ELECTRICITY DISTRIBUTION INVESTMENTS: WHAT REGULATORY FRAMEWORK DO WE NEED?

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ABSTRACT

The paper, based on a EURELECTRIC report from 2014, focuses on what regulatory framework is needed to facilitate the demanding investment challenges that European distribution system operators (DSOs) are facing for the years to come. It analyses the economic performance of DSOs and regulatory systems in different European countries. Subsequently, it identifies good practices and provides recommendations on how economic regulation of DSOs should be revised in order to incentivise DSOs to make efficient long-term investments.

INTRODUCTION

Two thirds out of €600 billion investments needed in European networks will be necessary in distribution grids. These go back to three main drivers: the need to integrate renewable energy sources (RES) into the electricity system, the need to replace existing assets in order to ensure continued quality of supply, and the development of smart grids. However, regulatory framework that would adequately address these challenges and allow for investments in smart distribution grids is not always in place in most European countries.

Most regulatory schemes set rules determining the amount of revenues a DSO is allowed to recover. Cost recovery through regulated revenues significantly influences the incentives and business case for investments. As such, it is also the main focus of this report. In most cases, additional regulation specifies the design of network tariffs (revenue recovery).

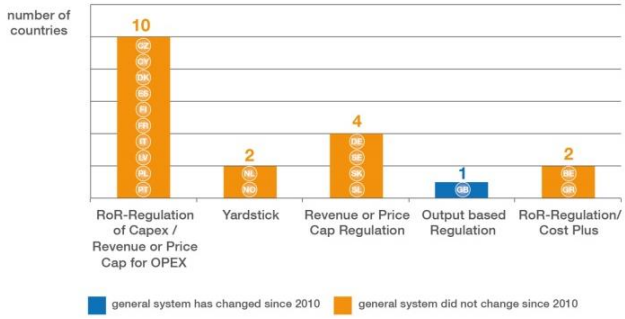

Figure 1: Regulatory systems in Europe

While the regulatory models in the EU differ, they do contain some common challenges for DSOs which this paper aims to clarify. Incentive regulation with some elements of rate of return regulation is the most common regulatory scheme in Europe. However, specific regulatory approaches as well as instruments differ a lot throughout Europe (Figure 1), making direct comparisons difficult.

DSOS' ECONOMIC PERFORMANCE

Based on the data from 49 DSOs from 18 European countries[1], in their 2014 report, EURELECTRIC explored the relationship between DSOs' profitability and investment activity [1]. The review of the economic performance of European DSOs in the period from 2008 to 2012 showed a clear link between capital expenditure in distribution assets and economic performance.

Value destruction?

In 2008, at the beginning of the analysed period, most DSOs were destroying value. Figure 2 analyses the DSO economic performance by looking at value creation/destruction, measured as the return on invested capital (ROIC) and the weighted average cost of capital (WACC) ratio (%). It indicates whether a company is creating value (i.e. >0%) or destroying value (i.e. <0%). In all countries but four (red and green shaded bars respectively), the aggregated pre-tax ROIC was lower than the pre-tax WACC of 9.5%.[2]

On average, the negative ROIC-WACC relationship amounted to -3.7% when the economic and financial crisis started in 2008. Companies destroying value are not able to profitably exploit their assets because the achieved return on their investment is lower than the cost of capital employed in funding those assets. While destroying value is not necessarily equivalent to making losses in the company's income statement (a company's profit may still be sufficient to cover financial expenses

[1] Czech Republic, Cyprus, Denmark, Estonia, Finland, France, Germany, Greece, Italy, Ireland, the Netherlands, Norway, Poland, Portugal, Slovakia, Spain, Sweden and the United Kingdom.

[2] The estimated 2008 WACC value has been taken from a previous EURELECTRIC report [2] as a departure point for the study. This paper shows the main WACC calculation parameters for a series of years. These parameters are an average resulting from several utility companies. Pre-tax WACC estimations had to be taken for the comparison exercise, as they had to be related to pre-tax return indicators. In our view, market parameters based on regulated monopolies would not have been sufficiently representative of the electricity distribution business. The available potential comparators in the monopoly universe are companies from the UK water regulated business or transmission system operators, whose business environment is different from the electricity distribution business environment. We acknowledge that average WACC estimations and rates of return decreased in the following years after 2008.

and income tax), it does not provide shareholders with the remuneration they expect and thus discourages investments.

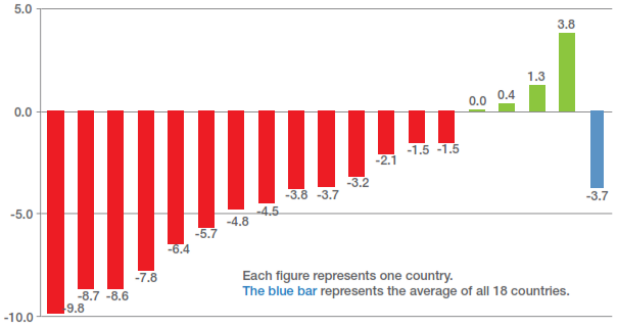

Figure 2: DSO value creation/destruction (ROIC-WACC) in 2008 (%)

Investments decline

DSO investments had a tendency to decline. Figure 3 shows the declining DSO investment effort in the period 2008-2012. It uses capital expenditure/ depreciation ratio as an indicator of the investment activity. The capital intensive nature of the electricity industry implies that electricity companies have on average higher capital expenditure to depreciation ratios than other sectors. Values well above 1 are not unusual.

In comparison to corporate activity and capital spent in non-regulated assets, DSOs have had to maintain a more active investment role. Regardless of their low returns, DSOs are facing the need to maintain investment, especially to ensure RES connection. They cannot decide to reduce their investments as they are (often legally) obliged to extend the network adequately.

Clearly, such a trend is not a sustainable way to promote viable investments. DSOs must be able to create value on a regular basis. In other words, a fair return on investments, i.e. higher than the cost of capital incurred, is essential to achieve the major investment needs.

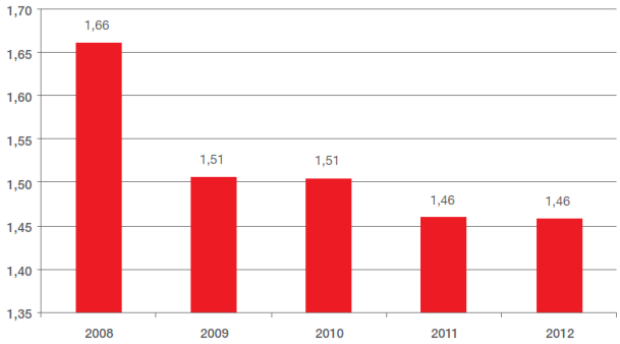

Figure 3: DSO investment activity (capital expenditure/depreciation ratio) evolution, 2008-2012

REGULATION OF DSOS

The abovementioned quantitative analysis was complemented by qualitative assessment. 17 DSO directors have provided their insight into future DSO challenges and evaluated the associated risks and the regulation system. In addition, EURELECTRIC made an expert survey on the design of national economic regulation for investments, including how such frameworks incentivise smart grids and smart metering.

Impact of regulation on DSO investments

Achievability and adequacy of the regulated rate of return on the one side and planning reliability on the other side are the most important criteria when evaluating the investment incentives delivered by a specific regulatory regime. Considering these three criteria, the results of the survey show that the incentives for investments have decreased since 2010. In most countries (1) DSOs take investment decisions under substantial regulatory risk and (2) the Regulated Rate of Return (RoR) is difficult to achieve and/or is not adequate [3] (Figure 4).

The following main problems were observed:

- Rate of return (RoR) often does not reflect the industry's capital cost;
- Regulatory requirements for efficiency are difficult to fulfil;
- Capital expenditure (CAPEX) is recognized with delay when setting revenue allowances (up to 7 years);
- The planning reliability is rather low, often due to high regulatory risk.

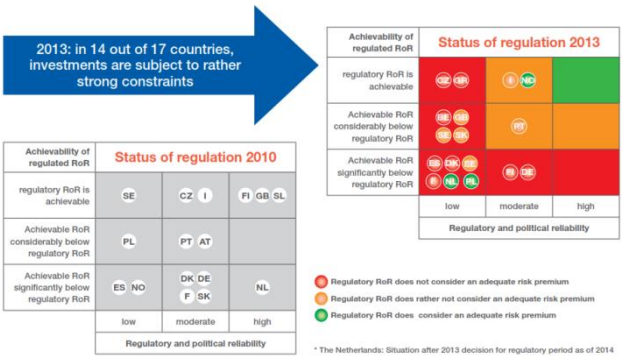

Figure 4: Status of regulation in 2010 and 2013

Regulated RoR

Regulated RoR should be set in a forward-looking way. The market risk premium and the company specific risk premium should be based on real market trends, not estimated on the basis of historic values, and take into account higher risk of new technology. In addition, the return must be consistent with the long lifetime of distribution assets. The risk-free rate and debt premium should reflect the typical network asset lifetime of 30 to 55 years [4]. For both companies and investors, a transparent, clear and stable methodology that ensures a stable return in the long run is essential. However, many countries do not fulfil these requirements.

Efficiency requirements

DSO directors from 14 out of 17 countries observed a negative effect of the efficiency requirements on the achievability of the regulated RoR.

There is a distinction between general and individual efficiency requirements. General efficiency requirements are determined on the basis of trends, i.e. there is no distinction between companies. Individual efficiency requirements take into account the specific performance of each DSO. As shown in Figures 5 and 6, the methods for determining these requirements differ a lot between countries. Benchmarking models requiring comparisons between a minimum number of companies are implemented in countries with many DSOs like Germany, Norway or Finland. By contrast, countries with few DSOs such as France, Portugal or Spain often base efficiency requirements on a specific analysis. In some countries, requirements refer to total cost and therewith reduce capital cost directly. If they refer to operational cost only there can be an indirect effect on the RoR.

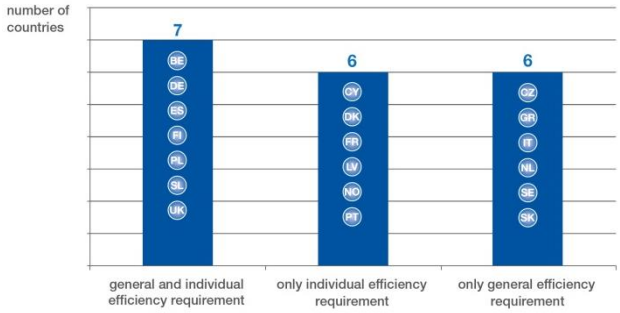

Figure 5: DSO efficiency requirements in Europe (2013)

		Individual Requirement	General Requirement
based on...	OPEX	CY, BE, F, FI, LV, PL, PT	does not apply
	OPEX + CAPEX	DE, DK, ES, GB, NO, SL	
referring to ...	OPEX	BE, CY, DK, FI, F, LV, PL, PT	BE, CZ, GR, IT, PL, SE, SL
	OPEX + CAPEX	DE, ES, GB, NO, SL	DE, ES, FI, SK, NL

Figure 6: Methods for determination of efficiency requirements (2013)

Efficiency requirements must take the current challenges and investment needs into account. This includes a trend towards higher operational expenditure as data handling gains importance. However, efficiency requirements are usually not calculated with regard to the upcoming challenges. Instead, they are often based on historic cost. This leads to inconsistent incentives. Regulation should also take into account that companies are reaching a common efficiency level.

"CAPEX time-shift"

The delayed recognition of capital expenditure (CAPEX) when setting allowances for revenues and prices is intrinsic to incentive-based regulation common all over Europe [5]. Pure incentive regulation like yardstick, price or revenue cap regulation is typically characterised by decoupling allowed revenues from current cost reductions. But necessary investments would only be approved with significant delay. According to a study of the German Energy Agency (dena) [6], this CAPEX time-shift significantly lowers the achievable rate of return: DSOs with high investment needs destroy value.

To relieve the CAPEX time-shift problem, most countries use regulatory mechanisms like planning cost approaches. This removes a significant investment constraint.

However, the problem is still unremedied in three countries: Germany, Slovakia and the Netherlands (Figure 7). In those three countries, DSO revenues are delayed on average for four years. In Germany, the CAPEX time shift is up to seven years. In the Netherlands, the methodology of the regulatory framework relieved the problem. The Dutch yardstick methodology includes an extrapolation of the historic asset base (including the X-factor) and the Dutch DSOs are allowed to keep extra revenues due to a rise in volumes (in the methodology allowed revenues are calculated based on historic volumes). However, the CAPEX time shift will be a topic on the agenda in the next years as the volume growth is expected not to be that high anymore and Dutch DSOs expect to invest more in electricity cables and gas pipes.

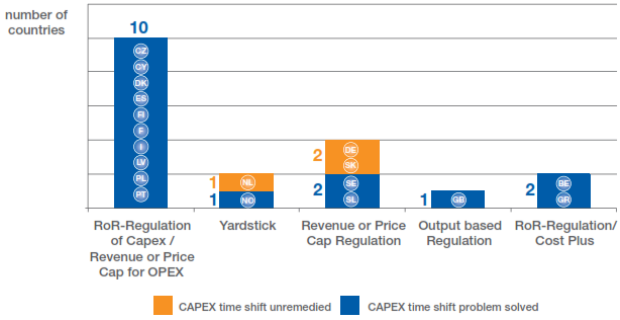

Figure 7: The CAPEX time shift remains unremedied in three countries (2013)

Planning reliability

For DSOs as well as for investors, planning reliability is as important as the current regulated rate of return when taking investment decisions. While DSOs still invest in most assets through corporate finance, debt financing is expected to gain importance as investment needs grow.

When making investment decisions, DSO directors ascribe the highest importance to regulatory risk followed by political uncertainty. Figure 8 ranks regulatory risk (the risk that regulation does not allow DSOs to cover costs), political uncertainty (risk arising e.g. from changes to the legal framework), market risk (systemic risk, e.g. recession), credit risk (arising when future cash flows might not be enough to meet the needs of borrowers) and technological risk (risk of stranded investments) according to the survey results. The finding that the outcome of regulation was not evaluated as predictable in any country is therefore alarming. Benchmarking was mentioned among the main explanations for this.

A predictable development of regulation includes avoiding significant discontinuity and involving the industry in case of changes. As the environment becomes increasingly dynamic, 're-openers' that recognise

changes in the cost-drivers can help regulation to become more flexible.

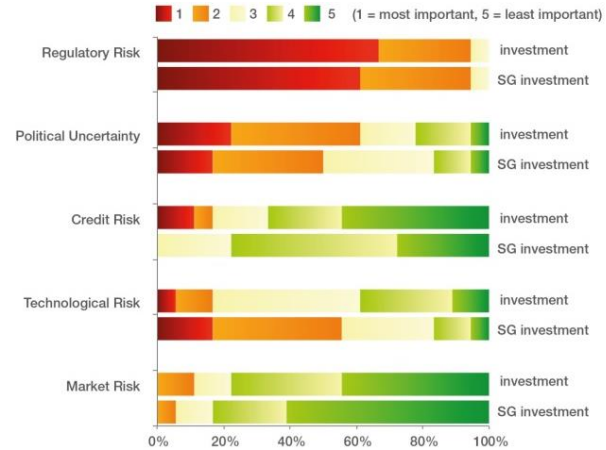

Figure 8: Evaluation of risk by DSO directors

Regulation for Smart Grids

Against the backdrop of variable renewables integration and the expected penetration of e-mobility, the ability to monitor the electricity flowing in their grids is becoming increasingly important for DSOs. Smart grids will equip DSOs with new tools to keep the system highly reliable and affordable. They will also create opportunities for customers to become more active and for service providers to package new innovative offers.

Smart metering

In most countries, DSOs have been responsible for metering and they will be also responsible for the smart meter roll-out (Figure 9).

Figure 9: Smart metering rollout responsibilities (2013)

The framework for the smart meter roll-outs in Europe has improved since 2010 (Figure 10), which could lead to increased smart metering penetration in the years to come. While likely to happen in the next years, the progress concerning the smart meter framework is not yet reflected in the roll-out process.

Smart Grid projects

Technological risk plays a much higher role for smart grid investments than for other investments. A smart grid cost benefit analysis by the government, a national action plan or roadmap and a national forum for involving stakeholders can enhance planning reliability.

Testing and exploring smart grid technologies is indispensable to deliver the most efficient solution. DSOs represent a key stakeholder in smart grid projects co-funded by the European research programme (FP7) [7]. In some countries (e.g. Germany), there are also several large national funded projects where DSOs play an important role.

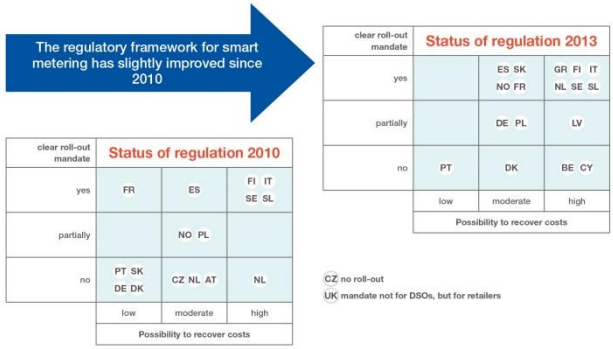

Figure 10: Overview of smart meter regulation in Europe (2013)

Despite this development and the political will to foster smart grids, there is still a big potential for better innovation incentives. Although there are several best practices around Europe (such as the Low Carbon Network Fund in the UK, 2% extra WACC for selected pilot projects in Italy or pass through of RD&D costs to a certain degree in Norway), most DSO directors believe that regulation still hampers innovation.

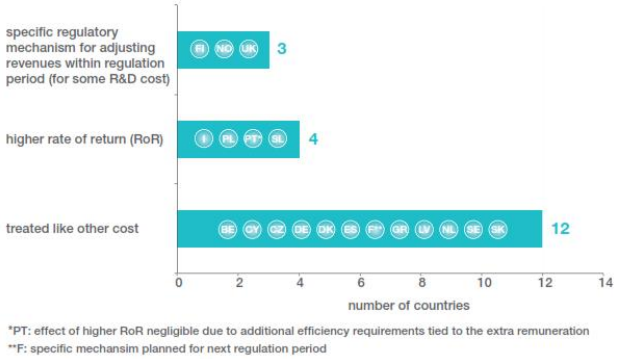

Figure 11: How are R&D and pilots treated in regulation?

In most countries, R&D and pilots are treated like any other cost, i.e. there is no specific compensation for the risks involved in testing new technologies and processes (Figure 11). While regulation mainly focuses on cost reductions, pilots do not necessarily lead to short-term cost reductions and may have a negative effect on the efficiency benchmarking. Depending on the regulation scheme, costs are thus not or not fully approved by the regulator. The special risk structure would neither be reflected by the regulatory risk premium nor by the depreciation period.

But even when specific incentives are in place, those may be offset by efficiency requirements. For example, in Portugal, higher RoR has negligible effect due to additional efficiency requirements.

CONCLUSION

All in all, it is crucial that regulation incentivises DSOs to

make efficient long-term investments rather than focusing on short-term optimisation and that it rewards rather than penalises innovation. This could be achieved by:

- defining a long-term policy not only for producers and consumers but also for networks;
- setting the regulated rate of return in a way that is transparent and based on long-term stable cost of capital consistent with the assets' lifetime;
- improving predictability of the regulatory formula;
- removing RD&D from efficiency targets, allowing a higher return on investments and a risk adjusted depreciation period for projects with significant risks and further encouraging financing of large scale demonstration projects.
- ensuring timely cost recovery of the smart meter roll-out by DSOs.

REFERENCES

[1, 3] EURELECTRIC, 2014, "Electricity Distribution Investments: What Regulatory Framework do we need?".

[2] EURELECTRIC, 2012, "The Financial Situation & Investment Climate of the Electricity Industry – Economic and Financial Update".

[4] CEER, 2013, "Memo on Regulatory aspects of energy investment conditions in European countries".

[5] EURELECTRIC, 2011, "Regulation for Smart Grids".

[6] German Energy Agency (Deutsche Energieagentur, dena), 2012, "dena Verteilnetzstudie".

[7] Joint Research Centre, 2013, "Smart Grid projects in Europe: Lessons learnt and current developments".