



Europe Economics

Cost of Capital calculation for Electricity and Gas DSO's in Flanders

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1. Introduction

Fluvius System Operator CVBA (Fluvius) was created on July 1st 2018 following the merger of Eandis System Operator and Infrax CVBA, the two largest electricity and gas distributors in Flanders. This merger created a single, multi-utility operating company for the entire Flemish Region. As a company managing the distribution networks of Flemish DSOs, Fluvius is regulated by the VREG (under article 4.1.30 of the Flemish Energy Decree, 2009). The VREG is responsible, among other tasks, for the approval of the distribution network tariffs for electricity and natural gas in the Flemish Region and the determination of the tariff methodology on the basis of which these tariffs must be determined.

The general regulatory approach for distribution system operators (DSOs) acknowledges that they are natural monopolies, and as such they receive their income and revenues under the supervision of a regulator. In doing so, the regulator has the task of taking the cost of capital into account when determining allowed revenues. The methodology for developing the tariffs involves the calculation of the cost of capital for the DSO to be used as the return on the relevant assets of the distribution system operators. This has to be done in a way that it allows the distribution system operator to operate and make the necessary investments for the performance of its tasks.

Under the Flemish Energy Decree, the VREG needs to develop a tariff methodology with the objectives of promoting stable and foreseeable regulation that contributes to the smooth function of the liberalized market which, at the same time, enables distribution system operators to make the necessary investments in their distribution networks. The latest methodology used by the VREG for establishing the reimbursement to cover the capital costs of the DSOs is determined in the Appendix 2 of the 2017-2020 Tariff Methodology.

The VREG has commissioned Europe Economics to determine the cost of capital for the electricity and gas DSOs for the next price control period 2021-2024. The VREG method for the Weighted Average Cost of Capital (WACC) analysis should preferably be used with proper justifications or departures when this is required.

This report consists of three sections:

- (i) Main report consisting of the WACC results.
- (ii) Annex 1: Other Issues.
- (iii) Annex 2: General Approach to Financeability.

A technical annex contains the statistical tests undertaken to assess the robustness of the beta estimates.

2. Method

Investors in regulated companies (such as network operators) bear an opportunity cost of the funds allocated to those companies. Namely, the potential returns they could have earned from investing in an alternative portfolio of firms with the same systematic risk exposure. The assessment of such opportunity costs is part of the total cost to be assessed in a price control and is typically done using a weighted average cost of capital (WACC), as described further below.

However, to estimate such costs an analysis of the risk exposure actually is required. We can distinguish between two types of risks:

- Business specific risks i.e. risks that are specific to the company itself and could be diversified away (using a geographic and industry-diversified portfolio), and
- Systematic risk i.e. risks that are correlated with the economy as a whole and hence cannot be eliminated via diversification.

Accounting for systematic risk is important in the WACC calculations (if compensation for systematic risk is not provided, investors would not provide capital for such assets). One standard way to identify the relevant systematic risk is by study of a comparator group of firms subject to similar such risks. This will be done in Chapter 3, below, where we explain our comparator selection and analysis. The calculation of the various WACC parameters and the overall WACC is described in chapters 4 to 7.

2.1. The WACC method

The WACC is a weighted average of the costs of equity and debt, weighted by the proportions of debt (called the “gearing”) and of equity (one minus the gearing). The formula is usually calculated as Vanilla WACC and is:

$$\text{Vanilla WACC} = (1 - g) * R_e + g * R_d,$$

where R_e is the return on equity (a return paid out of post-corporation-tax profits); R_d is the return on debt (we note that debt interest is an allowable expense for corporation tax purposes¹); and g is the percentage financed by debt (also known as gearing) and is defined as debt over assets.

For the purpose of this study² a pre-tax WACC needs to be calculated, adjusting the cost of equity to reflect the fact that dividends are paid out after corporation tax has been applied. This can be constructed simply deducting the taxes from the post-WACC:

$$\text{Pre-tax WACC} = (1 - g) * R_e / (1 - T_C) + g * R_d$$

where T_C is the percentage tax.

The VREG has previously used a methodology for the WACC calculations of DSOs laid down in:

- Appendix 2 of the tariff methodology for the 2015-2016 regulatory period;³

¹ We note that this is subject to certain exceptions and limitations arising from the application of the European Union’s Anti -Tax Avoidance Directive.

² VREG uses a nominal pre-tax WACC in its methodology.

³ Link: <https://www.vreg.be/nl/document/besl-2014-21>.

- Appendix 2 of the tariff methodology for the 2017-2020 regulatory period⁴, based among others on a review of VREG’s Methodology (2016) done by The Brattle Group (henceforth “Brattle”);⁵

Cost of equity (R_e)

Under the VREG methodology the cost of equity is obtained from the capital asset pricing model (CAPM). Developed in the 1960s, the CAPM model expresses investment returns as: $R_e = r_f + (TMR - r_f) * \beta$, where R_e is the (expected) return on the asset; r_f is the return that would be required for a perfectly risk-free asset; TMR is the total market return, i.e. the return that would be delivered by a notional perfectly diversified portfolio consisting of all assets (“the whole market”). Finally, β (“beta”) is a measure of the correlation between movements in the value of the asset of interest and in the value of assets as a whole.

Cost of debt (R_d)

The VREG methodology also described cost of debt calculations as a “debt premium approach”. This means, decomposing the return on debt into three components: the risk free, the debt premium and a fee: $R_d = r_f + DP + Fee$, where, R_d is the return on debt; r_f is the risk free rate, DP is the debt premium and Fee is a Non-interest fee (compensation for the transaction costs of issuing debt).

The parameters

There are 8 parameters that need to be calculated in the VREG’s methodology. The explicit calculations to be used are described in the following table.

Table 2.1: Summary of WACC calculations

Parameter	#	Calculation method / Source
Tax	[1]	Parameter / Chapter 4
Gearing (D/A)	[2]	Parameter / Chapter 4
Gearing (D/E)	[3]	= [2] / (1 - [2])
Asset beta	[4]	Parameter / Chapter 5
Equity beta	[5]	= [4] * (1 + (1 - [1]) * [3])
Risk free rate (equity)	[6]	Parameter / Chapter 5
Equity risk premium	[7]	Parameter / Chapter 5
Cost of Equity	[8]	= [6] + [5] * [7]
Cost of debt	[9]	Parameter / Chapter 6
Non-interest fees	[10]	Parameter / Chapter 6
Total cost of Debt (pre-tax)	[11]	= [9] + [10]
Nominal WACC (Vanilla)	[12]	= (1 - [2]) * [8] + [2] * [11]
Nominal WACC (pre-tax)	[13]	= ((1 - [2]) * [8]) / (1 - [1]) + [2] * [11]

Note: D/A = Debt over Assets. D/E Debt over Equity.

2.2. Data sources and cleansing methods

We have used the Thomson Reuters Eikon financial data system to obtain daily data on all comparators for the calculation of the WACC parameters.

We note that some of the companies are not traded every day. Where liquidity is low, there is the risk that movements in the company’s share value are affected by such illiquidity (for example, due to opening times and trading hours). In line with the Dutch method that was used to select the comparators previously used

⁴ Link: https://www.vreg.be/sites/default/files/uploads/BESL_2018_23/bijlage_2_rapport_kapitaalkostenvergoeding_reguleringsperiode_2017-2020_gewijzigd.pdf.

⁵ Link: https://www.vreg.be/sites/default/files/rapporten/brattle_rapport.pdf.

by VREG, our approach to deal with lack of stock liquidity is to select only firms whose stocks meet certain conditions (details are provided further below).

3. The peer group

A peer group of companies is required to calculate some of the parameters of the WACC. Different criteria are used to select companies which are similar to those for which the cost of capital is to be calculated. The criteria are typically related to: firms offering similar products and services, with similar cost structure (or business model), serving similar type of customers, facing similar levels of competition, operating under the same type of regulatory framework and in similar economies or geographical location. Besides the economic and political context it is important to take into account potential government intervention and/or firms' main business activities.

3.1. The approach

In the 2015 tariff methodology, the VREG used an average of asset betas from the decisions of other regulators in Europe (for the Dutch and German network operators and the French electricity network operator). For 2017-2020, the VREG asked Brattle to investigate whether that asset beta had to be adjusted. Brattle calculated a median asset beta using the same comparison group used by the ACM for Dutch network operators in the 2014-2016 regulatory period. For the purpose of this study, our approach follows this precedent with some small modifications needed for updating the parameters.

We have selected an initial list of comparators from the group used in the previous determination. This followed guidance from the VREG and seemed a reasonable decision as it will provide estimates which are on the same basis with the previous group (allowing like-with-like comparisons). Because the list of comparators relies on those used by the ACM and Brattle, our selection required the same conditions as those established therein. We therefore looked for a comparator group of size of at least 10 companies (as the ACM method establishes). This implied complementing the initial list by including, in a few instances, some additional companies (these were selected from a long-list of peers, identified so as to resemble the regulatory framework and activities of the regulated company). The selection of suitable comparators was undertaken using the conditions required by the ACM for the liquidity of the stocks to be used (it is understood that illiquid stocks tend to produce biased beta estimates) and size of the comparators (small firms are more likely to contain noise in the stock data). The same criteria were also used by Brattle.

Our selection of suitable comparators followed the following stages:

- **Stage 1:** Select a first list of comparators from the previous group.
- **Stage 2:** Select additional companies to be used as potential comparators.
- **Stage 3:** Consider the suitability of the comparators.
- **Stage 4:** Eliminate companies with non-relevant operations.
- **Stage 5:** Expand the peer group to 10 companies.

Stage 1: Select a first list of comparators from the previous group

The comparators to be used started from the list used previously. This contained: "Snam Rete Gas" (Italy); "Terna (Italy), "REN" (Portugal); "Red Electrica" (Spain); "Enagas" (Spain); "National Grid" (UK); "Elia" (Belgium); "Northwest Natural Gas Co" (US); "Piedmont Natural Gas Co" (US); "TC Pipelines LP" (US).⁶ Because some of these are from non-European jurisdictions (three companies are from the US), we decided

⁶ The WACC for the Dutch TSOs, DSOs, water companies and the Dutch Pilotage Organization (2012).

to exclude them from our first list.⁷ Later on, we proceed to expand the list with other potential comparators from a pool of transmission and distribution operators from other European countries first, and also from non-European jurisdictions.

Stage 2: Select additional companies to be used as potential comparators.

Our selection criterion for expanding the previous peer group has been to select companies subject to a similar regulatory framework and active in a similar sector. We looked at companies operating in Western Europe in the following sectors (Thomson Reuters classification):

- Electric Utilities (this includes Transmission and Distribution companies), and
- Natural Gas Distribution and Transportation.

This provided 16 additional comparators with complete financial records. We then proceeded to check the suitability of these additional comparators based on the liquidity of their stocks and some additional checks. These are discussed below.

Stage 3: Consider the suitability of the comparators

This stage checked the suitability of the comparators (those previously used and also of any possible additional ones) based on two liquidity tests: trade at least 90 per cent of trading days and achieve at least €100 million in annual sales. For consistency, we used the same test thresholds as the ACM.

- The percent of traded days was calculated as the number of days where the equity was traded divided by the total number of trading days (and expressed in percentage terms).⁸
- Annual sales were obtained using “revenues from the sale of merchandise goods, manufactured products and services” (from Thomson Reuters).⁹

In addition, we also checked the suitability of such comparators in relation to their credit rating (we only included companies that were investment grade) and an additional liquidity criterion based on the bid-ask price spread (for days where both bid and ask price are observed, the bid-ask spread was calculated as the ask price minus the bid price, divided by the average of both prices).¹⁰ We used the threshold used in previous precedents which defined stocks as illiquid if the 3-year average of the spread was larger than 1 per cent.¹¹

As a result of these checks 11 companies (of the 16 possible additional comparators) failed at least one of the three liquidity criterion and 1 company failed the investment grade criterion leaving just 4 additional comparators: “EVN AG” (Austria), “Iberdrola SA” (Spain), “Verbund AG” (Austria) and “EDP Energias de Portugal SA” (Portugal).

Stage 4: Eliminate companies with non-relevant operations

We further refined our set by eliminating companies that had significant unregulated operations. This eliminated 2 more companies, leaving only 2 companies: “EVN AG” and “EDP Energias de Portugal SA” as potential candidates to complement the previous peer group. At this stage the group included companies

⁷ The only reason ACM included these was because the European set fell short of the minimum threshold of 10 companies for a suitable peer group. We note that “Northwest Natural Gas Co” and “Piedmont Natural Gas Co” have since been delisted.

⁸ The number of equity-trading days was calculated using the number of shares traded for a stock on a particular day (a figure that is expressed in thousands). To calculate the number of trading days we used, for each stock exchange, two variables (the Return Index and the Price Index) which show the days where there was activity in the exchange (the variables reflect volume and market capitalisation; hence, if there is no information, it means that the market is closed).

⁹ In instances where data contained missing information, these were complemented with “revenue from all of a company’s operating activities after deducting any sales adjustments and their equivalents” (also from Thomson Reuters).

¹⁰ This has been used as a liquidity criterion by the ACM in some of its recent decisions (see WACC for energy and water companies in the Caribbean Netherlands 2020-2022).

¹¹ This has been suggested in Nera (2016): “Update of the Equity Beta and Asset Beta for BT Group and Comparators: For the Office of Communications (Ofcom)”. March. Also by the German Energy Regulator (BNetzA) for setting WACC allowance for gas/electricity transmission and distribution (citation from the same Nera report).

which have significant regulated activities (two of the companies have around 75 per cent share of EBITDA in regulated activities, and the remaining 8 have 84 per cent or more).

Stage 5: Expand the peer group to 10 companies

As a result of the selection process only 9 companies were selected: 7 original European comparators and 2 additional European comparators. At this stage we included the only North American company previously used that is still traded (“TC Pipelines”) to increase the size of our peer group to 10.¹²

3.2. The Peer Group

Our final peer group selection consists of 10 companies. This includes the 7 European companies previously used, 1 North American company previously used and 2 additional Electricity distribution and transmission companies in Western Europe. This constitutes the companies which will be used to calculate the asset beta estimate.

The final peer group along with the country of exchange for the company is provided in Table 3.1. All comparators comply with the liquidity and rating conditions we imposed: [1] companies to achieve at least €100 million in annual sales; [2] trade at least 90 per cent of trading days, [3] average of the spread was lower than 1 per cent, and [4] companies classified as investment grade (shown in the last four columns of the table). This will ensure that the beta estimates obtained have good statistical properties (this will be seen when undertaking different statistical tests as part of our beta calculations).

Table 3.1: The Peer Group

	Company Name	Country	Rev. (mil€) [1]	Trade (%) [2]	Bid-Ask (%) [3]	Rating [4]
1	Snam SpA	Italy	2,586	97.69	0.10	A
2	Terna Rete Elettrica Nazionale SpA	Italy	2,273	97.69	0.10	A
3	Ren Redes Energeticas Nacionais SGPS SA	Portugal	727	98.33	0.22	A-
4	Red Electrica Corporacion SA	Spain	1,949	98.33	0.05	A-
5	Enagas SA	Spain	1,295	98.33	0.06	A-
6	National Grid PLC	UK	4,897	97.18	0.03	A-
7	Elia System Operator SA	Belgium	1,823	98.33	0.27	BBB
8	TC PipeLines LP*	USA	479	96.67	0.10	BBB
9	EVN AG**	Austria	2,078	95.26	0.42	BBB
10	EDP Energias de Portugal SA**	Portugal	1,255	98.33	0.19	BBB

Note: * S&P rating used instead of TR credit compiled rating. ** Denotes new comparator.

¹² As it will be seen, the inclusion of this company has minor implications on the results, as the asset beta estimated for this company is very similar to the rest of the peer group sample.

4. Gearing and tax rate

In this section we will set out the gearing and the tax rate.

Gearing

Gearing is the ratio of a company's debt to equity. It is defined as net debt (D) over enterprise value ($D + E$): $\text{Gearing} = D / (D + E)$. Gearing is a measure that shows the extent to which a firm's operations are funded by lenders versus shareholders. A company's gearing is important because it can have an influence on its cost of capital. As interests on borrowed capital are tax deductible, disproportionately using more debt reduces the cost of capital of a distribution system operator (obviously this would happen up to the point where if there is a perceived increase in the risk of bankruptcy, investors would demand higher risk premiums).

The VREG methodology set the gearing at a level that corresponded to a distribution system operator that finances itself "efficiently". In the past, the VREG has regarded an "efficient" distribution systems operator with an "A" rating (or higher). The VREG envisaged the gearing of "A"-rated network companies on average to be around **60** per cent.

This seems like a reasonable assumption. As the VREG noted in the past, utility companies (also distribution networks) can generally obtain relatively stable and predictable operational cash flows. As a result, it is possible that healthy companies are financed with a relatively large amount of debt. This is why high levels of gearing can be envisaged (with consequences in lower costs of financing). The 60 per cent gearing for "A"-rated network companies is also consistent with both Fitch and Moody's rating methodologies: Fitch specifies that for an "A"-rated network company the ideal gearing is 60 per cent while Moody's specifies that the gearing should be between 45 – 60 per cent.¹³

Tax

The VREG method prescribes that the tax rate is equal to the applicable rate for the regulated entities. The applicable tax rate for the DSO's is the Belgian corporate tax rate in the regulatory period 2021-2024 is expected to be **25 per cent**.¹⁴

Historical the tax rates affecting comparators are needed to convert the equity beta into an asset beta (obtaining this way, a measure of risk volatility which does not depend on the corporate tax rate).¹⁵ We use effective tax rates from KPMG's (the publication provides a view of corporate tax rates around the world up to 2019).

¹³ Fitch (2018), 'Corporate rating criteria Sector Navigators', p. 165; Moody's (2017), 'Rating Methodology Regulated Electric and Gas Networks, 16 March 2017, p. 19.

¹⁴ Any changes in the tax rate during the regulatory period should involve an adjustment to the WACC.

¹⁵ VREG de-levers from equity to asset beta using the Hamada equation: $\text{Asset Beta} = \text{Equity Beta} / [1 + (1 - \text{tax}) * \text{gearing} / (1 - \text{gearing})]$.

5. Cost of equity

In this section we set out our estimates for the cost of equity. As stated in the methodology section, the cost of equity uses the CAPM, which estimates the expected return to equity using its different components of: risk free rate (RFR), the asset beta of a company (and its corresponding equity beta), and the average return of the market (also known as the Equity Risk Premium, ERP). This section describes these three components, in turn.

5.1. Risk-Free Rate (RFR)

Regulators have generally accepted that the best approach for selecting the risk-free interest is obtained by observing the returns on government bonds. Given the different available choices of bonds, three characteristics are typically required. These are: selecting bonds of a representative maturity, choosing a representative statistic (spot or mean values), and selecting a relevant type of bond. These items are described below in turn. As recent developments by the European Central Bank have had implications on the rates of government bonds, an assessment of the impacts of monetary policy in the Eurozone is also reviewed as a separate heading.

The representative bond maturity

There are different considerations typically needed when deciding the maturity of the representative bond, and this is because of the implications the selection entails. For example, while it is understood that bonds with shorter maturity carry less risk, it is also recognised that these are also more volatile (fluctuating according to the current economic situation and outlook). This makes them less reliable for a regulatory period that runs over a number of years, according to some practitioners.

Bonds with greater maturities (more than 10 years) also have problems as these can bear more risk and are normally traded less (which leads to an additional premium). But then, it is also recognised that the choice of bonds with longer maturities corresponds better with the observations about the CAPM in reality (as reflected in the VREG methodology) and provide consistency with the data used for other components of the CAPM (i.e. the market risk premium).

The compromise between these two options has been to use bonds with a 10 year maturity. This is also the method used by the VREG and is in line with the approach used by most regulators.

Selecting a spot rate or a mean estimate

Although the spot rate is considered the best indicator for tomorrow's future (as it contains all most recent information), this has been criticised by some analysts for not being representative enough. Some regulators have argued that the short term volatility of the spot rates makes it "undesirable". The VREG is also of the view that opting for the instantaneous spot rate would introduce too much uncertainty, and recommends using an average value for a certain time period.

To estimate rates over a regulatory period, different forward-looking statistics have been proposed. It is generally accepted that the longer historical period used in the average, the less volatility will be observed. However, at the same time it is also true that this will also imply using "older" data that might be influenced by factors unrelated to the present and future periods for which a forecast is required.

Taking these considerations into account, the VREG (based on the research of Brattle) was of the opinion that the average interest rate over the last 12 months works as the best trade-off between reduced volatility and a "not-too-large" deviation from current events. This is again a generally-accepted choice of most regulators.

The representative bond

The VREG 2015-2016 methodology used an average of German and Belgian 10-year bonds (average with 50-50 weights). The use of German bonds was justified by the VREG because of “country-specific” risks following the 2008 financial crisis. As in many other European countries, there was a period post-2008 where the yields on government bonds rose to levels that could not be explained as risk-free rate assets only. At that time, it was widely accepted that the rates observed contained a premium for the risk of default of the government of the country. In that context, it was argued to use Germany bonds (regarded as the country with a low risk of default) as a suitable instrument for the risk-free rate of the Eurozone.

In view of the insight provided by Brattle, the VREG believed that the 50-50 approach could lead to an under-compensation of the investor investing in the Flemish distribution system operator, and so, in the methodology for the 2017-2020, the average was replaced by one with a higher weight for Belgian bonds (75% and just 25% for German bonds). The reasons provided by the VREG were related to its infancy as a regulatory authority (acknowledging that it was competent since mid-2014 and potential investors could not yet fully estimate the regulatory risk), the differences in the risks at federal and national level in Belgium, and other political influencing factors. The VREG however, believed that some of such risks could be reduced in the future, especially as the VREG became more established.

Although some of these arguments might be debatable, what seems clear is that the reasons that lead to a recommendation of a 50-50 average have subsided. Any country-specific risks previously and accounted for (which were reflected in large spreads of European and German bonds), have been reducing recently: at present, the difference of bond yields is smaller for Belgium-German bonds (Figure 1), and also for other EU Member States. We therefore see no reason to change the 75%-25% allocation used in the previous period.

Figure 1: Yields on 10 year German and Belgian government bonds



Source: Thomson Reuters Eikon.

Eurozone monetary policy

In the previous determination, Brattle recommended applying an uplift to the estimate of the risk-free rate to be used in the WACC. They justified this on the basis that it was required in order to counterbalance the effects of the Quantitative Easing (QE) programme by the ECB, and was envisaged to start at the time where the programme was announced (22nd of January 2015) and last while the QE programme was in place.

The ECB programme implied an expanded asset purchase programme (APP) of bonds issued by euro area central government, agencies, and European institutions. Brattle explained how this would temporarily reduce bond-yields and hence the risk-free rate (if this is measured using the yields of 10-year government bonds). Because they assess that, if unadjusted, the risk-free rate would be underestimated, Brattle suggested an adjustment of +40 to +70-100 basis points for German and Belgian 10-year bond rates, respectively (the adjustments were estimated using a study published by the ECB and were contrasted with findings from other regulators and academic literature).

Since its start on January 2015, there have been several developments in the ECB's QE programme. On 13 December 2018, the ECB announced that it would put an end to the asset purchase programme, but then a year later (12 December 2019) it announced a decision to restart the programme (at a monthly pace of €20 billion). It is important to note that while the ECB stopped the asset purchase program, it did not sell back any of the €2.57 trillion stock that it had amassed through this program. This means that though the program was stopped its effect on government yields remained.

A quantitative easing programme is akin to a cut in policy rates in that it is a policy measure designed to reduce bond yields. The question of whether a regulatory WACC should embody such a policy-driven yields reduction or whether it should make some uplift or other adjustment to offset it depends upon the impact that such a policy should be expected to have upon prices across the economy. If monetary policy stimulus is short-term in nature, we should normally expect that it will not be fully embodied in price changes. Instead, firms will make higher profits in the period of the stimulus. The transmission mechanism of stimulus in this case will run via higher profits for firms, aiding their cash-flows. In this case *ex hypothesi*, policy will be reversed within a reasonably short time, so incentives for additional investment will be limited to a combination of the short period in which returns are elevated by the stimulus itself and the longer-term in which, because of the stimulus, the economy is expected to return to normal growth (i.e. partly the stimulus works by reducing the risk of longer-term low returns in a depressed growth environment).

In such a case there is an argument for offsetting the impact of policy, for example by raising the risk-free rate in the way that Brattle suggested. In the early 2010s many commentators regarded the policy situation as temporary, with quantitative easing expected to be reversed rapidly. By the mid-2010s this situation was under debate but there were reasonable judgement calls that could be made either.

More recently, however, most analysis have come to regard the monetary policy situation, of near-zero rates and quantitative easing, as applying over a longer-term period.¹⁶ In particular, it is expected to last more than one price control period and potentially for a large portion of the lives of assets invested in over the next few years. When policy stimulus is "permanent" (i.e. applies over the long-term) the impacts on prices (and hence the correct way to account for their impact in regulatory WACC analysis) is different. Whereas firms may keep prices higher, in the presence of a short-term cut in their financing costs, because that policy is expected to be reversed, when financing costs are reduced by policy on a longer-term basis, we should expect pressures in competitive markets to bid prices down. So in this case, instead of firms tending to capture the gains from policy in the form of higher profits, those gains are transmitted through to consumers in the form of lower prices. Given that this is the process in play across the wider economy, economic regulators imposing price and revenue controls should, similarly, allow policy-induced reductions in financing costs to feed through into lower prices instead of offsetting them by upwards adjustments to the WACC.

That means that, in this context, although there was a reasonable debate to be had in the past about whether there should be an upwards adjustment to the WACC to offset the impacts of QE, now that is no longer so and we recommend that no such adjustment should be applied.

¹⁶ eg See p7ff of <https://www.ofwat.gov.uk/wp-content/uploads/2017/12/PwC-Updated-analysis-on-cost-of-equity-for-PR19-Dec-2017.pdf>

Conclusion

In conclusion the VREG methodology has argued that the risk-free rate (RFR) should be estimated on the basis of Belgian and German government bond yields. Having obtained the yields on 10 year Government bonds in both Belgium and Germany, the average of the most recent year (12 months) is taken. The RFR is then constructed as a weighted average of the two giving 75 per cent weight to the Belgian bond and 25 per cent weight to the German bond. In Table 2.1 we report the results obtained for both bonds and the overall risk free rate.

We note that the yields on government bonds have decreased since the previous study on cost of capital for DSOs (Brattle, 2016). The 12 month average of German and Belgian bonds is -0.21 and 0.19, respectively, for the last year. The weighted average gives a Risk-free rate value of **0.09** per cent.

Table 5.1: Risk Free Rate

Country	12 months Average (01/01/2019 till 31/12/2019)	Weight
Germany	-0.21	25%
Belgium	0.19	75%
Average	0.09	

Source: Thomson Reuters and Europe Economics calculations.

5.2. Beta regressions

The equity beta is a measure of volatility of a company's stock compared to the broader market. It is a critical component of the WACC, as it helps weight the cost of equity by accounting for the risk the firm is exposed to. For each company in the peer group (see Chapter 3), the equity beta is calculated as the covariance of the company's returns and the returns on the market index.

As in previous determinations we have used daily frequency and an estimation period of 2 years (from 01/01/2018 till 31/12/2019). As equity betas are not directly comparable across companies asset betas are used in the WACC calculation (the Modigliani Miller equation, accounting for taxes, is used to de-leverage the equity betas).¹⁷ This is standard in most regulatory work.

Following standard regulatory practice, several tests have been undertaken to assess the robustness of the estimates.

- Test for autocorrelation and heteroscedasticity.
- Test for statistical significance of the estimates.
- Assess the betas against Dimson-corrected betas.

Detailed results for each test are shown in the Annex.

Test and correct for autocorrelation and heteroscedasticity

Autocorrelation refers to the degree of correlation between the values of the same variables across different observations in the data. Heteroscedasticity refers to a dispersion of the error terms across time. Although both autocorrelation and heteroscedasticity do not bias the coefficient estimates, there is a risk they are estimated with less precision if any of these problems are present.

We have carried the standard autocorrelation and heteroscedasticity tests: Breusch-Godfrey for autocorrelation and White for heteroscedasticity. No autocorrelation was found for all companies except "Elia System Operator SA" and "EVN AG"; and there was no evidence of heteroscedasticity in all companies except "Ren Redes Energeticas Nacionais SGPS SA" and "EDP Energias de Portugal SA". Where the tests

¹⁷ The Hamada equation provides the extension of the Modigliani Miller equation to account for taxes. See footnote 15.

detected autocorrelation or heteroscedasticity, estimates were compared to those obtained using a method which corrects for first-order autocorrelation (Prais–Winsten and Cochrane–Orcutt) and using heteroscedasticity-robust variance estimates (Huber/White/sandwich estimator). The results do not show major differences between the two methods (this shows consistency of the uncorrected initial beta estimates).

Statistical significance

Statistical significance is the likelihood that a relationship between two or more variables is caused by something other than chance. In this case, the statistical significance of the estimates shows the likelihood of there being a significant relationship between the return on the market and the return on a particular company. Our analysis has shown that all parameters are statistically significant (absolute t-statistics greater than 2 for all coefficients).

Assess the betas against Dimson-corrected betas

When betas are calculated using daily returns, there is a risk of differences in the company's stock price and the market index. This might be because “thin trading” (a lower liquidity of the share) or differences in the information contained in the data (due to differences in operating times in the exchanges where the company's stocks and market index are traded). A Dimson correction allows to correct for this by basing estimates on the same-day market index as independent variable, supplemented with the market index from one period earlier and one period later (where the lag- and forward-variables are found jointly significant, the Dimson beta is calculated as the sum of the three coefficients). Our tests showed that the Dimson adjustment was not needed for any company in our peer group.

Beta results

Table 5.2, contains the asset beta estimates for each peer. All estimated coefficients have a positive sign and less than 1. The positive sign of the coefficient means that the stocks of the comparators move in the same direction as the rest of the market. The fact that the coefficients are less than 1 means that the stocks are less volatile than the market (the comparators are less risky than their corresponding market index).

Table 5.2: Asset betas

Company name	Asset betas
Snam SpA	0.48
Terna Rete Elettrica Nazionale SpA	0.45
Ren Redes Energeticas Nacionais SGPS SA	0.17
Red Electrica Corporacion SA	0.33
Enagas SA	0.40
National Grid PLC	0.33
Elia System Operator SA	0.22
TC PipeLines LP	0.37
EVN AG	0.42
EDP Energias de Portugal SA	0.46
Average	0.36
Median	0.39

Source: Thomson Reuters and Europe Economics calculations.

Final Asset beta estimates

Our final estimate is based on the median value reported in the table above. We use the median because it is a robust statistic to outliers (its value is not severely affected by the presence of outliers or small deviations in the data). This is consistent with other European regulators' practice. Our estimate is **0.39** for the asset

beta, using the Hamada equation (footnote 15) this is equivalent to a **0.83** equity beta. It is around the same value obtained previously.¹⁸

5.3. Equity Risk Premium (ERP)

The equity risk premium is the extra return that investors demand for a perfectly diversified investment in risk-bearing equities compared to an investment in risk-free assumed government bonds. The approach by most regulators sets that the equity risk premium should be based on an ex post measure (the historical ERP) and/or on an ex ante estimation (based on expectations of the ERP).

- The ex post measure is typically based on the weighted average of the long-term arithmetic and geometric average ERP for the Eurozone based on the DMS series (weightings based on current market capitalization of each country's stock market).
- The ex ante estimations are normally envisaged to adjust downward the historical averages (and sanity check with forward-looking models, like the Divided Growth Models).

Ex post (historical ERP)

The ERP is determined by factors and circumstances happening in the capital market. The historical ERP is determined using the premium investors were able to get in the previous years and it is the compensation for the market circumstances. In order to calculate this ex post measure of the ERP, a period of data as long as possible is needed. In this way, the ERP estimate will reflect several fluctuations that occurred in the capital market in the past which may happen again in the future.

To calculate the ex post ERP, data from Dimson, Marsh and Staunton (DMS) are typically used. This is a study which, among others, analyses the level of ERP in 23 countries for the period 1900-2018. The study reports both the arithmetic and the geometric average. Based on insights provided by Brattle, the tariff methodology 2017-2020 uses the market risk premiums for the European countries in the Eurozone and weights them by their market capitalization.

There are different arguments provided in the literature for using the geometric or the arithmetic historical average return. As many other regulators have recently concluded, the VREG in its previous decision did not find any reason to prefer one over the other and used a 50-50 average of the arithmetic and geometric mean. We have seen no reason to depart from this method.

Ex ante (adjustments)

In the last 20 years the liquidity of the markets has been increasing, and this has implied that the historical estimates for the ERP are seen as an overestimate of the real premium, according to some analysts. Some possible corrections have been suggested using the Dividend Growth Model (DGM), in order to revise downward the historical ERP. The DGM (also known as the Gordon Growth Model, or constant growth Dividend Discount formula) expresses the current value of a stock as that stock's expected next-period dividend divided by the real required rate of return less the growth rate of the stock shares.

However, it is worth noticing, that although there have been different estimates for corrections by different analysts, very few regulators have used them in the past (the reasons are that most corrections use surveys, that are likely to be influenced by a bias among the parties consulted; a lack of clarity in the results; and volatility in the estimates obtained).

¹⁸ In the previous determination, the VREG chose to take the average of 0.33 (2015-2016 estimate) and 0.43 (the estimate calculate at that time) to come up with a 0.38 estimate for the asset beta. We assume this was done to reduce the differences between the two estimates (and facilitate the transition between the two regulatory periods). Because the differences of the current values are small compared to the previous ones (0.39 compared to the previous 0.38), we do not believe that such an adjustment is needed.

Conclusion

Although there are two main methods for the calculation of ERP (ex-post based on the historical DMS series) and using corrections from forward-looking models (or using ex-ante adjustments, like the DGM), there is still no consensus on the way these corrections should be made. Following recent VREG decisions¹⁹, our estimates look at historical ERP estimates only. This is a method widely used by other European regulators.

Table 5.3 summarises the calculations for the ERP. The weighted average of these countries gives an ERP value of **4.81** per cent for the Eurozone.

Table 5.3: Equity Risk Premium DMS (1900-2018) – Europe

	[1] Geometric Mean (%)	[2] Arithmetic Mean (%)	[3] Average [1] & [2] (%)	[4] Market Cap (€m)*
Austria	2.70	21.10	11.90	49,249
Belgium	2.10	4.10	3.10	124,463
Finland	5.10	8.60	6.85	270,031
France	3.00	5.30	4.15	1,657,006
Germany	4.80	8.20	6.50	1,073,732
Ireland	2.50	4.50	3.50	118,618
Italy	3.10	6.40	4.75	427,090
The Netherlands	3.20	5.50	4.35	643,899
Portugal	5.10	9.20	7.15	64,807
Spain	1.60	3.60	2.60	500,470
Eurozone	3.39	6.22	4.81	4,929,363

Sources: Table 9 page 32, "Credit Suisse Global Investment Returns Sourcebook 2019", Thomson Reuters EIKON, Europe Economics calculations. * The latest available Market capitalisation (in €) on Thomson Reuters is used.

5.4. Conclusion

Our analysis took into consideration all the relevant variables necessary to estimate the cost of equity. We applied the VREG approach used in its methodology in the estimation of all the variables. To summarize:

- We have estimated the relevant risk free rate using an average of 10-year government bonds in Belgium and Germany (weights 75-25). Our risk free rate estimate is **0.09** per cent.
- We have estimated asset betas using the peer companies. Our median asset beta estimate is **0.39** equivalent to a **0.83** estimate for equity beta.
- We have analysed the ERP as reported by DMS. Our estimate for the ERP is **4.81** per cent.

The results and choices made during our work are reasonable and can be justified based on the following. The use of 10 year government bonds is a standard practice by regulators, therefore the 0.09 per cent estimate for the risk free rate would seem uncontroversial. The asset beta has been obtained using a median statistic. The value of 0.39 is consistent across different methods being used (it is only slightly above the value of 0.38 used in the previous determination). The use of ERP as reported by DMS is also a standard practice, therefore the 4.81 per cent estimate is a value that could be found in most EU regulatory work.

¹⁹ Tariff methodology regulatory period 2017-2020 (Appendix 2 Capital cost reimbursement report)

https://www.vreg.be/sites/default/files/uploads/bijlage_2_rapport_kapitaalkostenvergoeding_reguleringsperiode_2017-2020.pdf

6. Cost of Debt

The cost of debt is based on interest costs and issuance costs (to cover for other expenses such as the banking, legal and agency fees).

In its 2015-2016 methodology VREG estimated the cost of debt by considering that the DSOs had a mixture of debt taken out in the past (cost of historic debt), and would also raise new debt at current interest rates (cost of new debt). For the cost of new debt, the VREG used the risk-free rate calculated as the average over the 12 months. For cost of historic debt, it again used the risk-free rate but calculated it as an average over the past 120 months (i.e. 10 years). For both costs, a credit spread of 120 basis points was added (the spread was calculated as the difference between the yields on A rated corporate Eurozone bonds and the risk-free rate).

The methodology used by the VREG takes a mixed approach of two extreme situations: that all debt is historical (also known as “embedded debt”) or based entirely on new loans. Such an approach is widely recognised as reflecting well the historical and new needs of the regulated company. However, an important issue of such method is how the proportions of historical and new debt should be computed.

In the previous determination (for the 2017-2020 period), the VREG started from a 60/40 weighting for old and new debt (as was established in the 2015-2016 tariff methodology). The weighting 60/40 was initially assumed to be operationally feasible, improving the stability and predictability of the tariff methodology (hence reducing the regulatory risk). On the other hand, the proposed weighting was also viewed to contain, in addition to efficiency advantages (it gives an incentive to lower interest rates and therefore distribution network rates), some disadvantages, the most important one being the fact that if the objectives are not feasible the method could lead to financial distress of the companies (this was the recommendation provided by Brattle).

To assess the feasibility of such ratio, the VREG asked the regulated companies for a projection of the expected interest charges in the 2017-2020 period. It was found that due to the specific circumstances for the distribution system operators during the 2017-2020 regulatory period (for example, distribution system operators did not plan early capital repayments, and justified this on the grounds that it was either not possible or entailed a too high cost) a ratio of 60/40 could not be maintained. As a result, the VREG established a new cost of capital based on a past / present weighting of 65/35, to give greater weight to past interest rates in order to be able to offer an adequate cost of capital.

Interest costs

Our estimates are based on a 10 year A-rated Eurozone utilities bonds. In particular we used “Thomson Reuter’s A-rated utility (bonds) index with 10 years to maturity”, for Europe. As done previously, we continue to employ the average of:

- Previous 12 months as the cost of new debt, and
- Previous 120 months as the cost of historic debt.

To see whether the 65/35 ratio between old and new debt still holds, we looked at the projection of the debt financing needs for Fluvius over the regulatory period 2021-2024 (data provided by the VREG). We found that projections on old capital account for 59 per cent of the total debt financing needs over the regulatory period, whereas new capital would contribute to 41 per cent. In the next paragraphs we round these values to 60 and 40 per cent, respectively.

An issue for discussion could be whether to use the previous 65/35 ratio or the one obtained with more recent data 60/40. The decision would need to consider the implications of using one over the other, and

would also need to realise the difference in costs of old and new debt (lower interest rates can be found for new debt compared to previous periods). Reducing the ratio (allowing a larger share for new debt) will lower the actual cost of debt for Fluvius and can put pressure on Fluvius to repay its old debt and refinance (using new debt at lower interest). However, from our discussion with VREG, we note that Fluvius cannot repay its old debt until it is at the end of maturity.

In any case, we would like to note that the decision of using one or other ratio entails a very small change in the parameter used (a 5 per cent change), and this has no major implications in the results: the cost of debt changes from 1.90 to 1.97 when using 65/35 instead of 60/40, and the impact on the final WACC is small before rounding i.e. 3.36 versus 3.31, though we note that after rounding this would mean 3.4 instead of 3.3.

The results are shown in Table 6.1.

Table 6.1 Cost of debt (%)

Year	RFR (%)	Debt Premium (%)	Cost of Debt (%)	Weight (%)
New¹	0.09	0.85	0.94	40
Historic²	1.62	0.67	2.29	60
Average (weighted)			1.75	

Note: 1 Average 12 months (01/01/2019 – 31/12/2019). 2 Average 120 months (01/01/2010 – 31/12/2019).

Non-interest fees

When taking up a debt, a company is confronted with external transaction costs i.e. non-interest costs, such as legal investigation or commission fees. In recognition of this, the VREG has previously allowed 15 basis points to adjust for such costs. This is a standard approach and has been adopted by other regulators across Europe. We have allowed the same 15 basis points for non interest fees.

6.1. Conclusion

The cost of debt estimates are based on TR indices for utility companies based in Europe with 10 years to maturity. The final estimate for the cost of debt is **1.90 per cent** (1.75 plus 0.15).

7. WACC final Results

The following table provides our summary of the WACC estimates for the Flemish Electricity and Gas DSO's for the regulatory period 2021-2024.

The sources of our calculations can be found in the following chapters of this report.

- Risk free rate (equity): Chapter 5.
- Equity risk premium (ERP): Chapter 5.
- Equity beta: Chapter 5.
- Asset beta: Chapter 5.
- Cost of Equity: Chapter 5.
- Tax rate: Chapter 4.
- Risk free rate (debt): Chapter 6.
- Non-interest fees: Chapter 6.
- Cost of Debt (pre-tax): Chapter 6.
- Gearing: Chapter 4.
- Nominal WACC (post-tax): calculation (see page 5).
- Nominal WACC (pre-tax): calculation (see page 5).

Table 7.1: Final WACC calculations (2021-2024)

Parameter	Value
Risk-free Rate (Equity)	0.09%
ERP	4.81%
Asset betas	0.39
Equity betas	0.83
Cost of equity	4.08%
Tax Rate	25%
Pre-tax cost of equity	5.44%
Risk-free Rate (Debt) (60/40)	1.01%
Debt Premium (60/40)	0.74%
Issuance cost	0.15%
Cost of debt	1.90%
Notional Gearing	60.00%
Nominal WACC (Vanilla)	2.8%
Nominal WACC (pre-tax)	3.3%

7.1. Comparison with other regulatory decisions

To assess our WACC estimate, we have examined the recent regulatory precedent and WACC estimates from other regulators across Europe for electricity and gas distribution sectors.

We note that most regulators use the real WACC for their respective price regulations. To make our estimate comparable to that of other regulators, we have computed our proposed WACC in real terms (this

has used an inflation rate forecast of 1.4 per cent for the regulatory period which is consistent with the inflation forecasts by the Federal Planning Bureau).²⁰

In general we can see that the Real (pre-tax) WACC estimates for regulators have been going down over recent years (Table 7.2). The fall in the WACC can generally be attributed to the continuous decrease of the risk-free rate (in some cases, such as the UK, the estimated risk free rate has even dropped to negative values). We note that since the start of 2016 the average risk free rate across the Eurozone countries and the UK has decreased from 1.29 to 0.30.

In light of the values obtained by other regulators and the trends observed, our estimate, at 1.87 per cent pre-tax, seems to be within a plausible range of values.

Table 7.2 Regulatory Precedent

Regulator	Sector	Year	Regulatory Period	Real (pre-tax) WACC (%)	Source
CER (FR)	GD	2016	2016 – 2020	5.0	[1]
CER (FR)	GT	2016	2017 – 2021	5.25	[2]
UR (UK)	GD	2016	2017 – 2023	4.32	[3]
ACM (NL)	ET / ED / GT / GD	2016	2017 – 2021	2.8	[4]
UR (UK)	ET / ED	2017	2017 – 2024	3.18	[5]
UR (UK)	GT	2017	2017 – 2022	2.01	[6]
Ofgem (UK)	ET / GT / GD	2019	2021 – 2026	2.88	[7]
VREG (Flanders)	ED / GD	2020	2021 – 2024	1.87	This report

Note: ET: Electricity Transmission, ED: Electricity Distribution, GT: Gas Transmission and GD: Gas Distribution

Source: Various Regulatory Decisions.

[1] <https://www.cre.fr/en/content/download/17121/211057>

[2] <https://www.cre.fr/content/download/15339/180726>

[3] https://www.uregni.gov.uk/sites/uregni.gov.uk/files/media-files/2016-09-15_GD17_Final_Determination_-_final.pdf

[4] <https://www.acm.nl/sites/default/files/documents/2019-01/herstel-bijlage-2-uitwerking-van-de-methode-voor-de-wacc.pdf>

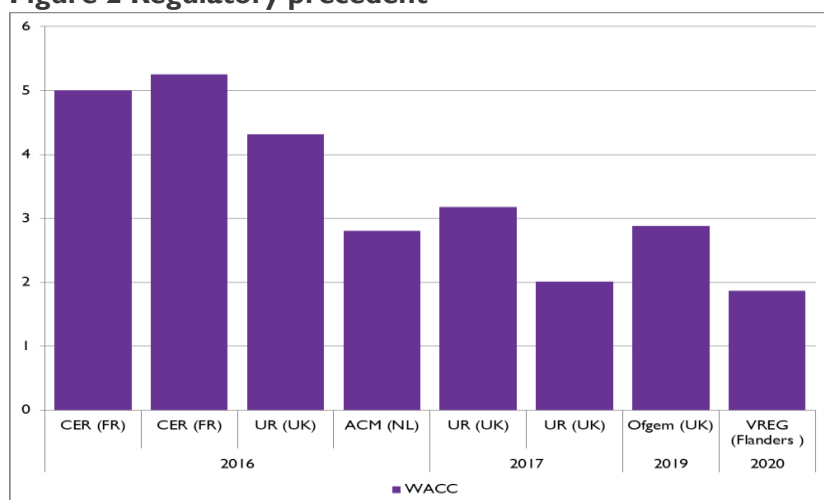
[5] <https://www.uregni.gov.uk/sites/uregni/files/media-files/2017-07-04%20RP6%20FD%20Main%20Report%20%28002%29.pdf#PAGE=226>

[6] http://gmo-ni.com/assets/documents/2017-08-01-GT17-final-determination-redacted-final_0.pdf

[7] https://www.ofgem.gov.uk/system/files/docs/2019/05/riio-2_sector_specific_methodology_decision_-_finance.pdf#page=121

Figure 2 shows the regulatory precedent according to the year the regulation came into effect. We further note that the government yields have decreased substantially over the last few years, and this might be explaining such reduction in estimated WACCs.

Figure 2 Regulatory precedent



Source: TR Eikon and various regulatory decisions.

²⁰ <https://www.plan.be/databases/17-en-consumer+price+index+inflation+forecasts>

The Belgian regulator CREG uses a different methodology that does not produce a comparable overall WACC figure, but it does report components of the cost of equity.

- For Elia this gives a post-tax cost of equity of 4.68 per cent.²¹
- For Fluxys this gives a post-tax cost of equity of 5.61 per cent.²²
- The key differences between these two decisions were: The Fluxys beta is higher (0.65 versus 0.53).
- The Fluxys decision includes a higher “illiquidity coefficient” adjustment, marking up the cost of equity by 20 per cent versus the Elia decision’s 10 per cent.

In each case the risk-free rate was 2.4 per cent.

²¹ Available here: <https://www.creg.be/sites/default/files/assets/Publications/Decisions/Z1109-10NL.pdf>.

²² Available here: <https://www.creg.be/sites/default/files/assets/Publications/Decisions/Z1110-11NL.pdf>.

8. Annex A: Other issues

8.1. Impacts of the Fluvius merger

As of 1 July 2018 the previous entities Eandis and Infrax merged to form Fluvius — a unified utility company for natural gas and electricity in the 300 Flemish municipalities and 100 per cent owned by the municipalities.

This raises the question of whether the merger could have a potential impact on the appropriate regulatory WACC. There are three key ways we could envisage a merger changing the cost of capital. It could affect:

- The systematic risk, and hence the asset beta;
- The credit rating, and hence the cost of debt and financeability analysis; and/or
- The gearing.

The extent to which these aspects could potentially be affected depends, in the first instance, on the extent to which the firm (and hence its WACC) is regulated on an “actual entity” versus “notional entity” basis. Where a firm is treated largely or wholly as a notional entity, a merger could still in principle affect this dimension if it changed the nature or organisation of the business in some way that meant a different notional analysis is appropriate. For example, suppose that by merging a regulated firm became able, as a matter of practicality, to offer new different (but still regulated) services from those it had been able to offer pre-merger. Then the notional “reasonably efficient firm” would be producing and selling different things, hence might have a different WACC in a number of ways.

Again, a merger could make new production methods possible that were not previously available, and these new methods might have new systematic cost risks.

In this case, our understanding is that the Fluvius merger has not made a fundamental difference to the firm’s services offering nor to its operational organisation. Therefore, we do not regard the merger as meaning that a different comparator set is appropriate for beta estimation.

The second and third questions concerns the credit rating and gearing. Even prior to the Fluvius merger, the ownership and control structure of Eandis was regarded by Moody’s as justifying a two-notch uplift. Under the VREG method, the cost of debt and gearing analysis for Fluvius are based on A rated comparator firms, and that was true for Eandis previously, also. There is limited scope for an A-rated entity to be upgraded further.

In our view the use of A-rated comparators already includes a built-in element of comfort. The Fluvius merger would, insofar as it had any effect at all, tend to bring the actual entity more closely in line with the notional entity (ie that implied by the choice of comparators under the VREG method). We therefore do not recommend any adjustment to the method in consequence of the merger.

8.2. Revaluation surpluses

When firms are regulated according to the RAB-WACC method, the regulatory asset base (RAB) is assigned a regulatory asset value (RAV). The rate of return on capital is then (typically) given by the $RAV \times WACC$.

The RAV depreciates over time as the assets age, and increases with new investment, all of which imply adjustments in the RAV. In addition to these changes, there can be other kinds of adjustment applied. For example, some assets may become obsolete (or, in the jargon, “stranded”) and as a consequence their value is removed from the RAV. Another form of adjustment occurs when the RAV is automatically indexed by inflation or some other measure of allowance for prices changing through time. A third form of adjustment

can be applied (sometimes in the communications sector or other sectors with rapid technological advance) whereby the RAB is, at intervals, revalued to the cost of investing in an equivalent modern asset.

From the 1970s up until 2003 there was an annual indexation of the fixed assets of Flemish DSOs, and this was done using a certain price index. Our understanding is that this was mainly an allowance for inflation. These increases in the RAV are referred to by the VREG as “revaluation surpluses” and (as with any other part of the RAV) are depreciated (allowing revenue from tariffs to cover the costs of depreciation and a rate of return was allowed in tariff methodology 2017-2020 upon their depreciated value).

When the Belgian energy market was liberalised, from 2003 onwards (which was also when the federal regulator CREG started fixing the relevant tariffs), the complete DSO asset base (including the previous, existing surpluses) was revalued to a modern equivalent asset value (or reconstruction value) as at that time. This was a one-off adjustment. This is a second category of “revaluation surplus” (also depreciated and with allowed revenue to cover for these costs).

Although these both items have been used by the VREG in the previous tariff methodologies, it has asked Europe Economics to investigate whether this approach should be maintained in the future.

When a regulator imposes a price cap, there can be at least three, quite different, concepts of what is being done.

According to the first concept, price regulation exists precisely when there is significant market power, which is defined as the absence of constraints upon the freedom of the regulated entity to raise its prices above the competitive or contestable market level. Since price regulation exists because of the absence of constraints upon pricing freedom, the job of price regulation is to introduce precisely those constraints upon pricing freedom the absence of which is the reason the regulation exists — i.e. to prevent the regulated firm from raising its prices above the competitive or contestable market level.

In a competitive market, the constraints upon pricing freedom depend upon the costs of the second most efficient firm. In a contestable market, the constraints upon pricing freedom depend upon the costs of an efficient new entrant. So in either case (whether the regulator is attempting to estimate what the costs would be of a reasonably efficient competitor or of a reasonably efficient new entrant), the conceptually correct price cap to impose will not depend, per se, upon the costs of the regulated entity itself. Instead, the regulator will construct, via the thought experiment of a competitor or new entrant, the costs of some notional alternative supplier of the goods or services being regulated.

One way to think about this form of regulation is that it is focused upon the prices charged to consumers. In principle, provided the firm charges the optimal price today and in the future, the costs the firm bears are largely its own affair, for it to manage as it sees best.

According to the second concept, the task of price regulation is not to model what prices would be in a competitive or contestable market and set that as the price cap. Rather, it is to consider what the costs would be of a reasonably efficient monopolist. In this case, the regulator does not consider the costs of a notional competitor or new entrant. Instead, the task of regulation is to assess, amongst the costs the monopolist bears, which are borne efficiently and which are not. If the monopolist is doing something inefficient (e.g. investing in some capital equipment that is not required or over-paying its chief executive), it might be instructed to carry out that activity more efficiently and pass on the lower costs that it achieves to the consumer.

One way to think about this form of regulation is that it is focused upon the costs of the regulated entity and on driving the regulated entity to manage its costs efficiently.

According to the third concept, the task of price regulation is to ensure that the firm recovers no more revenue than the costs it actually incurred (perhaps including some adjustments to disallow particularly

inefficiently-incurred costs) plus some reasonable rate of return. This is a concept more in the spirit of traditional US rate of return regulation.²³

One way to think about this form of regulation is that its focus is upon the recovery of costs actually incurred.

Often regulators are not terribly explicit which of the three above concepts they have in mind or, if they intend some combination of them, what weighting they place upon the different concepts in their deliberations.²⁴ But in the case of the regulatory surpluses we are considering here, a more explicit statement is required, because the different concepts imply very different outcomes for the regulatory surpluses.

If VREG intends primarily to be deploying the concept of setting prices at the level that would prevail in a competitive or contestable market or that of an efficient monopolist, the adjustment to the RAV that occurred when the regulatory surpluses were created tells us what the required asset value would be of a reasonably efficient competitor or new entrant, or of an efficient monopolist emerging now.²⁵ So the fact that the actual regulated entities did not have to raise any new equity or debt in order to fund that adjustment in the RAV is irrelevant. The RAV, after adjustment (i.e. including the regulatory surpluses), is the relevant asset value in determining the price that would prevail in a competitive or contestable market. So it follows that there should be an allowance for depreciation of the RAV, including the regulatory surpluses, and an allowance for a rate of return (a WACC) on the whole RAV (again including the regulatory surpluses). Let us refer to this as Option I.

One point to be clear about is that under these concepts of price regulation the “revaluation surpluses” are not a separate asset. They are a revaluation of the entire asset base. It is therefore not meaningful in economic terms to talk of how the revaluation surpluses are “financed” as if that were in some way separate from the question of how the RAB as a whole is financed. For example, it would not, in this case, be meaningful to say that the revaluation surpluses are “financed by debt” if there is non-zero equity in the RAV as a whole.²⁶

If, on the other hand, the conceptual focus is upon the recovery of costs actually incurred, then it becomes of interest that the regulated entity did not incur any such costs in respect of the regulatory surpluses. The costs it actually bore to create its RAB were the pre-regulatory-surpluses RAV (after depreciation). The regulatory surpluses were, in that sense, a windfall gain. And in that case potentially it might matter how they are subsequently financed. For example, perhaps they *subsequently* induced a cost, in that the firms chose to

²³ There are a number of important incentive differences between the use of cost recovery models and competitive/contestable market models of price regulation that are widely discussed. Exploring the details of these falls outside our scope here.

²⁴ In the case of VREG, the Flemish Energy decree (art 4.1.32 5°) states that “tariffs shall reflect actual costs incurred insofar as they correspond to those of an efficient comparable entity or activity”. (<https://codex.vlaanderen.be/PrintDocument.aspx?id=1018092&datum=&geannoteerd=false&print=false#H1072268>)

²⁵ This is, of course, on the assumption that the adjustment to the RAV that occurs when the regulatory surpluses are created has been calculated correctly.

²⁶ One was to visualise the difference between the correct and incorrect ways, in economic terms, to think of an accurately-produced revaluation surplus is through the following diagram. Here we have two images. In both cases we begin with the pre-revaluation RAV (called “Old RAV”) in the left-hand column. In the upper, correct, conception the revaluation expands the whole RAV to produce a “New RAV”. In the latter, economically incorrect conception, the revaluation surplus is an addition to the RAV, as if it were a new asset in itself and as if the “Old RAV” still existed. We accept that the accounting treatment may be different.

For completeness, we also note that if the re-assessment of the RS was done incorrectly in the past (or at least is now viewed in that way, with the benefit of hindsight) the true RAV is still the “Old RAV” and the RS, as in the right-hand case becomes an error to be corrected for.



pay out dividends and raise debt instead, so perhaps one could conceive of some portion of the windfall gains as now carrying a debt servicing costs. But the thought is that that would be the only form of actual cost that firms bore.

There would be a problem here, however, in respect of any sale of equity or any debts raised by equity-holders for which the RAV (including the regulatory surpluses) served as explicit or implicit capital. If the firm is sold after the adjustment to the RAV (i.e. after the regulatory surpluses are calculated) then the new shareholders have indeed borne actual costs that included the regulatory surpluses, in order to acquire the entity. Similarly, if the RAV including the regulatory surpluses was used to support any other finance-raising (e.g. if it were seen by lenders as a source of collateral) then it has played an economic role.

For a regulator deploying an actual cost recovery model of price regulation, the options for treating the regulatory surpluses would be either:

- Option 2: Allow no WACC on the regulatory surpluses, instead allowing a rate of return only upon actually-incurred investment costs (i.e. on the RAV excluding the regulatory surpluses).
- Option 3: Allow no WACC on the regulatory surpluses other than a cost of debt on the portion of the regulatory surpluses funded by debt (i.e. the gearing).

One issue we should emphasize under either of these approaches is that the consequence will be that, at the margin, consumers pay less for their energy than they would in competitive or contestable markets. That means that energy consumption will be slightly higher than would otherwise be the case. That will tend to slightly deter investment in energy saving in the longer-term, and in both the longer- and shorter-terms will mean higher carbon emissions than would prevail in an economically-efficient market.

8.3. Implications of non-regulated activities

In addition to being the network manager for electricity and natural gas, Fluvius also provides cable TV and sewerage networks in some of the municipalities in which it operates. More generally, DSOs are able to engage in a number of activities, including public lighting, sewerage, cable distribution, and district heating.

Some of these activities are regulated with the price control under consideration here. Some may be regulated by other entities, and other activities may be unregulated.

The question arises as to whether the WACC to be applied in this price control should be affected by the fact that these other activities occur.

The standard approach in economic regulation is to treat regulated activities as if they were ring-fenced — at least to a large degree. If firms gain economies of scope or scale in their operating expenses through providing unregulated products, that should not typically result in their operating cost allowances becoming stricter, and conversely if their unregulated activities perform badly, that should not lead to a cross-subsidy through more elevated regulated prices.

One dimension of this is business risk. In principle one could imagine a risk equivalent of economies of scope, whereby there was some operational-level diversification that reduced systematic risk. If so, that should not, in principle, be taken into account through a lower WACC. Similarly, if the firm increases its riskiness via these unregulated activities, including potentially increasing the riskiness of its costs or revenues for the regulated activities themselves, that should not result in a higher WACC.

One particularly important variant of this is the conglomerate merger theorem in corporate finance theory. This tells us that there cannot be a diversification gain to investors arising purely from the combination into one firm of separate activities, with their own risk profiles, without operational synergies (eg the changes in operational costs or risks mentioned above) or a lessening of competition. The reason is that such a merger restricts the flexibility of investors to tailor their investment portfolio in line with their own needs and

preferences.²⁷ The theory is that there cannot be an excess demand for the new stock of the merged party, as investors could already achieve the same risk profile by diversifying its investment into the stock of both companies pre-merger. However, there can be an excess supply of the new stock, as there may be some investors who only wanted to invest exclusively in one of the parties pre-merger and thus would not be willing to invest in the stock of the merged party. Hence, the merger could lead to some investors unloading their stock in the merged company and thus forcing the price down to the detriment of other investors.

8.4. High dividend payouts

We are informed by VREG that most Fluvius DSOs have had a policy of paying dividends at around 90 per cent of income. These are unusually high proportions of dividends, relative to net income, for a regulated utility. By way of comparison, in the UK, over the period 1995-2018 the average firm on the FTSE All Share Index paid out around 42 per cent of net income as dividends, annually.

Let us consider what determines what proportion of net income firms pay out in dividends, and various reasons why that level might be high or low.

Definition of a “dividend policy”

A “dividend policy” is the policy a company adopts regarding when it pays dividends and how much it pays. Perhaps the best-known feature of dividend policy is the “dividend policy irrelevance theorem” (a corollary to the famous Capital Structure Irrelevance Theorem of Modigliani and Miller). The dividend policy irrelevance theorem tells us that a firm’s value will not be affected by its dividend policy insofar as that policy has no effect upon the operation of the firm. If there is to be an effect, there needs to be some such operational consequence.

What determines optimal dividend policy?

A popular candidate for why dividend policy might in fact affect a firm’s operations is financial resilience or financial “buffers”. All firms face financial shocks from time to time. When firms face financial shocks they have a number of ways they can respond, including adapting investment plans, adjusting debt levels, adjusting equity issuance plans, selling the company or, of particular interest here, adapting their dividend plans. Deferring dividend payouts will increase both liquidity and capital buffers. If buffers are higher, that has at least two kinds of impact.

- First, it means that the firm is more able to take risks (since there is less chance of bankruptcy). That is not necessarily good or bad in itself — the optimal level of risk is unlikely to be either infinite or zero.
- Secondly, when buffers are higher, pressure on management to contain or cut costs is lower — running out of cash often provides a powerful trigger point to force management action.

Even if dividend policy is irrelevant to a firm’s value, that does not necessarily mean it doesn’t matter or has no anchoring determinants. In particular, optimal dividend policy could also be affected by the needs and opportunity of those to whom the dividends are paid. A firm’s owners may have alternative uses for the cash that dividends provide — eg investing or consuming. Their investment opportunities and consumption needs may evolve through time.

The optimal level of buffers will depend upon the balance of advantage of risk-taking, cost control and shareholder needs and opportunities given the state of the world at the time. That means that optimal

²⁷ Brealey, R., Myers, S. and Allen, F. (2006) ‘Principles of corporate finance’. 8th edition, McGraw-Hill/Irwin, 2006.

dividend policy can change — under some conditions it will be desirable to pay out high dividends (to cut excessive buffers) and in others it will be desirable to limit or suspend dividends.

When dividends might be high or low relative to net income: I — Profit shocks

Both theory and empirical evidence suggest that we should expect dividends to be smoother than profits — i.e. companies will typically reduce dividends by less than undershoots in profits and raise them by less than overshoots. Suppose a firm had a poor year for profits, in which those profits fell €1m below target, but the firm still paid out a dividend — indeed, a dividend only €0.5m less than originally scheduled, running down its cash reserves to cover the differences. Would that necessarily be irresponsible?

The general answer is no. Dividends should normally change by less, year-to-year, than cash flows do. To see why, note first that a firm's owners cannot typically be certain as to its profit prospects. They will form some expectations of future profits based on the information available to them. One source of such information may be the actual year-to-year cash flows. Let us suppose that, typically speaking, if in-period net cash-flows are more positive than expected, that will also lead to an increase in expected long-term profitability²⁸, but for now let us assume that in-period net cash flows do not lead to changes in expected volatility.

Now, to focus ideas and avoid complicating the question we are interested in with other issues, consider a simple case of a firm for which cash is the only form of liquidity, that is willing and able to adjust its cash buffer entirely through its dividend policy — paying higher dividends than previously planned if the cash buffer would otherwise be above the desired level; paying lower dividends if the cash level would otherwise be below.

In such a case, the year-to-year variation in dividends will be less than the year-to-year variation in cash-flows. The reason is that a positive shock will both raise available cash above the desired level and also raise what that desired level of cash is (because expected long-term future profits are raised), and vice versa for a negative shock.

To put this same point another way, a key function of a cash buffer is to protect a stream of future expected profits from being lost through bankruptcy. The higher that expected future stream of profits is, the more it is worth protecting and hence the higher the optimal buffer. If a firm started at its initially optimal cash buffer, then had a positive income shock, that would provide extra cash above the previous buffer, but would also (because it raised future income expectations) increase the buffer. So it would not (typically) be optimal to pay out the whole short-term income shock as a dividend.

The same reasoning applies in reverse to a negative income shock. We should expect that, because lower-than-expected profits will often lead owners to be more pessimistic about the future and hence less inclined to pay for liquidity to protect future profits, dividends will typically be cut by less, each period, than profits under-shoot their target.

Such dividend-smoothing is a well-known and widely-analysed phenomenon, and has tended to increase over recent decades.²⁹ So a firm that cut its dividend by less than its profit under-shoot might not be being irresponsible. That might be the correct strategy. A consequence could be that in a period of unusually poor performance, dividend payouts became a high proportion of net income for this “smoothing” reason.

²⁸ We accept that, in principle, a more-positive-than-expected in-period net cash flow could arise as a result of some shock known to mean long-term profit prospects had deteriorated. For example, a large client with a committed contract with a penalty clause for early dissolution could end its contract and pay the penalty, simultaneously raising short-term cash flow and lowering long-term profits expectations. But we submit that the more natural typical case will be as we set out above.

²⁹ See, for example, Leary, M.T. & Michaelley, R. (2011), “Determinants of Dividend Smoothing: Empirical Evidence”, *The Review of Financial Studies*, 24(10), pp3197–3249.

When dividends might be high or low relative to net income: II — Capital programmes

Another determinant of optimal dividend policy might be the scale of a firm's capital programme relative to its current net income. When a firm is expanding its asset base but maintaining a given level of gearing, that implies that it is taking on both debt and equity (assuming gearing is neither zero nor 100 per cent). One way to equity-fund investment is through recycling profits instead of paying out dividends. Hence, for a given level of gearing and given level of current net income, net dividends (ie the difference between dividends paid out and any rights issues or other form of equity injection) will be lower when capital expenditure is higher, and vice versa.

This can be an important driver of differences in optimal dividend policy between regulated entities in different countries. Two examples for why are as follow.

- First in some countries, in some periods, required capital programmes will be higher relative to net income and in others lower. When they are lower, optimal dividend payout rates will be higher, and vice versa.
- Second, in some countries, in some periods, either the nature of capital markets or the nature of new assets to be invested in means that the optimal gearing for funding those new investments is different from the optimal gearing of the current asset base. If new assets should be funded at higher gearing levels than current asset base, that will mean that net dividends will tend to be higher, relative to net income (since net income depends upon the current level of gearing), to the extent that any rise in optimal cash buffers, as gearing increases, is less than the effect of a lower proportion of equity being retained to fund investment (noting that perhaps the natural assumption is that when gearing is increasing, optimal cash buffers will be falling, since optimal gearing tends to increase when cash flows are more certain).

Two recommended dividend policies VREG might encourage for its regulated entities

To fully analyse the optimality or otherwise of Fluvius' dividends policy, we would need a robust analysis of

- its optimal capital and liquidity buffers, relative to the economic shocks it might face — it is possible that the perceived risk of economic shocks over the past five years or so has been materially lower than it was perceived as being between 10 and 5 years ago. That could mean that the DSOs held higher buffers in the, say, 2009-2014 period that it transpired subsequently that they required, meaning that it is optimal to run those buffers down through relatively high dividend payout rates;
- the needs and opportunities of Fluvius' shareholders — eg it might be that in recent years austerity has created strong incentives for municipalities to secure high levels of cash from the entities they own and control, rather than leaving cash in the business;
- the scale of Fluvius' capital expenditure programme and the optimal gearing for funding it — eg it might be that optimal gearing has risen in recent years as volatility of future outlooks fell.

However, absent the (rather extensive) analysis required to fully address all these aspects, we can suggest some general standards by which dividend policy might be assessed from here on, if we can assume that Fluvius' cash buffers and gearing are currently acceptable (as might be implied from Moody's recent assessment of Fluvius, in which it gave it a credit rating of A3³⁰) or if an acceptable target cash buffer and level of gearing is known. Consider the following two dividend policies:

- A. Pay out (net) dividends such that cash balances stay constant in money terms and gearing stays constant as a percentage of RAV
- B. Pay out (net) dividends such that cash balances and gearing both stay a constant proportion of RAV

³⁰ "Credit Opinion; Fluvius System Operator CVBA; Update following outlook change to stable", 12 Aug 2019

Let us assume that one of these policies would be sufficient for the firm to be deemed to have adequate financial resilience buffers. If that were not so, then we can vary the solutions below so that they take us to the required financial resilience thresholds.

First, we shall set up our notation. The following table gives how our variables are defined, along with some values we use for illustration in what follows.

Table AI.1: Notation plus illustrative values

C	The level of cash balances (€)	€100m
ΔC	The change in cash balances (€)	TBD
Cnew	The new level of cash balances (€)	TBD
RAV	The firm's opening RAV (€)	€5bn
ΔRAV	The change in the firm's RAV (€)	€150m
G	Gearing (%)	60%
r_E	The return on equity (%)	6%
R_E	The return on equity (€)	€120m
Debt	The amount of debt (€)	€3bn
r_D	The return on debt (%)	3%
R_D	The return on debt (€)	€90m
S	Surplus (€)	€210m
$\Delta Debt$	Change in the amount of debt (€)	€90m
$\Delta Equity$	Change in the amount of Equity (€)	€60m
Div	The amount of dividend paid out (€)	TBD

Note that dividends are expressed in net terms — dividends paid out net of any rights issues. Note also that, *ex hypothesi*, the Surplus is equal to the sum of the returns on debt and equity.

Now let us consider a dividend policy keeping cash balances constant in money terms and gearing constant in percentage terms. First we shall present the formula, then we shall illustrate that it has the intended effect. The formula is:

$$Div = R_E - \Delta Equity$$

where

$$\Delta Equity = \Delta RAV \times (1 - g)$$

In this case

$$\Delta Equity = €150m \times 0.4 = €60m$$

$$Div = €120m - €60m = €60m$$

Let us now demonstrate that this maintains cash balances constant.

$$Cash\ in = S + \Delta Debt = €210m + €90m = €300m$$

$$Cash\ out = \Delta RAV + R_D + Div = €150m + €90m + €60m = €300m$$

Since cash in equals cash out, there is no change in cash balances.³¹

We can also express dividends in terms of total return to equity:

³¹ Also, since there is no change in cash balances, there is no cash balance impact on net debt.

$$\text{Div} / R_E = 50\%$$

Next let us consider a dividend policy keeping cash balances constant in money terms and gearing constant³² in percentage terms. The formula is:

$$\text{Div} = R_E - \Delta\text{Equity} - \Delta C$$

where, in order to keep C in a constant ratio with RAV

$$\Delta C = (C/\text{RAV}) \times (\text{RAV} + \Delta\text{RAV}) - C$$

Here

$$\Delta C = 0.02 \times \text{€}5.15\text{bn} - \text{€}100\text{m} = \text{€}3\text{m}$$

So

$$\text{Div} = \text{€}120\text{m} - \text{€}60\text{m} - \text{€}3\text{m} = \text{€}57\text{m}$$

If we once again express dividends in terms of total return to equity, we obtain

$$\text{Div} / R_E = 47.5\%$$

Using actual figures, one of the above dividend policies (potentially modified if required for meeting mandated or assumed financial resilience adjustments) could be applied to Fluvius itself or a notional Fluvius entity.

8.5. Incentive payments and the WACC

Quality of service incentives

Some regulators use positive or negative financial incentives for quality of service (eg higher revenue caps if quality targets are reached and/or fines if required quality standards are not met). In the absence of such incentives, the incentives for cost efficiency in the regulatory framework may create incentives for companies to cut costs at the expense of quality. Price regulation of monopoly networks is sometimes viewed as aiming to mimic the outcomes that would be achieved by a competitive market (were that feasible). By introducing financial incentives on quality of service, the regulatory framework will better mimic a competitive market, since in a competitive market a firm is likely to generate less revenue if its products are low quality (since such a firm may not be able to charge as high a price, and will lose customers to rival firms offering better quality), while conversely a firm that sells high quality products is likely to be able to increase its revenue.

One question for us here is whether the use of such incentives could affect the WACC. Whether there is any such impact depends on whether the risks that the quality of service incentive scheme imposes on the company are specific or systematic. In general, we would expect the quality performance of the company to be a specific risk (since it relates to the performance of the management of this specific firm), and hence a priori we would not anticipate a material impact on the cost of capital.

Whether the quality of service incentive scheme has any impact on financeability is likely to depend on whether the financeability assessment is done on a notional or an actual basis. If done on a notional entity basis, it would generally be assumed that the firm performed in line with regulatory targets (e.g. on cost and quality), meaning that it would not be expected to suffer penalties under the quality of service incentive scheme. However, if the focus is on the firm's actual financeability, there could be an impact if a large amount

³² In practice, in this case, because cash balances change there is also a third-order impact net debt and hence on gearing (which, strictly speaking, falls to 59.94% on the proposed dividend policy). We ignore that small effect in this illustrative example for pedagogical clarity, since the mathematics becomes much more complicated to follow if we include the required adjustment, but with little gain in terms of substantial impact on the result.

of revenue is at stake under the incentive scheme, since if the firm performed badly under the incentive scheme its revenues would fall with adverse effects on its financial ratios.

WACC incentives for investment in specific assets

Sometimes regulators accept that some category of new investment has a different risk profile from that of the firm's existing RAB. For example, investment in some new technology or investment in some new region might be of higher risk than the existing asset base. In consequence of this higher risk, the WACC review for the period in which that investment is scheduled to occur might be higher.

But often regulators do not have the power to mandate investment. And even if investment is commenced, a capital programme may not be completed on schedule. A consequence could therefore be that the firm ended up granted a higher WACC for a period in which it had not acquired the assets that justified that higher WACC.

One approach regulators sometimes take here is to impose conditionality: the higher WACC (and hence higher prices and/or revenues) is only triggered once investment occurs in the relevant new assets or once their construction is completed.

9. Annex B: General Approach to Financeability

In this annex we lay out a general approach to Financeability using the current rating of Fluvius System Operator cvba and the current financial ratios the rating is based on. Once VREG has finalized a financial model for the forthcoming price control it could do the analysis laid down in the following sections with the updated data.

Financeability refers to the ability of a company to raise funds for necessary investments at a reasonable rate. We advise regulatory bodies to test for financeability to ensure that their price control proposals enable the company to maintain this ability.

The ability of a company to secure finance from investors is important since it enables a company to carry out necessary activities, including capital expenditure programmes. If a company does not maintain the required levels of financial ratios for a specified credit rating, the cost of debt will increase. It is therefore crucial to assess the financeability of a company.

Financeability analysis has two main potential objectives:

- It provides a consistency check. The WACC calculation involves an assumed level of gearing and assumed credit rating. If that level of gearing is not consistent with achieving that credit rating that should be exposed by the financeability analysis.
- Some regulators have the statutory duty to ensure that regulated entities are able to finance their functions. In such cases, financeability analysis tests whether this duty can be met.

9.1. Providing a consistency check

The first objective involves providing a consistency check. The WACC calculation involves an assumed level of gearing and assumed credit rating. If that level of gearing is not consistent with the achieving of that credit rating, it should be exposed by the financeability analysis.

A high gearing ratio means that the company has a high proportion of debt compared to equity. The higher the ratio the riskier the company is, and therefore the more difficult it becomes to attract investors. It is therefore important to ensure that the level of gearing is consistent with the target gearing required to maintain the specified credit rating.

9.2. Ensuring regulated entities are able to finance their functions

Some regulators have the statutory duty to ensure that regulated entities are able to finance their functions. In such cases, financeability analysis tests whether this duty can be met.

The duty of a regulator is to protect the interests of consumers. This includes ensuring a company is able to finance required investments without increasing the cost of debt as otherwise in the long-term consumers will suffer from higher prices.

9.3. Fluvius' financeability: indicative analysis

We next set out a preliminary view of Fluvius' financeability. Specifically, we discuss the following:

- The target credit rating.
- The relevant financial ratios used to estimate Fluvius' credit rating.
- What numbers one should expect for these financial ratios in order to achieve the target credit rating.
- The projected financial ratios given Fluvius' forecast expenditure, and what this implies for the financeability of Fluvius.

It should be noted that the quantitative assessment here is based on Fluvius' forecast expenditure for 2019 for the distribution network. This analysis would need to be revisited following VREG's view of the allowed costs in the forthcoming price control period.

Current and Target Credit Rating

The first question is what target credit rating should be assumed in the analysis. Fluvius currently achieves the following credit rating³³:

- Moody's: A3 (Stable).

We note that this credit rating is consistent with the "A" rating that we adopt as the target credit rating for the purposes of estimating the debt premium.

How we estimate the credit rating

To explore what credit rating Fluvius might obtain under these scenarios, we apply Moody's latest published rating methodology for Regulated Electric and Gas Networks.³⁴ Moody's sets out a transparent scorecard system that gives an approximate credit rating, which means that its approach can readily be applied within the context of a financeability assessment. Moody's makes clear, however, that its actual credit ratings may sometimes differ from those suggested by its scorecard methodology.

The scorecard approach set out by Moody considers the following factors:

- Regulatory Environment and Asset Ownership Model, which is given a 40 per cent weighting and under which Moody's assesses the following four sub-factors:
 - stability and predictability of regulatory environment (15 per cent);
 - asset ownership model (5 per cent);
 - cost and investment recovery (ability and timeliness) (15 per cent); and
 - revenue risk (5 per cent).
- Scale and Complexity of Capital Program, which is given 10 per cent weighting.
- Financial policy, which is given a 10 per cent weighting.
- Leverage and coverage, which is given a weight of 40 per cent and under which Moody's assesses the following four financial ratios:
 - Adjusted Interest Coverage [(FFO + Interest Expense - Non-Cash Accretion - Capital Charges) / (Interest Expense - Non-Cash Accretion)] OR FFO Interest Coverage [(FFO + Interest Expense) / Interest Expense (10 per cent)];
 - Net Debt / RAB OR Net Debt / Fixed Assets (12.5 per cent);
 - Funds from Operation (FFO) / Net Debt (12.5 per cent); and
 - Retained Cash Flow (RCF) / Net Debt (5 per cent).

Each factor or sub-factor is given a score from Moody's rating scale, and these scores are then combined using the weightings shown above. Additional over-weightings are applied to sub-factors that achieve a low rating, partly in recognition of the fact that a weakness in one area cannot necessarily be fully offset by strengths in other areas.

³³ "Credit Opinion; Fluvius System Operator CVBA; Update following outlook change to stable", 12 Aug 2019

³⁴ Moody's, "Rating methodology, Regulated Electric and Gas Networks", 16 March 2017

Moody's may also apply an uplift to Government-Related Issuers to take account of the potential for extraordinary government support.³⁵ Moody's methodology for calculating this uplift takes account of:

- The baseline credit assessment of the issuer, based on its standalone risk;
- The supporting government's rating;
- An estimate of the default correlation between the two entities; and
- An estimate of the likelihood of extraordinary government support.

What numbers one should expect for these financial ratios

Below we present a table (extracted from the same recent rating methodology for Regulated Electric and Gas Networks referenced above) of the financial ratios associated with two credit ratings.

Table A2.1: Financial ratios associated with two credit ratings

	Moody's	
	A	Baa
Net debt / RAB (%)	45 – 60%	60 – 75%
FFO interest cover (x)	4.0 – 5.5	2.8 – 4
FFO / Net debt (%)	18 – 26	11 – 18
RCF / Net debt (%)	14 – 21	7 – 14

Source: Moody's, "Rating methodology, Regulated Electric and Gas Networks", 16 March 2017.

Assumed scores for business profile and financial policy

In our analysis, we have applied Moody's scores for the business profile and financial policy factors. The scores are those given by Moody's for Fluvius.³⁶

Table A2.2: Scores applied for business profile and financial policy factors

	Fluvius scores
Regulatory Environment and Asset Ownership Model	
Stability and predictability of regulatory regime	A
Asset ownership model	Aa
Cost and investment recovery	A
Revenue risk	A
Scale and complexity of capital program	A
Financial policy	
Financial policy	Ba

Source: "Credit Opinion; Fluvius System Operator CVBA; Update following outlook change to stable", 12 Aug 2019.

Scores for Leverage and Coverage

The table below shows the 3 year average values of the financial ratios for the year ending 31 December 2018 and the 12-18 Month Forward view as of July 2019 as calculated by Moody's and the corresponding scores.

³⁵ Moody's methodology for doing this is set out in Moody's, "Rating methodology, Government-Related Issuers", 6 June 2018.

³⁶ These were obtained from Moody's, "Credit Opinion; Fluvius System Operator CVBA; Update following outlook change to stable", 12 Aug 2019

Table A2.3: Financial ratios for Fluvius

	FY 31/12/2018	Score	12 – 18 Month Forward View	Score
Net debt / RAB (%)	66.7	Baa	60	Baa
FFO interest cover (x)	5.9	Aa	4-4.5	A
FFO / Net debt (%)	15.2	Baa	10-12	Baa
RCF / Net debt (%)	11.8	Baa	5.5-7.5	Ba

Source: "Credit Opinion; Fluvius System Operator CVBA; Update following outlook change to stable", 12 Aug 2019.

This along with the qualitative ratings shown in Table A2.2 results in a baseline credit assessment of Baa2 for Fluvius. It is worth noting that 12 – 18 month forward view on gearing is consistent with VREG's proposed gearing level of 60 per cent.

9.4. Other Fluvius specific issues

The DSOs which comprise the Fluvius Economic Group and act as guarantors of Fluvius' debt are owned by most of the municipalities in the Flemish Region. Therefore, Fluvius and the Fluvius Economic Group falls within the scope of the Government-Related Issuers rating methodology, published by Moody's in June 2018.³⁷ According to Moody's, the ratings of companies that have government guarantors should be given an uplift from the baseline credit assessment. The value of the uplift is based on:

- the credit quality of the Community of Flanders;
- Moody's assessment that there is a strong probability of the Community providing support to the DSOs and/or its shareholding municipalities if either were in financial distress; and
- a high level of default dependence (that is, the degree of exposure to common drivers of credit quality) because of the entirely domestic operations of the Fluvius Economic Group and its close association with its owners and the region.

Taking the above three into account Moody's decide to give the baseline credit assessment for Fluvius a two notches uplift. Resulting in a credit rating of **A3** for Fluvius. Table A2.4 below summarizes the uplift.

Table A2.4: Credit Rating for Fluvius

	Score
Baseline Credit Assessment	Baa2
Government Local Currency Rating	Aa2 STA
Default Dependence	Strong
Support	High
Final Rating Outcome	A3

Source: "Credit Opinion; Fluvius System Operator CVBA; Update following outlook change to stable", 12 Aug 2019.

9.5. Conclusion

As can be seen from the findings above, the credit rating for Fluvius is consistent with the A rating used for the cost of debt calculation. It is important to note that Fluvius is at the lower end of the A rating threshold so even though the current rating suggests that there are no financeability issues for Fluvius, in the future the rating could be lowered.

³⁷ Government-Related Issuers rating methodology, June 2018 [[online](#)]

10. Appendix: Statistical Tests for beta

This Appendix contains the results of the three different tests undertaken to assess the robustness of the estimates, namely: for autocorrelation and heteroscedasticity; for statistical significance of the estimates and to assess the suitability of Dimson-corrections.

Autocorrelation and heteroscedasticity tests

We have carried the standard autocorrelation and heteroscedasticity tests i.e. Breusch-Godfrey for autocorrelation and White for heteroscedasticity. The interpretations of these tests is the following: an estimate is considered to be auto-correlated if the p-value obtained from the Breusch-Godfrey test is less than 0.05 and is consider to be subject to heteroscedasticity if the p-value obtained from the White test is less than 0.05. Our results show that in only two instances autocorrelation and heteroscedasticity is detected (Table I).

Table I: Autocorrelation [A] and heteroscedasticity [H] tests (chi-squared, p-value, result)

Company name	[A] Chi2	[A] p-val	Auto-correlation?	[H] Chi2	[H] p-val	Heteroscedasticity?
Snam SpA	0.27	0.6	NO	3.28	0.19	NO
Terna Rete Elettrica Nazionale SpA	0.42	0.52	NO	2.72	0.26	NO
Ren Redes Energeticas Nacionais SGPS SA	0.67	0.41	NO	19.54	0	YES
Red Electrica Corporacion SA	0.05	0.82	NO	2.17	0.34	NO
Enagas SA	2.18	0.14	NO	2.15	0.34	NO
National Grid PLC	0.3	0.58	NO	1.21	0.55	NO
Elia System Operator SA	4.26	0.04	YES	3.14	0.21	NO
TC PipeLines LP	0.73	0.39	NO	1.45	0.49	NO
EVN AG	10.39	0	YES	1.39	0.5	NO
EDP Energias de Portugal SA	0.04	0.84	NO	27.51	0	YES

Source: Thomson Reuters and Europe Economics calculations.

Where the tests detect autocorrelation or heteroscedasticity, estimates are compared to those obtained using a GLS method which corrects for first-order autocorrelation (Prais–Winsten and Cochrane–Orcutt) with heteroscedasticity-robust variance estimates (Huber/White/sandwich estimator). The results do not show major differences between the two methods (this shows consistency of the beta estimates under OLS and GLS, Table 2).

Table 2: Results of OLS and GLS beta estimates

Company name	Asset betas [OLS]	Standard error [OLS]	Asset betas [GLS]	Standard error [GLS]
Snam SpA	0.48	0.04	0.48	0.05
Terna Rete Elettrica Nazionale SpA	0.45	0.04	0.45	0.05
Ren Redes Energeticas Nacionais SGPS SA	0.17	0.04	0.17	0.04
Red Electrica Corporacion SA	0.33	0.05	0.33	0.06
Enagas SA	0.40	0.07	0.41	0.06
National Grid PLC	0.33	0.07	0.33	0.08
Elia System Operator SA	0.22	0.07	0.22	0.07
TC PipeLines LP	0.37	0.13	0.37	0.11
EVN AG	0.42	0.07	0.44	0.08
EDP Energias de Portugal SA	0.46	0.05	0.45	0.07

Source: Thomson Reuters and Europe Economics calculations.

Tests for statistical significance of the estimates

The statistical significance of the OLS and GLS estimates shows the likelihood of there being a significant relationship between the return on the market and the return on a particular company. Table 3 shows that the t-statistics for all coefficients are significant with both OLS t-statistics and GLS corrected standard errors.

Table 3: t-test results (OLS and GLS)

Company name	t-test [OLS]	t-test [GLS]
Snam SpA	18.22	16.45
Terna Rete Elettrica Nazionale SpA	16.52	15.04
Ren Redes Energeticas Nacionais SGPS SA	10.56	8.99
Red Electrica Corporacion SA	8.26	7.61
Enagas SA	9.76	10.12
National Grid PLC	8.36	7.37
Elia System Operator SA	5.57	4.97
TC PipeLines LP	4.54	5.42
EVN AG	6.99	6.65
EDP Energias de Portugal SA	15.92	11.23

Source: Thomson Reuters and Europe Economics calculations.

Tests assess the suitability of Dimson-corrections

We have also assessed the betas obtained from the Dimson correction (estimates using the same-day market index as independent variable, supplemented with the market index from one period earlier and one period later). Where the lag- and forward-variables are found jointly significant the Dimson beta is calculated as the sum of the three coefficients. The lag- and forward-variables are considered to be jointly significant if the F-test p-value is lesser than 0.05.

The results are shown in Table 4. The F-test of joint significance of the lag- and forward-variables indicates that the Dimson adjustment is not needed for any company in our peer group.

Table 4: Results of OLS and Dimson betas, and results of the test (F-test p-value denotes joint significance of lag- and forward-values)

Company name	Asset betas [OLS]	Asset betas [Dimson]	F-test p- value	Correction needed?
Snam SpA	0.48	0.40	0.05	NO
Terna Rete Elettrica Nazionale SpA	0.45	0.37	0.05	NO
Ren Redes Energeticas Nacionais SGPS SA	0.17	0.21	0.07	NO
Red Electrica Corporacion SA	0.33	0.35	0.68	NO
Enagas SA	0.40	0.34	0.27	NO
National Grid PLC	0.33	0.34	0.91	NO
Elia System Operator SA	0.22	0.20	0.74	NO
TC Pipelines LP	0.37	0.41	0.73	NO
EVN AG	0.42	0.57	0.07	NO
EDP Energias de Portugal SA	0.46	0.46	0.92	NO

Source: Thomson Reuters and Europe Economics calculations.