MECHANISM TO PROMOTE THE QUALITY OF TRANSMISSION SERVICE IN ROMANIA

Otilia Marin, Dr.   **Network Tariffs Department, Director,**
                                 Romanian Energy Regulatory Authority,
                                 3, Ctin. Nacu str., Bucureşti, România,
                                 omarin@anre.ro
Violeta Radu, Eng.   **Senior Teacher, Technical College,**
                                 Gheorghe Airinei, Bucureşti,
                                 Romania, v.radu_68@yahoo.com

The energy system is in continuous transformation in Europe and in Romania. The Romanian Energy Regulatory Authority introduced in year 2004 a revenue cap tariff methodology for the transmission service to control the tariffs. The methodology implies incentive schemes on controllable operation and maintenance costs, losses and investments.
In order to ensure a positive trend in increasing the quality of transmission service, an incentive scheme will be added based on the new performance standards. The selection of the indicators considered in the incentive scheme and the type of the scheme are very sensitive, for both quality of service and the risk of the company.
The paper will describe the present regulatory framework in Romania and the new incentive scheme which is proposed to be introduced regarding to the quality of transmission service.

Key words: *incentive scheme, quality of transmission service*

1. PRINCIPLES OF TARIFF REGULATION

The Romanian Energy Regulatory Authority (ANRE) has selected and implemented in the year 2004 the revenue cap tariff methodology for the transmission service performed by the transmission system operator (TSO) which has an exclusive monopoly granted by the Romanian Law. The aim of the tariff control regulation is to protect users paying correct tariff while ensuring the company remains viable and having an incentive to operate efficiently by a constraint mechanism on the overall level of the company revenue and corresponding tariff.

For tariffs stability and predictability over a regulatory period of time, the transmission network charges should satisfy the revenue cap smoothing formula as set out in the equation below:

$$R_{reg,t} = \prod_{k=1}^{t}\left(1+IPC_k\right)\times(1-X_s)^t \times R_{reference} + KR_{t,c} + KR_{t,s}$$

p is the regulatory period;
t is a tariff period of the regulatory period;
$R_{reg,t}$ is the regulated revenue for year t;
$R_{reference}$ is the regulated revenue for the last year of the previous regulatory period;
IPC_k is the forecasted yearly percentage change in the Consumer Price Index;
X_s is the smoothing factor;
$KR_{t,c}$ is correction factor in year t;
$KR_{t,s}$ is the quality of service incentive applied to regulated revenue.

Justified revenue covers the following cost components: capital remuneration, depreciation, operating and maintenance costs (controllable and non-controllable costs), costs of grid losses, congestion removing cost and inter TSOs compensation mechanism for cross-border trade, others.

According to the implemented mechanism, the justified revenue of the TSO could increase each year in line with inflation and investment level, but could decrease at least following the efficiency imposed by regulator for different components: an annual efficiency factor for controllable operating and maintenance costs and an annual cap for losses level (%) including unbalanced electricity for losses.

Corrections with different incomes of the TSO (allocation of the interconnection capacity etc.), cost of losses, inter TSO compensation, congestions etc. are applied for each tariff period t originated from t-1 and t-2 tariff periods after applying the smoothing formula.

The equally sharing of the efficiency gain from controllable operation and maintenance cost for a regulatory period is applied in the first tariff period of the next regulatory period after applying the smoothing formula.

Corrections related to the assets base for p-1 and p-2 regulatory periods are considered to the requested revenue of the first tariff period of regulatory period p, before applying the smoothing formula.

2. INCENTIVE MECHANISMS IN FORCE
2.1. CONTROLLABLE OPERATING AND MAINTENANCE COST

The incentive schemes applied to controllable operating and maintenance cost and, from the second regulatory period, losses, gave to TSO the incentives to increase the efficiency of its activity in order to increase their profits on short term. These schemes also gave to TSO the base in establishment of new efficient investments. More, using a rate of return applied to the average assets base registered in each year of the regulatory period versus a cost plus methodology, gives the incentive to TSO to invest. Only the efficient investments in the transmission network are considered by the regulator.

According to the incentive mechanism, the controllable operating and maintenance cost approved by the regulator as starting point at the beginning of a regulatory period, is the registered operating and maintenance costs in the last year of the previous regulatory period plus half of the difference between:

- the controllable operating and maintenance cost approved by the regulator for the last year of the regulatory period, and
- the registered controllable operating and maintenance cost for the same year.

The starting point at the beginning of a regulatory period will be considered the controllable operating and maintenance cost approved by the regulator for the last year of the previous regulatory period when the registered controllable operating and maintenance cost are higher than the controllable operating and maintenance cost approved by the regulator for the same year.

Applying these rules to the activity of the Romanian TSO for the second regulatory period, the regulated starting point for the controllable operating and maintenance costs was with 1.2% under the regulated level for the last year of the first regulatory period.

The regulated slope of controllable operating and maintenance cost for the second regulatory period is 80% of the achieved slope in the first regulatory period: 1.5% for the second regulatory period is higher than 1.0% used for the first regulatory period.

On the other side of the incentive mechanism, for the first regulatory period, the TSO kept the profit over the approved level. The equally sharing of the efficiency gain from controllable operation and maintenance cost for the second regulatory period will be applied in the first tariff period of the third regulatory period after applying the smoothing formula.

2.2. INVESTMENT

The investment incentive mechanism consists in unlinking the operator revenues to its costs, but to the investments of the company through the approved component of the justified revenue consisting by the pre tax nominal weighted average cost of capital (debt and equity) applied to the regulated asset base.

As soon as the investments are undertaken at different tariff periods and vary considerably in size, the smoothing formula applied to investment costs has the greatest impact in providing a stronger tariff stability and predictability. Substantial fluctuations in cash spending from year to year can occur.

A stream of investment cost is converted into assets on which an annual return is earned and into a stream of yearly depreciation cost. The yearly capital consumption is measured as the sum of the capital costs components: return on assets and depreciation.

At present, the asset of the operator have two components: the major one commissioned before the first year of the first regulatory period (2005) where the depreciation is regulated considering an average depreciation time of 25 years and the second one, with the assets commissioned after the year 2005 and linear depreciation over the life time.

About 80% of the very ambitious investment plan (170 mil Euro per year) has been achieved during the first regulatory period. The correction between prognosis and achievements were considered in the tariff with inflation and interest rates according to the methodology provisions at the end of the regulatory period as the penalty side of the incentive mechanism.

2.3. LOSSES

The network losses costs are driven by quantity and price of losses, as a distinct component of the building blocks.

Starting with the first year of the second regulatory period, a yearly cap varying from 2.1% to 1.85% from the energy entering in the transmission network was considered, in correlation with the investment plan. For each tariff period, additional profit of the company is represented by earnings from efficiency higher than 10% of the cap.

More, the incentive scheme imposes that the quantity needed to be purchased on balancing market in order to cover the losses has not to exceed 2% of monthly regulated losses. Considering the

unbalancing losses costs as part of the controllable operating and maintenance costs, the second part of the incentive mechanism is covered for losses in order to stimulate the operator to increase its performance.

The percent of losses decreased from 2.63% in the year 2004 to 2.59% in 2005, 2.47% in 2006 and 2.26% in 2007 from the energy entering in the transmission network.

3. QUALITY SERVICE INCENTIVE MECHANISM

In order to ensure the quality of the transmission service, according to the special provision of the Electricity Law no. 13/2007 (no. 318/2003), performance standards are in force for supplying, distribution, transmission and system service beginning with the year 2008.

The basis of quality service promotion is represented by the performance publication, but the performance standards with customer and overall guaranteed standards make sure that no uneconomic degradation of quality occurs.

Customer guaranteed standards are levels of performance which must be fulfilled in each individual delivery of a specified service. Customers who fail to receive the required level of service under a guaranteed standard may be entitled to receive a penalty payment.

Overall guaranteed standards are levels of performance set by the regulator and companies must use their best endeavours to comply with them.

The incentive scheme represents an even more powerful instrument to promote the improving of quality service and in the establishment of the efficient investments. Price and quality are closely related: each quality is associated with a price adjustment.

The company's performance is compared to a quality target; deviations result in either a penalty or a reward. There are many variations of quality incentive schemes. Price and quality can be mapped continuously, in a discrete fashion, or a combination of these, the level of the penalty or reward can be capped, dead bands may be applied etc. (Figure 1).

Figure 1. Quality Incentive Schemes
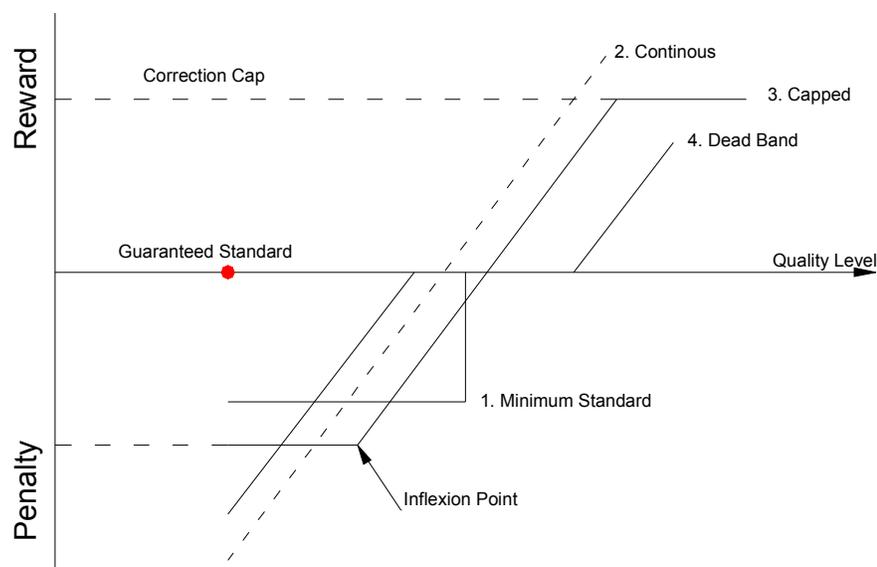
Under scheme 1, a fixed penalty is imposed when the quality target is not fulfilled. Scheme 2 introduces a continuous relation between price and quality. Scheme 3 is similar to scheme 2 except that the penalty and reward are now capped in order to reduce the financial risks at the company and customers. Scheme 4 is similar to scheme 2, but it has a dead band where no price adjustments are made. The dead band is introduced in order to avoid, on short term, the stochastic element which can lead to not relevant quality fluctuations and as result, unintended penalty and reward fluctuations. Asymmetries between penalty and reward are possible.

At present, ANRE intends to impose an incentive scheme for quality of transmission service related to the continuity aspect. It monitors the Energy Not Served – ENS and Average Interruption Time – AIT for transmission service and balancing energy requested due to the network congestion and their annual costs for system service. For technical and commercial aspects, customer guaranteed standards are in place.

In order to reduce the financial risk and the stochastic variation, the scheme with direct relation between quality level and incentive level, cap and dead band is considered as appropriated. More, for calibration, two options are considered as transitory application of the scheme: with a correction cap of ± 2.5% of the associated yearly revenue without it's application to the next tariff period revenue calculation or with a correction cap of ± 1.0% of the associated yearly revenue with it's application to the next tariff period revenue calculation. After the transitory period, the level of the correction cap established by the Romanian regulator will not be over ± 2.5% of associated yearly revenue, according to the tariff methodology in force. The link between quality and the tariff methodology is $KR_{t,s}$ presented in Formula 1.

For the year 2008, the associated revenue from transmission tariff is about 266 mil Euro. Accordingly, the correction cap is 2.66 mil Euro for the cap of ± 1.0% and 6.64 mil Euro for the correction cap of ± 2.5%.

For the first year of application, only ENS and AIT has to be considered in the scheme because the balancing market is in place in Romania only since 2005 and not enough historical data are registered for the other indicator. The balancing energy requested due to the network congestion in the year 2008 was 74 GWh for a costs of 3.7 mil Euro. The removing time shorter than 300h on the load duration curve, the average removing cost was 75 Eur/MWh for a maximum of 85 Eur/MWh. For the 2700 h when the system was congested due to the network, the average removing cost was about 55 Eur/MWh.

The evolution of the ENS (unplanned interruptions caused by TSO, except force majeure) is presented in Figure 1 for the period 2004 – 2008. The strong sustained investment program, configuration and the low loading level of the network allowed the TSO a good efficiency in this field.

For dead band of ±20% and an inflexion band of ±40%, sensitivity analyses were performed on the target of the incentive scheme. The inflexion point represents the point where the cap is applied to the linear variation of the correction versus quality.

Figure 2 presents, for a discount rate of 10%, the variation of the ENS price versus the target considered for the incentive scheme over the study period 2004 – 2008.

The discounted consumers gain over the study period for different targets, varies from 12.1 mil Euro to -4.4 mil Euro for a correction cap of 1% of the associated revenue from tariffs and 30.2 mil Euro to -11 mil Euro for a correction cap of 2.5%.

The flattening of the first two years of five year period, changes the crossing of the X axis for a target of 120 MWh. Accordingly, the ENS price is 720 Euro/MWh for a correction cap of 1% and 1800 Euro/MWh for a correction cap of 2.5%. Based on the fact that at present, in Romania, ENS is valued to 1000 Euro/MWh, this value of 120 MWh is proposed to be the target of the incentive scheme for the year 2009.

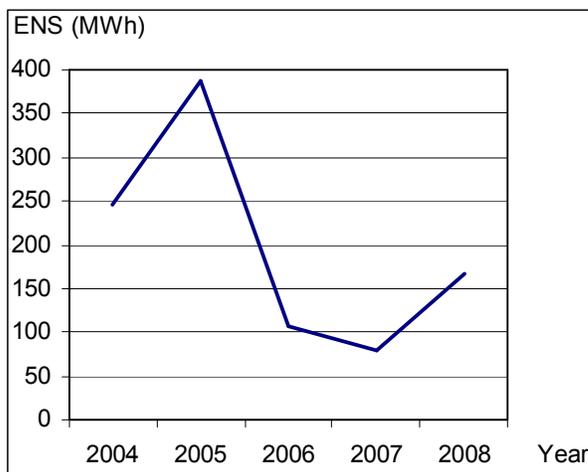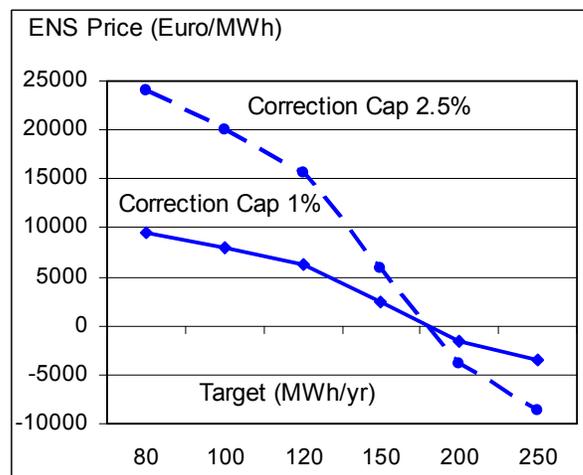Figure 3. Evolution of the ENS for period 2004 – 2008

Figure 4. ENS price variation with target

Taking into account the forecasted values for the year 2009, the proposed target is 1.1 minutes lost per year. For this target, the dead band of ±20%, an achieved value greater than 1.33 minutes lost per year penalizes the TSO when a value smaller than 0.89 minutes lost per year rewards the TSO. For the inflexion band of ±40% from the target, the ENS price is 39500 Euro/MWh for the Penalty Inflexion Point (1.56 minutes lost per year) and 92200 Euro/MWh for the Reward Inflexion Point (0.67 minutes lost per year). The marginal ENS price is 276600 Euro/MWh, outside of the dead band and inside of the correction caps.

According to the investment plan and the achieved values in 2009 for continuity aspects, a new target will be proposed for the year 2010.

4. Conclusions

At present, in Romania, incentive schemes for controllable operating and maintenance costs, investment and losses are already in force.

The schemes applied to controllable operating a maintenance cost and, from the second regulatory period, losses, give to the TSO the incentives to increase the efficiency of its activity in order to

increase their profits on short term. These schemes also give to the TSO the base in establishment of new efficient investments. More, using a rate of return applied to the average assets base registered in each year of the regulatory period versus a cost plus methodology, the TSO has the incentive to invest. Only the efficient investments in the transmission network are considered by the regulator. Penalties are applied by the mechanism when it doesn't receive the proper attention from the TSO.

By introducing the incentive scheme for quality of the transmission service, the regulator has assured the aim of a tariff control regulation for integration of quality and tariff control without an explicit approach, but a general one.

The performance standards, promoted by ANRE according to the Energy Law, guarantee a reliable and stable operation, when the incentive scheme on quality of the transmission service gives to the TSO the incentive to more efficiency in this respect and a new instrument to establish new investments.

Because of the lack of data, only an incentive scheme for quality of transmission service related to the continuity aspect should be implemented, even the ANRE monitors the ENS and AIT for the transmission service and balancing energy requested due to the network congestion and their annual costs for system service.

At present, the proposed indicator for the quality of transmission service incentive mechanism is average interruption time.

In order to reduce the financial risk and the stochastic variation, the direct relation between quality level and incentive level, cap and dead band is considered as appropriated. The proposed target of the scheme for the year 2009 is 1.1 minutes lost per year (unplanned interruptions caused by TSO, except force majeure) with a dead band of ±20% and an inflexion band of ±40%.

More, for calibration, two options are considered as transitory application of the scheme: with a correction cap of ± 2.5% of the associated yearly revenue without it's application to the next tariff period revenue calculation or with a correction cap of ± 1.0% of the associated yearly revenue with it's application to the next tariff period revenue calculation. After the transitory period, the level of the correction cap established by the Romanian regulator will not be over ± 2.5% of associated yearly revenue, according to the tariff methodology in force. Accordingly, the correction cap associated to the year 2008 is 2.66 mil Euro for the cap of ± 1.0% and 6.64 mil Euro for the cap of ± 2.5%.

New developments are considered regarding to the undelivered energy from generators and, for the quality of the system service, to the congestion, as soon as more historical data will be available. The undelivered energy from generators registered more than 900 MWh at the level of the year 2008. The number of dispatch intervals when congestion occurs with a marginal value grater than a specific value (Eur/MWh) should be also monitored. A weighting factor has to be considered between the quality's indicators considered in the scheme.

All developments of the regulatory framework have to be done in a transparent, predictable and competent way in order to ensure the sustainable development of the society in the European environment.

References

[1] Methodology for establishing the tariffs for the electricity transmission service - ANRE

[2] Activity and Financial Reports – CN Transelectrica SA