always-on comprehensibility of the actions carried out with a polished and flexible reporting capability.

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