

## THE MANAGEMENT OF SUPPLYING CONSUMERS WITH ELECTRIC ENERGY

**Ioan Constantin RADA, Stefan NAGY, Simona Veronica ABRUDAN CACIORA**

University of Oradea, Universitatii Street no.1, phone number 1740/048182, e-mail

[irada@uoradea.ro](mailto:irada@uoradea.ro)

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Abstract: The supplier of electric energy should make predictions in relation with the selling of electric energy. If these predictions are very different from the actual situation, the supplier will be faced with a selling capacity in excess or will lose money, as a result of an underestimation of the selling capacity. The following questions need to be answered: Which are the main concepts in measuring and predicting the demand for electric energy? How can we estimate the current demand? How can we estimate the future demand?

### INTRODUCTION

The consumer (C) is associated with the total of electric installations for distribution and usage, afferent to an enterprise, institution or community.

The supplier (F) of electric energy is associated with the total of installations for the production, the transport and the distribution of electric energy.

The electric energy is transmitted from the supplier to consumer by means of a reception station (RS) that, depending on the consumer, can be a transformation station, (TS), transformation post (TP), or a switchboard (S). The point of separation between supplier and consumer is called delimitation point (DP).

The delimitation points are separate if each one of them can supply the power that the customer needs, in the situation in which the tension disappears at the other point. Such points can be supplied from:

- ▶ Two different power or electrical stations
- ▶ Two bar sections from the same power or electrical station, if each station benefits from independent supply ways (generators, lines, transformers), and the sections are either separate or connected by means of a switch with quick starting in case of perturbation of the normal functioning system in one of the sections.

The supply of the consumer of electric energy can be done from one of the following sources:

- **The central source**, that provides the supply with electric energy of the consumers' receivers, in a normal regime of functioning
- **The reserve source**, that allows the supply with electric energy of the consumers' receivers when the central source is not in use
- **The intervention source** that provides the electric energy for a restricted number of receivers, with the view of avoiding some dangerous phenomena at the consumer. It can be represented by a separate power station, of some small synchronous generators, activated by motors with internal combustion, of some Diesel groups with quick starting or batteries for accumulators.

The degree of satisfaction, in terms of the supply of customers with electric energy, at the point of delimitation for installations, is defined as the ratio of the probable duration for supply and the demanded supply duration

$$SCD = \frac{T_c - T_n}{T_c} 100\% , \text{ where}$$

SCD is the degree of supply completion,  
 Tc – the interval of time in a year when the consumer demands a safety criterion,  
 and  
 Tn – the probable duration of non-supply, during the period taken into consideration.

**Section 1. BASIC CONCEPTS IN ESTIMATING THE DEMAND FOR ELECTRIC ENERGY**

The concept of demand should be clearly defined:

**1.1 Different types of estimating the demand**

In terms of place	Oradea			
	Marghita			
	Salonta			
	Beiuș			
	Vașcău			
In terms of marketing	Total of items sold			
	Sales from the central source			
	Sales from the reserve source			
	Sales from the intervention source			
	Categories of consumers of electric energy			
	The classification of consumers' receivers, in relation to demands for continuity of the supply			
		Short	Medium	Long
In terms of time				

Tab.1 90 types of the demand evaluation (6x5x3)

The figure above indicates 90 types of estimations for demand that the supplier may use. The demand may be estimated for 6 levels of marketing, 5 levels of space and 3 levels of time.

**1.2 The market that needs to be estimated**

The specialists in marketing speak about different types of markets: potential, available, target or penetrated.

**The market** is made up of the totality of current and potential buyers for a certain product.

**The dimension of the market** is established in terms of potential customers, in the case of a certain offer.

**The potential customer** is defined in terms of three aspects: interest, revenue and access.

For instance, we might take into consideration the customers on the market for electric energy, for the category of ZERO receptors, in terms of continuity in supply. The number of buyers potentially interested in buying this type of energy is estimated. To achieve this, a sample of potential buyers will be asked if they are interested in buying electric energy for the ZERO receptors; if one in ten potential customers answers positively, one could assume that 10% of the total number of customers will constitute the potential market for that type of electric energy.

**The potential market** is made up of buyers that present a sufficiently high interest in that particular offer.

However, it is not enough to take into consideration just the interest demonstrated by buyers in order to define the market. The potential buyers must have sufficiently high revenues in order to afford the acquisition of electric energy for the category of ZERO receptors. The higher the price, the more reduced the number of persons answering positively to the question mentioned above.

Thus, the dimension of the market is defined in terms of interest and revenue. The access barriers reduce the dimension of the market. If the electric energy is not distributed for the category of ZERO receptors, in the field of the supplier's activity, the potential consumers are excluded.

**The available market** consists of a number of buyers that present interest and have sufficient revenues and access to a certain type of offer for electric energy.

For certain offers, the supplier of electric energy can establish buying restrictions for certain groups. That particular offer is only for those customers that prove they have receptors with continuity demands, as far the supply with electric energy is concerned. The other customers represent the established available market (the totality of consumers that demonstrate interest in the offer).

The supplier needs to choose between two alternatives: that of catering for the whole available and qualified market, or for a segment of this market.

**The target market** represents a part of the available and qualified market, on which the supplier chooses to concentrate its attention. It can choose, for example, to concentrate its marketing efforts in the segment where it can identify ZERO receptors of the I, II and III category, in terms of demands for the continuity of provision with electric energy. This market segment becomes, for our supplier, the target-client market. Each supplier will sell on its target market.

**The penetrated market** refers to the totality of consumers that have really bought electric energy.

The following figure indicates all the concepts mentioned above, together with some hypothetical percent values:

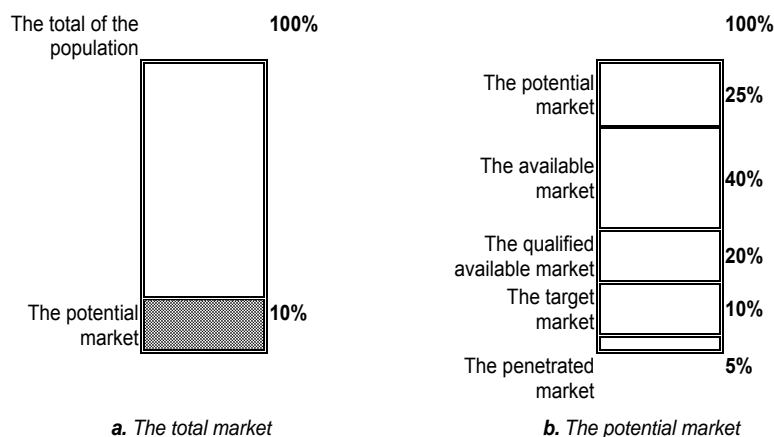


Fig.1.

The left column illustrates the share of the potential market - all the persons interested - from the total of the population. The right column represents the potential market, of which the largest part - 40% is represented by the available market. The available qualified market is made up of buyers that satisfy the legal demands and represent 20% of the potential market, or 50% of the available market.

The supplier, together with its competitors, has generated 5% of the potential market, namely 50% of the target market.

The definitions of the market represent a useful tool for planning. If the supplier of electric energy is not content with the current level of selling, it can adopt several

measures, for instance: to attract more buyers for the target market, to reduce the qualifications demanded for the potential customers, to extend the distribution, or to lower the price. It can also extend the potential market with the help of advertisements, thus being able to attract customers that have not been interested before.

### **1.3 Elements concerning the evaluation of demand for electric energy**

Conceptele majore în măsurarea cererii sunt cererea de piață și cererea agentului pentru comercializarea produselor petroliere. În continuare, vom face distincția între funcția cererii de piață, previziunea de piață și potențialul de piață.

#### **Cererea de piață**

The major concepts in this respect are the market demand and the demand of the agent that sells oil products. We shall explain the difference between the function of market demand, market prediction and market potential.

#### **The market demand**

While evaluating the market opportunities, the first step would be the estimation of the total demand of the market. The market demand for a certain product represents the total volume that might be bought by a certain group of buyers, in a certain geographical area, during a certain period of time, by means of a marketing programme. The total demand of the market has no fixed value, but depends on pre-established conditions; for this reason it is also called "the function of market demand".

The figure above presents the dependence of the total demand of the market upon the established conditions. The horizontal line indicates the possible levels of market expenses in a determined period of time. The vertical line indicates the level of resulted demand. The curve represents the estimated demand, associated with the level of market expenses. Some basic sales (called market minimum) are achieved without involving expenses for the stimulation of demand. The higher levels of market expenses generate higher levels of demand, the latter being initially higher, then smaller than the former. The market expenses that go beyond a certain level do not stimulate the increase of the demand, which indicates that there is an upper level of demand, which is called market potential.

The difference between the market minimum and the market potential emphasizes the sensitivity of demand to the market efforts.

We shall consider two extreme types of markets: the expansible one and the non-expansible one. An expansible market (for instance the market for electric energy from the intervention source) is quite affected, in terms of its total size, by the level of market expenses. In accordance with *fig.a*, the difference between Q1 and Q2 is big. A non/expansible market (for instance the market of electric energy from basic sources) is not very much affected by the level of marketing expenses; the distance between Q1 and Q2 is relatively small. For the selling processes in this non-expansible market we can consider, for instance, the expansion of the market (the level of primary demand) and the direction of market resources so that the expected market quota can be attained (the level of the selective demand).

The function of demand refers to current predictions in terms of the marketing effort on the current market.

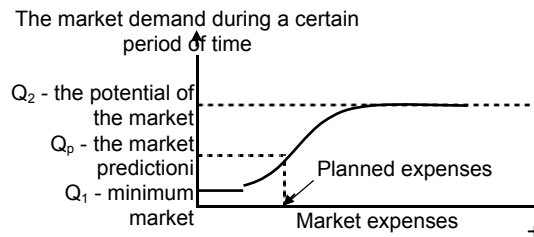
#### **The market prediction**

The expenses for the market will have a single real level, the demand corresponding to this level.

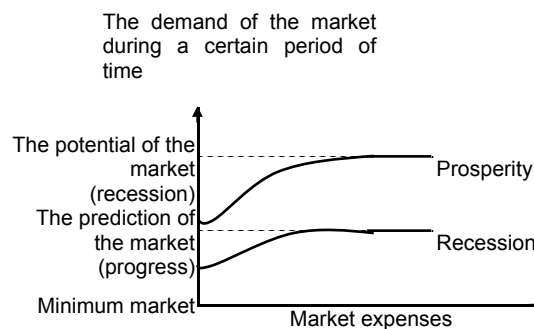
#### **The market potential**

The market prevision indicates the expected demand, not the maximum demand. Thus we need to find out the demand for a very high level of market expenses, when

subsequent increase of the market effort would have minimum effects in the simulation of demand.



a. The market demand as a function of market expenses (demanding a certain market level)



b. The market demand as a function of market expenses (demanding two different market areas)

Fig.. 2

The potential of the market represents the limit towards which the demand tends, for a certain area, when the market expenses tend towards infinite.

This idea (of a certain area) is crucial for the concept of potential market. We need to consider the potential market for electric energy that comes from the basic source, in a period of recession and in a period of prosperity. The demand is very flexible in relation to revenues. The dependence relation between the potential of the market and the environment is illustrated in *figure b* (the market demand as a function of market expenses). A distinction should be made between the position of the demand function, the level of demand and their interdependence. The supplier cannot influence the position of the demand function; the latter is determined by the market environment. However, it can influence its own position in relation to the demand when it decides how much it will spend with the market activities.

The demand satisfied by the supplier of electric energy

The demand of the supplier represents its share from the market demand:

$$Q_i = S_i Q,$$

Where  $Q_i$  = demand satisfied by the supplier of electric energy

$S_i$  = the supplier's market share

$Q$  = the total demand on the market

The market share of the provider depends very much upon the way in which different electric energy offers, services, prices are perceived in relation to those of its competitors. The market share of the supplier depends upon the extent and the efficiency of its market expenses in relation to those of its competitors. Specialists in market models have established reaction functions of sale, in order to indicate the way in which the sales

of a company are influenced by the level of market expenses, the marketing mix and the efficiency of marketing.

#### **The predictions of the company**

The demand satisfied by the supplier of electric energy describes its estimated sale at different levels of the market effort. The management will choose the level of market expenses. The chosen level of the marketing effort will generate a certain level of the sale, which is called the prediction of the supplier's sale. This refers to the expected level of sale, starting from a certain market plan and market environment. It can be represented in the same way as the market prediction (shown in *figure a*).

The relationship between the predictions of the supplier and its market plan can often be confusing. When it is said that the supplier should develop the market plan, starting from the prediction of the sale, the demand satisfied by the supplier should be non-expansible. The relationship is not real if the demand is expansible, or when the prediction refers to an estimation of the supplier's sale. The sale prediction is a result of a certain market expenses plan.

Further on, we shall define two other concepts related to the prediction of the electric energy supplier's sale.

**The sale quota** represents the sale expected to be achieved for a certain kind of supply, from certain sources and for certain categories of customers. It is mainly an instrument for the definition and simulation of the selling effort. The selling quota is established starting from the predictions of the supplier's sale and the psychology of achievement simulation. Generally speaking, the sale quotas are established at a slightly higher level of estimated sale, in order to reduce the sale effort.

The sale budget represents an estimation of the expected volume of sales and is mainly used for current acquisitions, marketing and decisions concerning the cash flux.

The sales budget takes into consideration the sales prediction and the need to avoid excessive risks. This budget is usually established at a slightly lower level than the sales prediction.

#### **The potential of the supplier of electric energy**

The sales potential of the supplier represents the limit towards which the demand satisfied by the supplier tends, when the supplier's or the market effort increases in relation to those of the competitors. The highest limit of the demand that can be satisfied by the supplier represents **the potential market**. These two are equal when the supplier occupies 100% form the market. Most often, the supplier's sales potential is lower than the potential market, because each supplier has its own customers that do not respond to the supplier's efforts to attract them.

## **Section 2. ESTIMATING THE CURRENT DEMAND**

In order to achieve this objective, the practical methods of estimating the current demand for electric energy need to be made clear. The supplier's managers need to estimate the total potential of the market, the total sales and the market quotas.

### **2.1 The total potential of the market**

It represents the maximum volume of sales and can be obtained by any supplier of electric energy in terms of its activity, time period, level of the market effort and certain environment conditions. A usual way of estimating the total potential of the market is to apply the formula:

$$Q = nqp,$$

Where Q = the total potential of the market

n = the total number of buyers or the respective market

q = the quantity of electric energy bought by a medium buyer



$p$  = the price of a unity of electric energy

The “ $n$ ” variable is the most difficult to be estimated.

## 2.2 The potential of the market for each area

The supplier might be confronted with the problem of choosing the best area for the supply and that of providing the optimum market budget for that particular area. Thus, the supplier needs to estimate the potential of the market in different areas and can apply one of the following methods.

### The method that relies on the market

This method is applied especially by those who use the electric energy for productive consume. The supplier wants to estimate, for instance, the potential of the market for the town of Beius. First, it needs to identify all the potential buyers in the area, using existing data from the Commerce’s Register, the County Statistics Department or by means of questionnaires. The next step is to develop a data basis for the estimation of the quantity of electric energy used by each company.

The following table presents hypothetical data that can be applied in the case of Beius:

Category of receptors	of Electric energy sales [lei/year]	Number of buyers	Potential number of MW/hi	Potential market
	1	2	3	1x2x3
ZERO	X	x	X	X
I	X	x	X	x
II	X	x	X	x
III	X	x	X	x
TOTAL =				x

Tab.2

However, the supplier needs extra information about each market, with reference to the level of saturation, the number of competitors, the growth quota, the average age of existing installations, etc.

### The multifunctional method

This method is used by those who use the electric energy for their consume. There are many customers they cannot become known. In order to determine the potential of a certain area, the index method is generally used.

The supplier can assume that the potential market is identical with the number of people in the area. We shall consider the market provided by Beius, where the number of buyers of electric energy is largely identical with the number of the population. However, the sale of electric energy is influenced by the revenue of each buyer and by the number of consumers. Consequently, we need to make use of a multifunctional method.

Among the most accurate indices of the regional demand is “The analysis of the real buying power. The following index reflects the relative buying power in Beius:

$$B_i = 0.5 Y_i + 0.3 r_i + 0.2 p_i$$

$B_i$  = the extent of the buying power in the “ $i$ ” region, Beius, form the total of the buying power from the activity of the supplier

$Y_i$  = the extent for revenues in the I region, from the total of revenues in area of the supplier’s activity

$R_i$  = the extent of sales of electric energy in the I region, in relation with the supplier’s area of activity

$P_i$  = the number of consumers of electric energy in the “ $i$ ” area, form the total of the population consuming electric energy in the area of the supplier’s activity.

The data used for calculating the index are somehow arbitrary. Some other factors can be taken into consideration, for instance the presence of competitors, the local costs for advertising activities, temporary or transitional factors, local market traditions.

The supplier of electric energy must calculate other indicators as a basis for allocating the market resources. We supposed that the supplier has in view 5 cities from Bihor county (Oradea, Marghita, Salonta, Vascau, Beius).

Geographical area	Sales percentage form basic resources or the total of sales	Sales percentage on different sources from the total of the sales	Index
	1	2	3 = 1:2x100
Oradea	X	X	X
Marghita	X	X	X
Salonta	X	X	X
Beius	X	X	X
Vascau	X	X	X

Tab.3

Generally speaking, the lower the index, the higher the market opportunities. Some researchers believe the contrary (that the market resources should be directed towards the markets with the highest level of the sales). For a correct appreciation, some other factors should be taken into consideration as well.

### Section 3. ESTIMATING THE FUTURE DEMAND FOR ELECTRIC ENERGY

On the market, the total demand and the satisfied demand are not stable, thus prediction plays a very important part in the success of the supplier's actions. Inaccurate predictions can cause the incorrect setting of prices or deficits. The more unstable the demand, the more important and complex is the prediction. Usually, a three-stage procedure is used:

The macoreconomic prediction refers to inflation, unemployment, interest rate, consume expenses, etc. The final result represents a prediction of the national gross product and is used, alongside other indicators, for the prediction of market sales. Then the supplier infers its own sales, in the conditions of a certain market quota.

All the predictions are based on three categories of information: what people say, what they did and what do they do.

The first category of information is associated with finding out the customers' opinions or those of the experts, by means of questionnaires concerning the intentions of buyers, the sales agents' opinions and the experts' opinion.

The second category involves the analysis of the behaviour prior to buying and the analysis of the time series or the statistics of demand.

#### 3.1 The survey of electric energy buyers

Prediction is the art of anticipating behaviour in certain conditions. Thus, the reactions of potential buyers should be constantly monitored. The surveys are useful when buyers have clear options, which they accurately describe. The following questions are frequent:

Do you have any intention to buy electric energy from the source?					
0.00	0.20	0.40	0.60	0.80	1.00
No	Slight possibility	Medium possibility	Highly possible	High probability	Certainly

Tab. 4 This is the scale of buying possibilities.



### **3.2 The opinions of the electrical energy supplier' personnel**

When interviewing customers is not useful, the supplier will demand information from its own employees. Each one should estimate how much energy will be bought by present and potential buyers. These estimations need to be adjusted since, in situations of crisis, after failure or success, the employees can become either pessimists or optimists.

### **3.3 The experts' opinion**

The supplier can obtain estimations from dealers, distributors, suppliers and marketing consultants.

Occasionally, the supplier can invite a group of experts that might do these predictions. The latter will discuss the problem and exchange opinions and afterwards bring forth several estimations: either one obtained by the whole group, or another one, from each expert in particular. Irrespective of the estimation type that is used, the results should be followed by discussions with the supplier's managers.

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