IMPORTANCE AND COMPARISON OF INCENTIVE REGULATION MODELS FOR STATE REGULATED NATURAL MONOPOLIES IN ENERGY SECTOR

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Abstract. Not so long ago the most popular mechanism of energy companies regulation was Cost plus model but over the time regulators and economists started to criticize that model was not efficient enough for both regulated companies and consumers. Therefore incentive regulation was invented which nowadays is applied among majority of EU countries, nevertheless there are different alternatives to be applied which depends on regulation needs and goals in every case. The aim of this article is to define what the real importance of incentive regulation is and to determine mainpros and cons of different variations of incentive regulation models.

Key words: incentive regulation, energy companies, state regulation.

JEL classification:

P28 – Natural Resources; Energy; Environment

Q43 – Energy and the Macroeconomy

Q48 – Government Policy

Introduction

Usually, state regulation is applied in various monopolistic sectors of democratic countries, such as transport, telecommunications, energy and etc., in this article energy monopolistic sector and its incentive regulation is analyzed. Normally, the role of state regulation is carried out by national regulatory authorities (NRA) – which has a mandate to act independently from other national institutions. One of the main goals of NRAs is to ensure the financial stability of regulated company which could provide cost-based, efficient services for whole society (Khalfallah, H., 2013).In order to reach such goals, nowadays NRAs adoptmethodologies on regulated price calculation and relevant part of it is incentive regulation.

Incentive regulation is application of set of incentives and punishments which are used to encourage regulated companies to perform in sustainable, cost-based and efficient way not only for themselves but for public needs as well (Lewis T., Garmon C., 1997). Also, incentive regulation could be called as the mimics of market incentives which regulators aim to develop in order to represent the conditions of competitive markets in regulated ones (Heine K, 2013). But not so long ago, incentive regulation was not applied at all, so it is important to find out

why incentive regulation became much relevant and which incentive model and when should be applied. Therefore, the aim of this article is to define incentive regulation models application importance for development of sustainable energy sector regulation and to perform comparison of different incentive regulation models.In section 1 the main object – Incentive Regulation models – and its importance will be analyzed. Later on section by section different incentive regulation models and its pros and cons will be analyzed.

Importance of applying incentive regulation

If the set of rules for incentive regulation is not clearly determined or not determined at all, the regulated companies are not stimulated to reach better financial and economical results, improve quality of services provided, and it results on losses for both – regulated companies and end-users. Moreover, incentive regulationperforms preventive role in case of information asymmetry when NRAs "know less" than regulated company, informational asymmetry is object of neoclassical economics which says that informational asymmetry is the basic idea of incentive regulation(Heine K., 2013).Such situation could be used by regulated company in order to affect the process of regulated price calculations for regulated company's needs. This is why regulatory task formed for regulated company, while using incentive regulation, usually, acts like prevention and it reduces the effect of information asymmetry (Joskow, P. L., 2014).

Therefore, while carrying out above mentioned role NRAs regulate the prices of services provided by monopolistic energy companies. It is done by evaluating justified costs (usually, once a year but could be done more frequently) and setting allowed revenue level, in such way business continuing and possibility for end-users to have good quality service is ensured (Ter-Martirosyan, A. and Kwoka, J., 2010). In a simplified case, scheme works in such way:

- For the first year of regulation period, NRA sets allowed revenue level for regulated company to collect during the year,e. g.50 mln Eur.Such level is set according to forecasted required cost level (including capital and operational costs) and the level of allowed profit to earn. Thenforecasted volumes of transported energy units are set[8], e. g. 2.5 blncubic meters. Taking into account mentioned circumstances, NRA should set regulated price of 20 Eur/tcm for the year.
- After the year of regulation ends, regulated company submits factual data on costs incurred, energy units transmitted, collected revenue to NRA. In this simplified version, the results could go in two ways – transmitted volume of energy units could be less or more in comparison what was forecasted. At the first case, regulated company would collect more revenue in comparison what was forecasted and at the other case – vice versa. For example, if the level of cost incurred was the same as it was forecasted, and transmitted volume consisted of 2 blncubic meters, collected revenues amount is40 mlnEur (10 mlnEurless than was expected), ortransmitted volume consisted of 3 blncubic meters, collected revenues amount is60 mlnEur (10 mlnEurmore than was expected).
- NRA evaluates received data and seeks to check whether received data is justified enough. It is assumed, that in both cases received data is justified enough. Then NRA has to estimate over collected or not collected revenues while setting regulated price for the next year of regulation period by increasing it respectively on first case or decreasing it respectively on second case.The same steps are taken by NRAs if factual costs differ from forecasted ones.

[8] It depends on regulation mechanism applied, such level could be set by NRA or even regulated company itself.

This simple approach shows that if regulated company does not collect enough revenues to cover the costs NRA has to increase regulated price for the next year of regulated period in order to ensure sustainable continuing of energy company business. On the other hand, if regulated company over-collected revenues, NRAs have to ensure the over-collected money will come back to consumers – it is done by reducing the regulated price for the next year of regulatory period. While applying such tools NRA has to ensure the balance between the interests of regulated company and end-users.

Therefore, one of the oldest regulation mechanisms (which was shown in simplified example above) is called "Cost plus". Such mechanism results in situation when the collected revenues of regulated company meets costs incurred, plus giving some profit to earn, which is calculated as some percentage of regulatory asset base. However, afterwards such mechanism caused more and more discussions among the NRAs, that such mechanism does not promote regulated companies to perform more effectively: to reduce the costs and to improve quality of services.Such understanding was correct and obvious because Cost plus mechanism ensures the regulated company that any of justified costs will be covered via the regulated price and there is no point to reduce that costs, because all the gain will be left for end-users(same logic for improving quality of services) (Joskow, 2008).

Because of that different countries apply different incentive regulation models, trying to foster regulated energy companies to reduce the costs, improve quality of services and on the one hand to reduce regulated prices for end-users and on the other hand to leave more space to earn the profit for regulated companies.

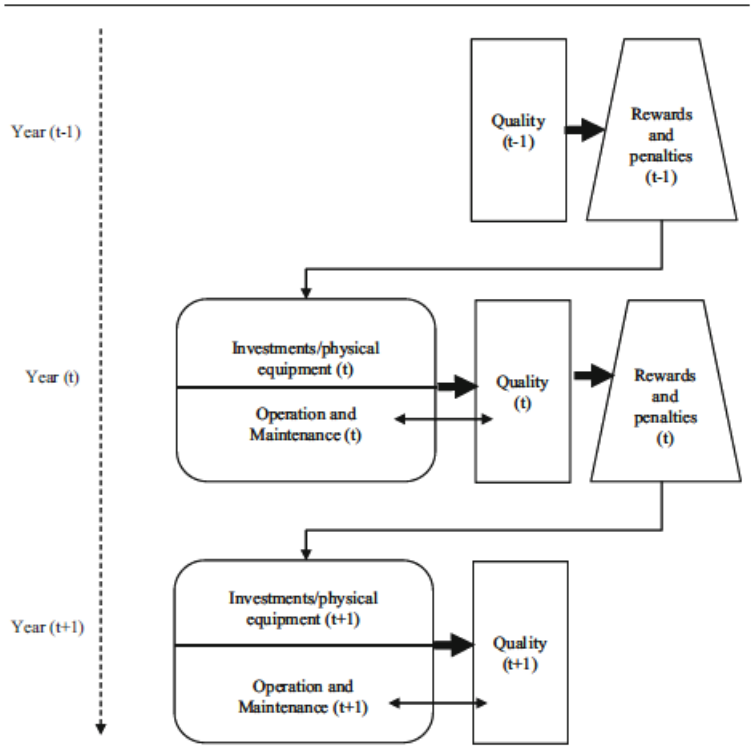
Which incentive regulation model to apply depends on: competence of NRA regarding the understanding of regulated companies specific, resources of NRA in order to perform comprehensive monitoring and control of regulated company, political environment, structure of market and etc.(Sanford V. Berg, 2000).

Price Cap Regulation model

Price Cap regulation model is one of the incentive regulation models.This model arose out of dissatisfaction with Cost plus which resulted in excessive use not only of capital costs but of other inputs as well. Price cap regulation was proposed for its superior efficiency properties (Crew M. A. and Kahlon R.S., 2014). It differs from Cost plus mechanism because it is usually applied for longer period than one year, e. g. 5 years. NRA sets price cap while forecasting costs of regulated companies and later on reevaluating regulated price (for example every year, but it depends on every case)taking into account different factors which had an effect on changing the price cap. NRA and politics have to seek that all those factors would be decided before the regulatory period starts. Other attribute of such mechanism isevaluation of inflationduring the regulatory period. While setting the price cap NRA determines that it will be linked to inflation index (Jamison, M. A., 2007).

Essential exclusivity of Price cap regulation model – efficiency criteria. NRAsets economic or (and) improving quality of services task. It means that NRA is able to set real, approachable level of costs to be reduced after the discussions with market participants and (or) to set the reachable indicator of improving the quality of service.It is also very important to decide before setting the task, what part of gain will be left to regulated company (as an additional profit, incentive) and to end-users (as a lower price for the next year of regulation)(Sappington, David E. M, Weisma, Dennis L., 2010).When the tasks are reached and realized, regulated companies have to ensure that lower costs will not increase in the future and the level of services quality will not drop. This scheme is shown in figure 1:

Figure 1: Incentives, expendituresandquality



Source: Camcini C., Fumagalli E., Rondi L(2016)

NRA could set quality task for *t* year and company can reach it by either investments or specific operation and maintenance, if it fails – it can be punished by penalty (if it was decided before setting such mechanism, usually the mechanism of punishments is set while using Performance Based Regulation model), if it reaches the target – it gets reward. In case of reward the quality of services for the *t+1* year cannot be lower than it was reached on year *t* – service quality at least should be the same or even betterin order to get one more reward.

On the one hand, such model promotes regulated company to reduce the costs and improve the quality of services but on the other hand there is no guarantee that it would be reached (as it was stated while using Price Cap Regulation the mechanism of punishment, in case when company keeps the same level of services quality for the next year and does not reach the target of regulators task, is not set. According to Crew, M. A. and Kleindorfer, P. R. in such way regulated companies become as a hostage of regulator). In addition to that, it is very difficult for NRA to objectively set effective and efficient task that could not be too difficult or too easy to reach. Having in mind that after the task is implemented, regulated companies must to ensure that reached level will be kept, sometimes such tasks are too easy to implement and that would be very inefficient. The same thing if the task is too difficult to implement – incentive regulation will not work in practice in such way. But if the task is set in a right way the outcome of accomplishing it may be very good. For example, it is worth to mention that improvements in service quality, which was result of implemented incentive regulation in UK, have made a significant contribution to the UK electricity sector's total productivity change (Giannakis, D., Jamasb, T., Pollitt, M., 2005).

Furthermore, when regulated price is quite huge and this is the reason why energy consumption is decreasing, regulated company will be forced to lower the costs and that would lead to situation where regulated company would reach much more results than it was obliged to reach by regulatory task. That means that regulatory company would not reach extra profit for "overreaching" the task.

It should be emphasized, that applying Price Cap model, it is important to separate that there are some costs on which level regulated company has an influence and other part on which – not. Such costs are related with state taxes, fees, state security requirements and etc. Even capital costs in some sense, because the main part of regulatory asset base was created before regulatory period, so it could not be affected by regulated company.Therefore such costs should not be assessed while evaluating whether regulated company implemented its task or not.

Performance Based Regulation

According to Performance based regulation NRA sets regulated prices based on historical results of the regulated company.It is necessary to evaluate several years' results in the past of regulated company and according to them to set regulatory, incentive task. If regulated company implements regulated task it gains additional profit (usually the reward is determined before setting the task) but if it fails to implement the task it gets punished – loses part of allowed profit (respectively what part of allowed profit would be lost is determined before setting the task). Additional profit may be set not only as additional percentage on regulatory asset base but also as an absolute value.Also, Performance based regulation is a unique model because regulated tasks could be set for a longer period than one year and tasks could be set more than one.Usually, surveys are done in order to understand end-users expectations how quality of services could be improved in a longer period than one year (Vogelsang, I., 2006).

Furthermore, this model is directly linked to incentivizing the regulated company since it only can gain additional profit if it reaches certain financial or economic results (set in smaller tasks), this is why this model can be very efficient for companies financial and economic results itself.On the other hand, if company will not implement most of regulatory tasks it will lose relevant part of allowed and additional profit, soattentive planning of internal processes in regulated company becomes very crucial.Some of the authors (e. g.Khalfallah, H., Vogelsang, I.)distinguish that model as separate but it can fully work in line with other ones, for example with Price cap regulation model.

The major risk of the model could occur because of these factors:

- **NRAcompetence**. If NRA lacks the experience and has few internal resources for evaluation of regulated company historical data, regulated tasks could be set incorrectly and regulated prices which would be set based on received data could not reflect the real situation of the regulated company;
- **Lack of historical data**. Performance based regulation is not the most suitable model for incentive regulation if NRAs have received incomplete data or assessed company exists only few years;
- **Justification of data**. If historical data is not well assessed, evaluated and there is no signed conclusion of independent auditors (it would be worth that audit would be performed and based not only on financial requirements but on regulated requirements as well) it is also difficult to apply that model.
- **Unreliability of end-users survey results**. If public survey regarding the improvement of services quality shows distorted results NRA probably will set inappropriate regulatory task.

Therefore, Performance based regulation is relatively expensive model and requires lots of efforts to be put while analyzing received historical data at the beginning of applying this model but afterwards job is done properly the model becomes very useful.

Benchmarking regulation (or Yardstick regulation)

According to that model NRA sets regulated prices which are based neither on the historical data nor forecasted data but the results which are held by comparing similar companies. Normally, regulated companies from the same sector or some similar companies with similar results being analyzed and compared(Jamasb, T. and Pollitt, M., 2000). The more companies and their results are compared the more accurate and objective results are found.

When Benchmarking model is applied, NRA sets allowed revenue level in accordance with revenue level of similar companies from the same sector or similar companies in comparison of effectiveness. In that way, regulatory task is bornnaturally – if regulated company was compared with a little bit more effective company it has to reach that level. In some cases, difference between compared companies is too big to expect that less effective company will reach effectiveness of another in one year period, than regulatory task is expanded and is set for few or more years.

This model could be applied when NRA is not sure that received data from regulated company could be justified enough in order to set regulated price or NRA feels that information asymmetry problem is very actual (Jamasb, T. and Nepal, R., 2014). Also, in some cases regulated companies are not keen to collaborate with NRA and fail to submit all necessary data for regulator in order to set regulated price, even sometimes NRA may feel that some regulated companies are trying to avoid submitting the data, in that case Benchmark model is very useful.

Yardstick regulation model is not very cheap as well as Performance based regulation because of time, financial and human resources NRA has to put in order to get proper results but once the model is done successfully it becomes very useful for the future.

In particular, it is very difficult to apply that model if there is a lack of information about other companies and there is no enough resources to get them. For that reason it is necessary to cooperate between the regulators and share the information. The success of that model depends on reliability of data NRAs have.

Incentive regulation for investments

When Price cap model was analyzed in this article, it was mentioned that regulated companies cannot affect some groups of the costs. One group of that costs (in a sense which was described above) is capital costs and incentive regulation models cannot help to decrease them. In terms of depreciation costs regulated companies do not have almost any tools to reduce them, since certain investments are already made and could not be changed (of course regulated companies could expand the terms of depreciation and to lower one year depreciation costs but this is not the case for this article).Nevertheless, incentive regulation could be applied directly for investments performed by regulated companies(Poudineh R. and Jamasb, T., 2013). It is also should be mentioned that regulated monopolies have an incentive to overinvest when the allowed rate of return is higher than the cost of capital, so, usually Cost plus model was very attractive for energy companies, on the other hand if rate of return is lower than the cost of capital the market would suffer because of underinvestment, this is why incentive regulation is also very important to be applied for capital costs of regulated energy company (Poudineh R. and Jamasb T., 2015).

Normally, allowed profit for regulated energy company is calculated as certain amount of percentage multiplied by regulatory asset base. Depreciation terms are quite long, for some parts of the asset it could be even more than 50 years. Furthermore,the risk of transmitted volume in some cases is dedicated not to end-usersbut to regulated energy companies. Therefore, in those specific cases it is very difficult for regulated companies to make a decision to invest (especially in terms of relatively high investments) into infrastructure which will not bring additional transported volume units of energy, because simply such investments

are not economically viable (Henze B., Noussair Ch., Willems B., 2012). Because of that, sometimes regulated companies are trying to avoid to invest because they understand that such investments will not gain any additional profit.This is why NRAs has a right to incentivize risky investments by letting regulated companies to gain more profit (Cambini C. and Rondi, L., 2009).

Also, there might be some situations, when NRA sets regulatory task for regulated company to improve quality of service and the only way to reach that is to invest into depreciated and old infrastructure to update it or to create additional capacity. In that case regulated company could expect to gain more profit and end-users to get service with higher quality.

Conclusions

1. Incentive regulation is necessary tool for regulation of monopolistic energy companies, because it brings benefits to all parties: a) regulated companies while implementing regulatory tasks gains additional profit;b) end-users – better quality services for lower price; c) national regulatory authorities accumulates necessary knowledge in order to lower effect of information asymmetry.
2. There are several incentive regulation models and they are different, but they all have single attribute – national regulatory authorities set motivated regulatory tasks to be implemented by regulated companies. Incentive regulation models explained in this article could be applied together or separately. Choosing which one is most suitable in one or another country mostly depends not on the pros and cons which are also given in this article but more on these factors: the level of national regulatory authorities experience and competence regarding the specifics of regulated company, the level of justification of received data, figure of similar energy companies in energy sector, complexity of information asymmetry problem etc.

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