Incentive Scheme For Investment And Quality Of Supply On Transmission Tariffs In Romania

The unbundling process of the electricity sector started in Romania by the year 2000, when one transmission and eight distribution companies were established, owned by State. Apart of these companies with natural monopoly, other production companies were established in the generation field and more than one hundred companies received license for supplying activity.

At present, 10% of the transmission and system operator (TSO) is listed on Bucharest stock exchange and 15% were transferred to the Property Fund. In the same period of time, five distribution companies were privatised. In this framework, the Romanian Energy Regulatory Authority (ANRE) introduced a revenue cap tariff methodology for the transmission service and a price cap tariffs basket methodology for the distribution service. These methodologies imply reduction targets on controllable operation costs and losses, incentive scheme for investments and mechanisms to control the dimension of the investment plan on regulatory period.

In order to ensure a positive trend in increasing the quality of supply in transmission system, an incentive scheme will be introduced in the Romanian regulatory framework based on the new performance standards.

The paper will describe the present regulatory framework in Romania with the positive results obtained and the new incentive schemes which will be introduced regarding to the quality of supply.

Keywords: incentive scheme, quality of supply, losses, transmission and distribution networks

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1. The aim and principles of price control regulation

The aim of a price control regulation is to protect consumers, while ensuring the company remains viable and has an incentive to operate efficiently. This signifies that the control is a constraint on the overall level of the company revenue and corresponding prices. The regulator must ensure that the constraint is not too harsh so that the company remains viable, or not too light, consumers paying unnecessarily high prices, which is undesirable.

Following the best international practice and according to its legal competency, the Romanian regulator (ANRE) have selected and implemented in the year 2004 the revenue cap regulation, as form of price control, applied from 2005 year to the transmission and system operator (TSO), for a 3/5 years regulatory period (2005-2007/2008-2012).

According to this incentive mechanism, the revenue will increase each year in line with inflation (1+IPC)

(IPC-consumer price index) but will decrease following the efficiency increasing by an efficiency, smoothing factor (X) established by the regulator.

ANRE Performance Incentive Scheme was included in the revenue cap formula in the second regulatory period.

The use of transmission network charges should satisfy the revenue cap formula as set out in the equation below:

$$R_{cap,t} = \prod_{k=1}^{t}\left(1+IPC_k\right) \times (1-X_s)^t \times R_{reference} + KR_t + KR_s$$

p is the regulatory period p;

t is an year of the regulatory period p;

k is the number of the regulatory period years;

$R_{cap,t}$ is the revenue cap (maximum allowable) on use of transmission network charges for year t;

$R_{reference,t}$ is the registered revenue in the year before the regulatory period beginning;

IPC_k is the forecasted yearly percentage change in the Consumer Price Index;

X_s is the efficiency factor, applicable to Operation and Maintenance (O&M) controllable cost, smoothed along the regulatory period;

KRt is the quantity correction factor in year t;

KRs is the service quality correction factor in year t applied to regulated revenue.

Revenue requirements cover the following cost components (building block):

- Capital expenditure (CAPEX) related to:
  - return on capital (capital remuneration-WACC*RAB) and,
  - return of capital (depreciation D)
- Operating and maintenance (OPEX) expenditure related to:
  - controllable costs (OPEXcon);
  - non-controllable costs (OPEXnoncon)
- Costs of grid losses acquisition (L), congestion removing (CON) and cross-border trade (CBT)
- Incentive for transmission service quality.

The building block equations are as follow, for each year t of the regulatory period:

$R_{cap,t}$ = (WACC*RAB) - D + OPEX$_{con}$ + OPEX$_{noncon}$ + L + CON + CBT

where:

WACC = before tax weighted average cost of capital

RAB = regulatory asset base

Cap regulation avoids the need to reset regulated cost

yearly, provides stronger price stability and predictability and cost reductions simultaneously with efficiency increasing. Unlinking revenues from costs creates strong incentives for efficiency improvement, as any cost saving directly translates into higher profits.

In this way, the regulator has assured the majority of incentive regulation aims, without a comprehensive approach for integration of quality and price control.

2. Items on which incentive regulation operates

The application of an incentive type regulation secures:

- promotion of efficient operating and maintenance practices;
- promotion of efficient investments in the transmission network;
- efficient use of existing infrastructure by losses reduction;
- improvement of the transmission service quality.

For the first regulatory period (2005-2007), the Romanian regulator approved the cost components if its cover the expenditure corresponding to efficient investments, controllable O&M and losses reduction. In this way, the regulator has assured the majority of incentive regulation aims, without a comprehensive approach for integration of quality in price control. This is one important task for the second regulatory period (2008-2012). Without additional quality regulation measures, it is possible these incentives to lead to quality degradation.

2.1 Incentives for controllable costs reducing

The revenue-cap mechanism aims to provide incentives for better productivity in the assumption that the company is able to control its level of costs.

There are some costs there are not under the company's control and therefore, it would not be reasonable to expect any productivity improvements in this area. Such non-controllable costs may include items as taxes, regulatory contributions, costs resulting from force majeure.

The incentives would only be applied to controllable cost items, non-controllable costs would be allowed to be passed through to consumers on the basis of actual costs. In the first and second regulatory period,

the TSO will be allowed to keep the profit over the efficiency gains level established by regulator. To compute the caped revenue for the third regulatory period, the regulator will determine the efficiency gains over the established target for the second regulatory period and which will be 50% shared with the customers of the transmission service (gains sharing mechanism) and respectively 50% with the TSO. This amount will be reduced from the corresponding revenue after the application of the efficiency factor, in the first year of the third regulatory period. In the second regulatory period, the regulator assessed the efficiency level equal with average registered value in the previous regulatory period.

OPEX typically includes the costs of personnel, maintenance, buildings and office rentals, administration, transportation, etc. The company could adjust its level of OPEX in a relatively short period. For example, it could reduce its maintenance activities according to new investments achievement, dispose of personnel, or attract additional staff.

The controllable operating and maintenance costs considered as starting point at the beginning of the second regulatory period will be the actual operating and maintenance costs in the last year of the first regulatory period on top of which it is added half of the difference between:

- the controllable operating and maintenance costs previously forecasted by the regulator for the last year of the first regulatory period, and

- the actual controllable registered operating and maintenance costs by the transmission system operator, in the last year of the first regulatory period which should not be higher than the value previously approved by the regulator. This provision does not apply if the actual controllable O&M costs for the last year of the first regulatory period are higher as compared to the controllable operating and maintenance costs, previously approved by the regulator.

In this case, the starting point at the beginning of the second regulatory period will be considered the controllable O&M cost previously established by the regulator for the last year of the first period p-1.

Some of these provisions and consequences of increasing/reducing of efficiency factor level arereflected in the study case shown in the table below.

These consequences can be the following:

- X factor increasing over the approved by regulator efficiency gains level (2.8% µ 1%) leads to additional profit but to a higher improvement level (0.97 applied to controllable O&M is more restrictive than 0.99) established for the next regulatory period. In the same time, the reference values of controllable O&M for the next regulatory period p will be limited at a lower value than that forecasted for the last year of the previous regulatory period p-1 (101 µ 114);

- X factor reducing under the efficiency gains level approved by regulator leads to less profit and to a reference values of controllable O&M for the next regulatory period p equal with that forecasted for the last year of the previous regulatory period p-1.

Both of these cases are disadvantageous for TSO implying corresponding effort to reduce O&M expenditure in the next regulatory period.

Controllable cost (CC)	Regulatory period p-1, years:			
	Reference	1	2	3
Forecasted values	100	99	98	97
X forecasted		1%		
Forecasted improvement (1-x)		0.99	0.99	0.99
Forecasted values *(1-IPC)		106	111	114
Registered values	100	94	84	89
Registered yearly improvement (1-x)		0.94	0.90	1.06
Additional profit		5	14	8
X registered		6%	10%	-6%
X registered yearly average			3,5%	

2.2 Incentives for capex costs reducing

With respect to controllable costs, the company can increase productivity through its own efforts. Generally, regulators distinguish between two types of controllable costs that are controllable in the short-term (operational expenditures - OPEX), and costs that are controllable only in the longer term (investments or capital expenditures - CAPEX).

Regulator recognizes that cost reductions should not be pushed by prohibitive regulatory arrangements that would not allow investors to earn adequate return on asset. When setting caps, regulator should consider that their level is sufficient to cover not only efficiently

incurred O&M costs, but also an adequate return on both existing assets and new economical justified investment.

CAPEX has a long-term nature and is controllable only in the longer run; in the short run, CAPEX can be considered fixed. These costs typically relate to investments for rehabilitate or extending network capacity as well as for upgrading quality.

The measurement of CAPEX is traditionally problematic. Investments are typically undertaken at different tariff period and tend to considerably vary in size. Investment might be characterized by substantial fluctuations in cash spending from year to year. For this reason, averaging CAPEX spending for the years of the regulatory period has to be smoothed.

A stream of yearly investment cost is converted into assets (on which a return is earned), and into a stream of yearly depreciation cost. In this case, yearly capital consumption is measured as the sum of the capital costs components: return on assets and depreciation.

The general idea is that, during some predetermined period (the depreciation period) the company earns back the cost that it paid for the investment and the cost of capital necessary to refund the investment. The yearly depreciation would be equal to the purchase price of the asset, divided by the depreciation period of that asset. The rate-of-return is typically set by the regulator based on standard costs of capital or an assessment of the company's costs of capital along the regulatory period. Companies have two sources to finance their investments, debt and equity. For these finance sources, the company should pay interest and a dividend respectively. These combined costs (weighted average) determine the company's costs of capital and it is applied to the assets value registered in each year of the regulatory period. From this view point, the forecasted investment program by TSO is very important and could lead to revenue reducing for the next regulatory period, taking into account the correction due to investments is made once at the end of the regulatory period.

If the investment program was lower as compared to the one approved by the regulator for the previous regulatory period p-1, regulated asset base (RAB) will be adjusted by reducing in the regulatory period p.

The additional investment, which was completed due to exceptional conditions, as compared to the approved program for a certain regulatory period, can be introduced in RAB at the beginning of the next regulatory period only with the approval of the regulator.

The delayed / advanced investment as compared to the approved plan are quantified and sent to the regulator in order to be subtracted from / added to the RAB corresponding to the next year of the regulatory period.

2.3 Incentives for losses reducing

Some of non-controllable costs are considered non-controllable while in reality, these costs can be influenced by the company. For example network losses costs are driven by three factors: measured losses quantity (kWh), the price for losses acquisition (lei/kWh) and measured losses unbalancing quantity (kWh). At least one, but generally all of these factors are more or less controllable and influenced by the company. The losses quantity can be reduced by different operating measures (voltage levels control, increasing network capacity, using better equipment) and the price paid for losses may be reduced by using the market facilities. Similarly, the losses unbalancing quantity can be reduced by a better planning activity.

If the regulator would consider network losses fully non-, the company would have neither incentive to reduce these losses, nor to purchase the electricity at lowest price possible. As follow, the Romanian regulator will adopt, for the second regulatory period, a cap for the forecasted losses quantity. The registered cost under (10%) / above this cap will represent additional/ less profit for each tariff period.

A new measure was implemented in order to reduce the losses unbalancing quantity needed to be purchase on balancing market by limiting this value to 2% of monthly value of regulated losses quantity. It has to be mentioned that, from the second regulatory period, the losses unbalancing costs are items of controllable costs.

2.4 Incentives for quality of supply improvement

Under the new regulatory schemes more efficiency can be attained, but inclusion of quality regulation elements will be imperative. In the short term the regulator will need to make sure that no uneconomic degradation of quality occurs, and in the longer term it will need to provide incentives for a desired level of quality. In addition, regulator has taken further steps to

ensure that certain performance and quality standards are met. This involves mainly prescription of certain standards and using financial incentives based on reward and penalty schemes.

Way the quality is important? Because:

- Demand for quality increases with economic grows
- Consumers attach more importance to quality
- Monopoly firms may provide suboptimal quality
- Power industry reform adversely affects quality.

There are three network service quality types:

- **Continuity of Supply (Reliability) -** describes the availability of the electricity and is characterized by the number and duration of interruptions and some other indices specified in the Grid Code and included in the TSO yearly report.
- **Technical Quality -** describes the physical parameters of the electricity and covers aspects such as voltage and frequency stability, voltage dips, over-voltages or harmonic distortions and it requirements are forecasted in the Grid Code and are monitored by regulator.
- **Commercial Quality -** describes the customer service quality including the quality of all relationships between a service provider and a user and it is monitored by regulator which approved the framework contracts.

Regulator will monitor the quality using quality standards and performance targets, and quality performance from previous regulatory period.

The quality correction factor links prices from quality. These two items are closely related: each quality level is associated with a price adjustment. The company's performance is compared to some quality target: deviations result in either a penalty or a reward. The level of the penalty or reward can be capped and dead bands may be applied.

The argument for this capping is that this reduces the financial risks to the company and customers. However, capping also has some drawbacks: if quality decreases, the company would only have to pay penalties to a certain point. After that, further quality degradation does not carry any financial effects. Similarly, capping the reward level will reduce the company's incentives to improve further quality once the maximal reward has been reached.

The level of revenues associated to the reward/ pen-

alty schemes established by the Romanian regulator will not be over ± 2.5% of the yearly revenue for the second/third regulatory period.

There are some Quality Incentive Schemes shown in the figure below.
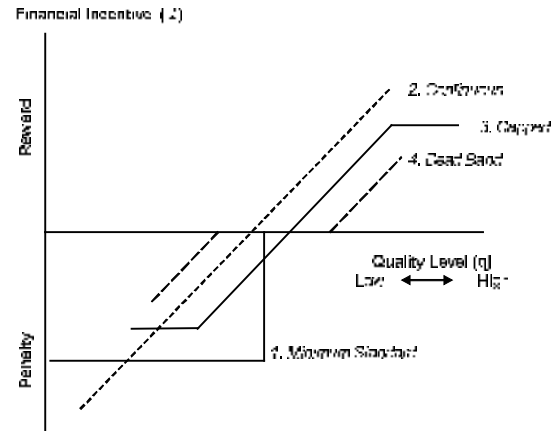
Under scheme 1, after reaching a certain quality level, a fixed penalty is imposed. This is essentially an ordinary standard. Scheme 2 introduces a continuous relation between price and quality. At each level of quality, a corresponding penalty or reward is attached. Scheme 3 is similar to scheme 2 except that the penalty and reward are now capped. The argument for this capping is that this reduces the financial risks to the company and customers. However, capping also has some drawbacks: If quality decreases, the company would only have to pay penalties to a certain point. Scheme 4 is similar to scheme 2, but has a dead band. For quality levels within this band, no price adjustments are made.

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Structure of the performance incentives scheme comprises the service component and market impact component.

These components set out:

- the parameters that apply to each TSO
- the requirements with which the values to be attributed to the parameters must comply, and
- the maximum revenue increment or decrement that a TSO may receive under each component

of the scheme.

For the first year of application, the Romanian regulator has proposed 2 indicators for service component:

- Energy Not Supplied (ENS) - (MWh)
- Average Interruption Time (AIT) - (h)

and 1 indicators for market impact component:

- the number of dispatch intervals where an outage on a TSO network results in a network outage constraint with a marginal value greater than a specific value X (Eur/MWh).

4 Conclusions

The implementation of an economic regulation is caused by monitoring and control needs of the companies which activate on markets where full and fair competition cannot be relied upon to protect consumers' interest from the abuse of market power by dominant or monopolistic participants.

The transmission system operator (TSO) has an exclusive monopoly over the provision of transmission services granted by the Romanian energy law. The price control applied by the Romanian regulator for the first time in 2005, concerns the regulatory period 2005-2007 and has had a major scope to protect consumer interests by a fair allocation of the gains resulted from the increase of efficiency over the targets set by regulator, between TSO and customers.

As follow, based on registered data concerning controllable cost in the first regulatory period, a higher efficiency level will be established for the next regulatory period having as effect reducing the O&M expenditure and total TSO costs need to be covered by the regulated revenue and corresponding tariff.

In the same time, taking into account the TSO has to ensure the Romanian Power System reliable and stable operation, the price control provides a corresponding return on TSO registered assets, but only to those corresponding to the efficient investments in the transmission network, approved by the regulator at the beginning of the regulatory period.

Implementing of new measures concerning regulated losses quantity in order to increase the efficiency of infrastructure use and a performance incentive scheme, has represented a characteristic of the second regulatory period.

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