"Le (R)R0I est mort! Vive le (R)ROI!":

Regulation of electricity distribution in Belgium.[1]

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Abstract

Electricity distribution belongs since the 6th Reform of the Belgian State to the Regions. The Flemish regulator introduced for 2015-2016 (i) a revenue regulation and (ii) incentives for Distribution System Operators (DSOs) to reduce their costs. However, their allowed revenues are still based on the regulated Return-On-Investment (ROI) and historical costs approach from the past. I present and discuss the main aspects of the recent reform in Flanders.

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1. Introduction

As a result of the 6th Reform of the Belgian State, the federal regulator for electricity and gas CREG (Commissie voor de Regulering van de Elektriciteit en het Gas/Commission de Régulation de l'Électricité et du Gaz), transferred its tariff responsibilities to the regional regulators. As from July 1st 2014, the regional regulators are now not only responsible for the technical regulation and control of distribution of gas and electricity in their region. They have extended their competences and their responsibility includes now also tariff methodology and tariff approval. All regional regulators have autonomous competences to organize the efficiency in the market for electricity and gas distribution in line with the regional preferences. The CREG remains responsible for the regulation of transmission of electricity and transportation of gas.

This transfer of responsibilities offered all regional regulators the opportunity to adjust tariff regulation and introduce new ways to further strengthening the operational efficiency of the distributing companies. The regional regulators are "brugel" (De Brusselse Regulator voor Energie/Le Regulateur Bruxellois pour l'Energie) for the Brussels Region, "CWaPE" (Commission wallonne pour l'Energie) for the Walloon Region, and "VREG" (Vlaamse Regulator voor Energie en Gas). The Brussels Region and the Walloon Region have, by and large, left the tariff regulation unchanged as compared to what the CREG had done during its last regulatory period. The Brussels Region will continue with this tariff regulation for 2015-2019 during which it will evaluate the tariff methodology. The Walloon Region adopts the cost-plus or regulated ROI approach during 2015-2016 after which it will start a new regulatory period for five years. In contrast, the Flemish regulator VREG has introduced an adjusted tariff methodology for the period 2015-2016. In what follows, we will explain and comment on VREG's new tariff methodology and what to think of the *status quo* choice made by the Brussels and Walloon regions.

Section 2 offers a summarizing overview of the main ingredients of the tariff regulation framework in Flanders. Section 3 presents a discussion on the new regulatory framework. Section 4 offers some concluding remarks.

2. The regulation framework for electricity distribution in Flanders.[3]

Until July 1st 2014, the CREG's tariff regulation of electricity distribution companies was, by and large, the result of a hybrid model of regulation. One (large) category of costs was regulated on the basis of "rate-on-investment" or "rate-of-return" regulation. In other words, the return on capital investment was regulated for specific costs of the distribution company. The other (small) category of costs was the result of "revenue" regulation. That is, certain costs were compensated with a fixed budget—indexed over time—so that profit margins (i.e. the difference between regulated revenue and costs) were the result of (the absence of) efficiencies at the level of the distribution companies. One of the natural consequences of such a hybrid system is that the regulated firm has all incentives to run with the hare and hunt with the hounds. That is, by (re)allocating costs as much as possible from

[3] My description tries to summarize the main properties of the regulation framework, at the cost of neglecting the details. For a full description, I refer to the document VREG (2014).

the "revenue" regulation category to the other "rate-of-return" regulation category, it maximizes its profits since the budget for costs falling under the category of "revenue" regulation is fixed. Such behavior could potentially lead to intense, costly monitoring from the regulator's side and results in costly ex post bargaining between the two parties on where to allocate specific costs. The VREG has regarded this as a critique, though not the most important one.

The Brussels regulator *brugel* and the Walloon regulator *CWaPE* have, by and large, copied CREG's regulated tariff model. In contrast, *VREG*, the regulatory body for electricity and gas distribution in Flanders, has, for good reasons in this author's opinion, reflected on how to alter the way distribution companies ought to be regulated if operational efficiency is one of its objectives. VREG is—rightly so—still convinced that distribution companies should be regulated. As local monopolies, even though they are natural monopolies with respect to infrastructure, distribution companies, owned by communes, have all incentives to charge high (monopoly) prices and earn a monopoly profit rate. In addition, monopolies typically have high incentives to behave inefficiently with regard to allocating inputs and producing too low quality outputs.

To prevent them from doing so, the regulator wants to control its profits and tariffs charged in one way or another. Return-on-investment (ROI) or rate-of-return (ROR) regulation, also known as "cost-plus" or more informatively[4] "cost-of-service" regulation, offers such an upper bound by (i) guaranteeing the regulated firm a *profit rate* and (ii) approving a tariff that are considered to be *fair* and *reasonable*. With regard to returns from capital, the regulator tries to determine the right price for invested inside and outside capital, and monitors the operational expenditures. When it comes to tariffs, the regulator wants to limit the freedom of the firm to price discriminate too much. Taken together, the regulator arrives at the necessary revenue required to cover the costs. In general, the average tariff should cover the average cost.

As is well-known, however, ROI regulation invites the regulated company to increase its costs *above* the efficient level while respecting the constraint on the profit rate. The reasoning is that costs will be paid back by the end-users anyhow since higher costs are reflected in higher prices while still respecting the regulated rate of return constraint. As a result, if the regulator wants to prevent the distribution company from engaging in too high costs, it will need to check the regulated firm's slack and monitor whether its costs are necessary or not. Such a monitoring activity is extremely costly and difficult to organize efficiently.

There is sufficient convincing theoretical analysis and empirical evidence showing that asymmetric information, on e.g. cost structures, between the regulator and the regulated firm is to the advantage of the latter. In summary, cost-plus regulation is regarded as an inefficient way to safeguard operational efficiency. The VREG, in its new tariff methodology, has decided to leave this path and substitute it for another form of regulation that,

[4] Laffont and Tirole (1993), p.13.

according to VREG, offers the regulated firms more incentives to behave in a cost-efficient way.

To do so, VREG has left CREG's hybrid model of "cost-plus" regulation and "revenue"-regulation. The VREG distinguishes for its regulation, by and large, between *exogenous* and *non-exogenous* costs. Exogenous costs refer to costs not under the control of the distribution company—mainly green certificates—and will be paid for by the distribution network users. The non-exogenous costs, in contrast, are under the DSO's control and are subject to revenue regulation. In what follows, we concentrate on these non-exogenous costs.

As mentioned earlier, revenue regulation allocates a fixed budget to the regulated firm and avoids the regulator's approval of specific costs and their level. Cost reductions, then, resulting e.g. from improvements in productive efficiencies, directly translate into a higher profitability for the distribution companies. As a result, such a form of regulation should provide the distribution company with sufficient incentives to operate in an efficient way.

The fixed annual allowed revenue (for non-exogenous costs) for DSO i in 2015 ($TR_{2015,i}$) is *a specific* result of its recent historical total costs. DSO i's historical costs for year j can be written as

$$TC_{j,i} = DEP_{j,i} + NOC_{j,i} + CC_{j,i}$$

where $DEP_{j,i}$ stands for the value of depreciation, $NOC_{j,i}$ net operational costs, and $CC_{j,i}$ a regulated return on capital determined by the VREG. We refer to VREG's document for the details on how the different components are determined. One important remark is that the VREG sets the cost of capital equal across all DSOs which is based on the behavior of an efficient DSO.

The VREG determines a DSO i's total revenue in 2015-2016 by estimating the linear time trend of all DSOs' costs starting from 2010 to 2013. The trend line, therefore, makes use of 4 total historical costs; 2014 is not used to determine the revenues for 2015-2016. Each DSO will then be allocated in 2015 a share of the trend value resulting from the linear extrapolation. A DSO's share is determined by its individual share of the (discounted) historical total costs. If a DSO's current costs happen to develop at a higher speed than the estimated sector's costs, its share from the historical total sector costs does not follow. As a result, the DSO will suffer from lower profits. Similarly, if its current costs develop at a lower speed than the sector's costs, it will increase its profits as its share is based on its historical costs. Summarizing, DSO i's total revenue for 2015 equals

$$TR_{2015,i} = a_i \cdot TC_{2015,\text{ trend}}$$

where a_i is DSO i's share of the discounted sector costs from 2010-2013 and $TC_{\text{trend},2015}$ reflects the total sector revenues for 2015 resulting from the linear extrapolation of the discounted sector costs in 2010-2013.

During the second year of the regulatory period 2015-2016, total revenue for DSO i equals

$$TR_{2016,i} = TR_{2015,i}(1 + CPI - x + q_i)$$

where $TR_{2016,i}$ stands for the total revenue allocated to DSO i in 2016, CPI the consumption price index as a correction for inflation, x as a proxy for productivity changes, and q_i a quality index.

Finally, each DSO must get approval from the VREG for its tariffs. The tariff setting should not result in a violation of the DSO's allowed revenue. In addition, it is VREG's opinion that there is currently no need to let tariff regulation deviate from the regulation approach at the revenue level. That is, tariffs should follow the same logic as the total regulated revenue explained above.

3. Comments on VREG's revenue-regulation

The current revenue-regulation framework introduced by the VREG is mainly characterized by two properties. The first property is that the framework is mainly oriented towards revenues required to cover costs. The second property is that the regulation wants to offer incentives at the DSO level to reduce their costs and become more efficient. I will first discuss these two properties in more detail in what follows. Then, I comment on two other characteristics of the regulatory framework, i.e. productivity and quality.

Revenue covering costs oriented framework — Revenue regulation insures each DSO completely against changes in the volume of electricity demanded. As a result, the current regulation distinguishes itself from revenue-*cap* regulation which imposes an *upper* bound on the revenues the regulated firm can receive.[5] The VREG assesses that downward variability in a DSO's revenue would result in too much uncertainty for the DSO's capital return. This downward variability would expose it to an unacceptable financial risk and increase the cost of capital. The reasoning is that a DSO's total costs are, by and large, represented by its distribution network and characterized by a fixed cost investment. At the same time, *most* of its revenues are coming from electricity distribution tariffs that are the result of a variable amount of electric power consumption, and therefore an uncertain volume of injected power. The risk exposure is real: electricity consumption at the household level in Flanders lowered from 11,372,000 MWh in 2009 to 10,521,000 MWh in 2013 or a decrease of 7.5%.[6] To guarantee its promised revenues, a DSO will therefore be able to increase ex post its tariffs if the expected volumes are lower than predicted so as to receive the foreseen revenues. In other words, the distribution tariff will go up if consumption diminishes. Conversely, distribution tariffs will be lowered if the demand for electricity goes up. This side-effect of revenue-regulation is at odds with sound economics where efficiency prescribes that prices should go up when demand augments. It is also at odds with a generally accepted policy that efficient energy consumption, a.o. electricity, should be encouraged.

As an alternative to this rather annoying side-effect, the regulator could, given the fixed cost characteristic of the distribution network, offer a framework that is more oriented towards

[5] See Crew and Kleindorfer (1996) for a critical assessment of revenue(-cap) regulation.
[6] http://www.vreg.be/nl/gemiddeld-energieverbruik-van-een-gezin.

promoting fixed distribution charges. That is, charges that are more oriented towards levies independent of the amount of injected power. Such an approach meets the objectives of safeguarding the DSO's revenues—and, importantly, therefore keeping the cost of capital equally low—while mitigating the odd effect from variable consumption on tariff changes. Of course, a first critique could be that consumers with a low consumption profile will experience a higher average tariff as compared to consumers with a high consumption profile. In extreme cases, some consumers may refrain from buying electricity. One answer is here to let consumers choose between menus of tariffs. In other words, consumers with a low consumption profile can opt for a distribution charge based on their consumption. Another critique on a fixed charge approach might be that a regulatory framework more oriented towards a fixed distribution charge encourages consumption as it translates into lower unit prices. Other instruments however, e.g. an environmental tax, are available to correct for this consumption increasing effect.

The VREG assesses the total costs for the regulatory period 2015-2016 by taking a linear time trend based on the historical costs of the sector during 2010-2013. The regulator does not really motivate its choice for this particular time interval. Moreover, the regulator presents the linear regression approach and the consequent extrapolations for 2015-2016 as an "objective and transparent" approach. It is unclear to what extent this argument holds since there is much more than meets the eye from an econometric point of view. It would have been informative if the regulator devoted more time to explain why other (better performing) methods or regression specifications were not reported or considered.

Relatedly, since each distribution network contains elements that are characterized by economies of scale, it is unclear why the approach to assess the trend imposes that total costs should increase in a linear way. Since not all DSOs have the same size, smaller ones may suffer from higher average cost levels as compared to large-size DSOs; with increasing returns to scale, average cost of servicing goes down ceteris paribus. Size has clearly increased at the aggregate level, since the number of connections[7] in Flanders has increased from about 2,652,000 in 2009 to 2,701,000 in 2013, or an increase of almost 2%, so that average cost must have come down. The current approach focuses on total costs rather than average costs. Consequently, the linear trend as a basis for assessing future costs benefits larger DSOs more than smaller ones.[8] It is unclear to what extent this effect—i.e. the regulation potentially discriminates against smaller DSOs—is compatible with the objectives of the regulator. The total cost approach taken by the VREG could therefore have been improved on by also taking an average cost approach as this measure at least corrects for size. The average cost approach therefore seems worth being carried out.

The costs built up by the DSOs in the period 2010-2013 are the result of the regulatory environment organized by the federal regulator CREG. This regulation was, by and large, a regulated ROI or cost-plus regulation. The VREG, rightly so, wants to get rid of this form of regulation; asymmetric information invites the regulated firms to inefficiently inflate their

[7] http://www.vreg.be/nl/gemiddeld-energieverbruik-van-een-gezin .

[8] Technically, for a natural monopoly, the elasticity of total costs with respect to size is smaller than one. Only if the value of this elasticity equals one—constant costs to scale—the method is non-discriminatory.

costs and take advantage of the regulator's high monitoring costs. However, the VREG argues that use of the historical costs as the basis to assess the DSOs expected costs for 2015-2016 is sound since the CREG closely monitored the DSOs. This motivation is unfortunate as it stands in sharp contrast with its critique on the regulated ROI-method in general. Remark that costs in these period have increase over time. Part of the increase may be the result of the regulatory method that invites DSOs to increase costs. Indeed, reported costs go up as a result of low incentives in the past, and as a result the (linear) trend goes up as well. Referring again to the linear regression method, one may wonder if the VREG would have regarded the method "objective and transparent" and whether it would have adopted it if historical costs had decreased over time.

Finally, the distinction between revenue-regulation and ROI-regulation may be futile if the historical costs and the return on invested capital are used as a basis to determine revenues and tariffs.

Incentives for cost reduction — Revenue regulation is not the only characteristic of VREG's regulation framework. There are built-in incentives for DSOs to reduce their costs. Each DSO receives a measure of its fraction of the historical costs—i.e. a_i —from the total sector extrapolated trend costs. All DSOs, therefore, have a short-run cash benefit to reduce its structural costs. If their current costs decrease as compared to their historical costs, they receives the difference between its allocated trend costs and its actual costs. In sharp contrast, if a DSO's costs increases faster than the trend, it loses money and makes a loss. This form of yardstick competition (Shleifer, 1985) is well-known to be a powerful cost-reducing incentive mechanism, eventually leading to the socially-efficient outcome. However, there are at least two main obstacles that should be met to guarantee its success. First, there should be no collusive behavior between the regulated firms. Collusion is less of a problem when there are numerous regulated local monopolies. It is doubtful, however, that yardstick competition with only a few players is collusion-proof. While Flanders has 12 DSOs, 7 DSOs are grouped within *Eandis* while the remaining other 4 DSOs are taken care of by *Infrax*. Second, the regulatory period should be long enough. Cost-reductions are interesting insofar as they are beneficial to the DSO. If the trend sector costs are adjusted too frequently, a DSO shoots itself in the foot by reducing its costs. The reasoning is that a cost reduction automatically translates into a lower share in the historical costs, determining the future share of the trend sector costs. This effect works as a two-edged sword. The regulatory period for the current framework spans only two years. As a comparison, in the UK, the regulatory period for electricity distribution spans eight years (Ofgem, 2010). While the VREG fully realizes the potential effects of such a small regulatory time-frame, DSOs will probably act accordingly and not take too much risk. Cost reductions could therefore turn out to be moderate.

Productivity and quality — In addition to the yardstick competition component, the current regulatory framework also foresees a productivity component x. Remark, however, that this is not a pure cost-reduction incentive rather than a regulatory constraint imposed in a top-down way. Typically, this productivity factor adjusts the inflation-adjusted (CPI) level of allowed revenues (or tariffs) for progress in sector productivity. The method used to

determine the value of this productivity component, however, is based on the evolution of the trend costs. In particular, for the period 2015-2016, the VREG determines

$$x = 1 - \frac{TC_{2016,\text{ trend}}}{TC_{2015,\text{ trend}}},$$

where $TC_{2015,\text{ trend}}$ and $TC_{2016,\text{ trend}}$ are the total sector revenues for 2015 and 2016 resp., resulting from the linear extrapolation of the discounted sector costs in 2010-2013. This method looks somewhat mechanical as it does not explicitly explain to what the x-component is referring to. Following Bernstein and Sappington (1999), this component should reflect the extent to which (i) total factor productivity growth rate in the regulated industry exceeds the corresponding growth rate in the rest of the economy, and (ii) input prices used by the regulated firms have changed as compared to input prices used by other firms in the economy. It is unclear to what extent the used productivity-proxy by VREG reflects these two criteria.

Although the new regulatory framework allows for a quality component, i.e. q_i, the VREG has decided to set $q_i = 0$. The regulator's view on how to interpret this quality component is limited to the length of power interruptions and related financial compensations. While the regulator regards the quality of DSO-services to be high, this may probably be too narrow a vision on quality of services. Measurable quality standards for safety or the environment could also be part of the regulatory framework.

4. Conclusions

VREG has introduced a shift in organizing the regulation of electricity distribution in Flanders by introducing components for cost-reducing incentives. This shift should be applauded. However, an important part of the regulation for 2015-2016 is still based on a linear extrapolation of the historical costs resulting from ROI-regulation characteristics. CWaPE and brugel, the Walloon and Brussels regulators resp., have chosen, by and large, to adopt a "copy-paste" approach by remaining with the ROI-regulation set up by CREG. This is probably a missed chance, wherefrom the title of this contribution.

Further improvements on how to organize regulation of electricity distribution in Belgium should be further explored. Input-based incentives are only one side of the coin. Output-based incentives, like quality standards, are the other side of the same coin, are as important and could be integrated more intensively, like e.g. in the UK and Italy (Cambini et al. 2014). Mandatory competitive, public procurement imposed to owners of networks for the operational exploitation of their distribution networks could also be seen as a way to reorganize this important part of our economy.

To make this happen, we should strive to *further* strengthen the effectiveness and capabilities of our regulatory bodies to optimize regulatory intervention where needed. This call does not only refer to further safeguard regulatory independence in governance terms, but also in terms of manpower. The regional Governments have an important responsibility to make this happen.

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