FIRST RESULTS OF PERFORMANCE BASED REGULATION OF SUPPLY QUALITY IN HUNGARY

Tibor TERSZTYANSZKY
Hungarian Energy Office - Hungary
tersztyanszkyt@eh.gov.hu

SUMMARY

The paper outlines the reasons of setting supply quality standards based on the experiences learned until 2002. The liberalized electricity market was introduced in 2003 and at the same time a new supply quality regulation regime was introduced. Detailed descriptions of applied procedures are presented. These include setting performance standards for expected level and minimum standards of quality of supply on three-year averages. Improvement targets for continuity of supply are prescribed, as well. The paper presents the first result of performance based regulation in the field of network security, continuity of supply and the quality incentive/penalty system for distribution companies. The performances of the distribution companies show improvement in all fields of the regulated indices of supply quality e.g. the System Minutes Lost improved from 411 in year 1999 to 155 minutes in 2003.

INTRODUCTION

Electricity Law introducing the liberalized market in Hungary came into force in 2003 in order to apply competition in the industry. This act creates new environment for regulation of supply quality and a need for new methods and procedures. Principles for quality regulation in Hungary are described in [1] presenting the development of the electric power industry regulation towards the market liberalization in Hungary and covers the methods and procedures for monitoring and supervising supply quality including the quality incentive/penalty system for distribution introduced from 2003 via link between quality performance standards and distribution fee. The aim of this paper is to present the first results of quality of supply regulation introduced in 2003.

REASONS OF SETTING PERFORMANCE STANDARDS

Before the introduction of liberalized market that is till 2002 the following two methods indicated that the setting of performance standards was justified:

a) Security of high and medium voltage network

The breakdown records of system of security of medium and high voltage network have the longest historical database in Hungary as it was introduced before privatisation of industry. This monitoring method included several indices e.g. the number of interruption occurred in the HV and MV network. The yearly evaluation of the breakdown reports makes it possible to monitor security and reliability of HV and MV network. E.g. the outage rate of medium and high voltage network is shown on Table I. (the outage rate is defined as the ratio of non-supplied power to the available power for consumers).

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Outage rate, ‰</td>
<td>0.109</td>
<td>0.138</td>
<td>0.108</td>
<td>0.123</td>
<td>0.149</td>
</tr>
</tbody>
</table>

A decrease in supply quality can be observed in 1999. The privatization took place in Hungary in 1995 and price cap regulation was introduced in 1997. It is stated in [1,2,3] that the importance of monitoring the supply quality becomes greater in the case of price cap regulation, as the price cap regulation can result in cutting costs in order to increase profits, and privatization of utilities may reduce the quality of service in monopolistic activities. Moreover, price regulation without quality regulation may give unintended and misleading incentives to quality level. Hungarian experiences seem to underline that this statement is in harmony with international experiences, that is the network operator tends to reduce the maintenance costs and to postpone the replacement of the old components of the network without standards.

The Office made some effective measurements in order to improve overall security of medium and high voltage network. The results in the following years 2001 and 2002 can be seen in Table 1.

b) Continuity of supply

The Hungarian Energy Office focused on the main features of continuity of supply in accordance with the international tendencies [2,3,4]. These consumer oriented monitoring methods – with an engineering approach – gave the following results before the introduction of liberalised market (Table II.)

<table>
<thead>
<tr>
<th>Year</th>
<th>1998</th>
<th>1999</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAIFI</td>
<td>2.71</td>
<td>3.09</td>
</tr>
</tbody>
</table>
Conclusions from the data are as follows:
- The data reveal that in the year 1999 the supply reliability worsened both from the interruption frequency and the duration time point of view. Measuring the supply quality with this method showed similar decrease in the supply quality in 1999 as with the high and medium voltage network security monitoring method;
- This result confirms that to use this method and the procedure of monitoring the supply quality applied in Hungary is suitable for monitoring the continuity of supply;
- Several countries in Europe have better performance data than Hungary e.g. the average duration of unplanned interruption in France 59, in Italy 171 min in year 2001 [3,5];
- The Office’s intervention in year 2000 in order to improve the quality resulted better performance level in the following years 2001 and 2002.

PROCEDURE OF SETTING PERFORMANCE STANDARDS AFTER THE INTRODUCTION THE COMPETITION IN 2003

The electricity Act that created a liberalized electricity market from 1 January, 2003 brought lots of changes from the quality regulation point of view. One of them is that the transmission and distribution networks and the regulated public supply businesses are separated from competitive activities because they constitute natural monopolies. The other is that the Office, the Regulator is empowered to set the expected level and minimum quality standards of quality of each individual licensee.

The procedure of determination of standards is based on the results gained from data of security of high and medium voltage network of the distribution companies presented in the previous years. The data in year 1994-2001 shows that

1. the performance is changing year by year reflecting more or less the changing weather;
2. the tendency of the performance in the same period is worsening.

Taking into account these facts the expected levels and minimum quality standards are based on the average of year 1999-2001 in order to solve the problems of changing weather and to stop the worsening tendency. It is worth mentioning that the application of three-year average is not a unique tool of supply quality regulation [6].

Taking account that the further worsening should be avoided, the Office launched projects with proposed standards of performance and made consultations with representatives of companies and consumer interest representing organizations. Besides the Office’s homepage was used to publish the proposals. It makes the Regulator’s work transparent.

General consideration of the expected levels and minimum quality requirements standards are as follows:

a. Prescribed values must provide incentives for maintaining the adequate state of and repairing distribution network for various voltages.

b. The starting values of the expected level of the quality requirements were defined based on data provided by each Network Company on average data of three years. Taking account that the requirements were prepared in 2002, the expected level is the mean value of data from the years 1999-2001.

c. There is a 5% tolerance limit between the expected level and minimum quality requirement level in order to mitigate occasional annual weather.

d. The minimal quality requirement is a value 5% worse than the expected level in order to mitigate the effect of changing weather.

e. Actual performance is also determined according to each Network Company’s data based on the average of three years: based on the mean value of the reporting year and the two years preceding it.

f. The actual performance of the expected level and minimum quality requirement is compared against the expected level and minimum quality requirement defined for each Network Company.

g. The levels remain in effect - except SADI - until the Resolution is reviewed.

h. Failure to comply with the minimal quality requirement and transgression of limits may lead to penalties being imposed depending on the judgment of the Office. Stages are introduced proportionally with non-compliance. Stage I includes performance between 0 to 0.5%, stage II includes performance worse than 5%.

i. Expected levels serve the purpose of monitoring, failure to comply does not lead to penalties imposed.

j. The standards are different for each distribution operator reflecting different parameters of the region.

An example for setting Performance standard for Distribution Company A in the case of Outage Rate is shown on Fig.1.

FIRST RESULTS IN THE FIELD OF NETWORK SECURITY

The aim of network security standards is to regulate the ability of the electric system to withstand sudden disturbances such as
electric short circuits or unanticipated loss of network elements. The procedure of determination of standards is prescribed in the previous chapter. The indices of prescribed expected levels and minimum quality standards, based on the average of year 1999-2001, are as follows:
- Outage rate,
- Faults of medium voltage network/100 km (overhead line and cable separately),
- Average restoration time of medium voltage faults,
- Relative number of low voltage faults.

The performance is measured again on a three-year average basis and compared to the minimum standards: it means that at the beginning of year 2004 the average performance of 2001-2003 was compared to the minimum standards based on the 1999-2001 average. The evaluation of the most important index, the outage rate index, shows improvements in the first year. As an example, the Fig.2 presents the improvement of the outage rate in case of one of the distribution companies.

Fig. 2.
The minimum standard (1999-2001) and the actual performance (2001-2003) of the outage rate index

The results of the evaluation of performances of the supply quality after introduction the regulation show that the improvement of the actual performances of the distribution companies is significant. The nationwide CML in Hungary improved from 411 in 1999 to 155 minutes in 2003 (Fig.3).

Fig. 3
National Customer Minutes Lost (CML) in Hungary

Fig.4
The performance of the different distribution companies related to the minimum standard of continuity of supply in 2003

The performances of the distribution companies differ from each other significantly (Fig.4). It must be noted that the standards took into account the very bad performance of 1999.

FIRST RESULTS IN THE FIELD OF CONTINUITY OF SUPPLY

The aim is to guarantee a minimum quality threshold to average customers. The procedure of determination of standards is similar to one of the network security: the standards are different for each distribution operator reflecting different parameters (geographical, historical, etc.) of the region. The prescribed expected levels and minimum quality standards, indices based on average of year 1999-2001, are as follows:
- Consumer interruption (CI) or System average interruption frequency (SAIFI);
- Consumer Minutes Lost (CML) or System Average Interruption Duration Index (CML, SAIDI);
- Restoration time within 3 hours;
- Restoration time within 24 hours.

The evaluation process is similar to the network security: the performance is measured again on a three-year average basis and compared with the standards; e.g. 2002-2004 averages for year 2004 is compared with the standards based on the 1999-2001 average.

The CML standards are the single standards, which are rolling year by year in order to improve the performance. The annual improvement depends on the performance of the interruption duration time: where the performances of the previous three years were low, the improvement targets are higher (Table III.)

TABLE III.
Continuity of supply improvement target

<table>
<thead>
<tr>
<th>CML (SAIDI)</th>
<th>min/year</th>
<th>61-180</th>
<th>181-240</th>
<th>241-300</th>
<th>301-360</th>
<th>&gt;360</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improvement/year</td>
<td>%</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

The results are that the standards of the following year depend only on performances of the previous three years. Therefore we can expect that the fulfillment in the following year will be around 1 instead of 0,52…0,83.

FIRST RESULTS IN THE FIELD OF QUALITY INCENTIVE/PENALTY REGIME

Minister of Economy introduced then quality incentive
regulation from 1 January 2003. According to the ministerial decree the Office is entitled to select maximum 4 supply quality performance indices from the previously described minimum standards and the distribution network charge and the company profit depends on the performance of the minimum standards.

The Office designated 3 quality performance standards to be taken into account in the quality incentive regime for the next 3 years (Table IV).

**TABLE IV.**

<table>
<thead>
<tr>
<th>No.</th>
<th>Performance Standards</th>
<th>Indices</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Network Security</td>
<td>Outage rate</td>
</tr>
<tr>
<td>2</td>
<td>Continuity of Supply</td>
<td>Interruption frequency (SAIFI or CI)</td>
</tr>
<tr>
<td>3</td>
<td>Continuity of Supply</td>
<td>Interruption duration time (SAIDI or CML)</td>
</tr>
</tbody>
</table>

The incentive/penalty mechanisms are as follows. The regulated distribution charge should be decreased

a) by 0.5% if the performance is worse than 5% but less than 10%, and

b) by 1% if the performance is worse than 10% or more than the standard.

In case 2 or 3 minimum standards are worse, then the decrease of distribution charge should be determined by adding them. In the worst case it means a total 3% decrease in charge. The amount of decrease should be transferred to the consumer in a way agreed with the Office. In case any of the performance is better by 10% and none is worse, the profit limit may be 10% higher.

The procedure is that each network operator prepares and submits annual report to the Office by March 31. The report should contain, among others, a self-evaluation of the quality performance and show the necessary decrease of distribution charge or the possible profit increase. The Office makes the final decision in a form of a formal approval. It will come into force from July 1 of every year for one year.

The first year evaluation of performance shows that the distribution companies fulfilled the supply quality requirements. The Table IV shows the performances and the fulfilments of the Interruption frequency (SAIFI or CI) as an example by each distribution company.

**TABLE IV.**

<table>
<thead>
<tr>
<th></th>
<th>DE-DASZ</th>
<th>DE-MASZ</th>
<th>EL-MC</th>
<th>ED-ASZ</th>
<th>EM-ASZ</th>
<th>TI-TASZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimal requirement</td>
<td>2,99</td>
<td>3,16</td>
<td>1,74</td>
<td>2,37</td>
<td>3,59</td>
<td>2,86</td>
</tr>
<tr>
<td>Performance/Actual</td>
<td>0,79</td>
<td>0,79</td>
<td>0,89</td>
<td>0,79</td>
<td>0,67</td>
<td>0,81</td>
</tr>
<tr>
<td>Fulfillment</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
</tbody>
</table>

The result means that all the distribution companies improved the unplanned interruption frequency in the first year of regulation and they do not need to decrease the network charges.

**CONSUMER RELATIONS**

The Office issued - after consultation - regulation on the following indices in the field of consumer relations:

- Information to be provided in reply to consumer request notice (the average duration calculated from the written consumer query being lodged until the supplier’s provision of written information (day / consumer / year)

- Connection of new consumer (the average period starting from the public service agreement becoming effective until the connection of the place of consumption (subject to the availability of conditions set forth by legislation) (day / consumer / year)

- Provision of information upon being approached in writing by residential consumer (the average period calculated from the receiving or the submission of any kind of written approach connected to the electricity supply until the electricity supplier’s reply (day / consumer / year)

- Call Centre service level indicator (what is the percentage of incoming calls (%), (for example an indicator of 80/20 would mean that the 80% of received calls are taken by the operator within 20 seconds);

- Standards of Service for Individual Consumer, Guaranteed Standards.

The evaluation showed that further experiences needed in these fields. The reason is that in this field more historical and robust data are needed for drawing reliable conclusions. The main results are that since the beginning the regulation the reliable data collection has begun and this will give the possibility to prepare a correct evaluation.

**REFERENCES**


