The WACC for the Dutch Electricity TSO and Electricity and Gas DSOs

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I. Introduction and Summary

The Dutch Authority for Consumers and Markets (ACM) has commissioned The Brattle Group (Brattle) to calculate the Weighted Average Cost of Capital (WACC) for (i) the electricity Transmission System Operator (Electricity TSO) and (ii) the electricity and gas Distribution System Operators (DSOs) in the Netherlands for the next five-year regulatory period, January 2022-December 2026.[1] Throughout this report, we refer to the Dutch Electricity TSO and the DSOs as the "Dutch Energy Networks".

The ACM has instructed us to calculate the WACC using ACM's methodology for the energy sector, as recently amended,[2] and to assess whether future developments in the Dutch energy sector may require any adjustment to the betas of the Dutch Energy Networks. In preparing this report, we use data up to and including 31 December 2020, being the most recent data available at the time of our analysis. Unless otherwise noted, in this report we have applied the same methodology applied in in the Gas TSO report we recently prepared for the ACM (Gas TSO Report),[3] and differences in the estimated WACC parameters only reflect use of more recent data.

In its 2016 method decisions, the ACM used a 'real approach', which indexed the regulatory asset base with inflation, and required to calculate a real pre-tax WACC for both the year before the start of the regulatory period (2016) and the final year of the regulatory period (2021). For the next regulatory period, the ACM will require a WACC for each year of the regulatory period 2022-2026, and for 2021 for the existing capital of the DSOs. Furthermore, the ACM might consider moving to a 'nominal approach' for the Dutch Energy Networks, similar to its decision for the Gas TSO. In this case, the ACM will no longer index the RAB and will require a nominal pre-tax WACC.

The methodology also requires us to calculate a different WACC for existing capital and new investments (new capital).[4] Accordingly, the ACM has instructed us to calculate 11 WACCs:

- The WACC for existing capital in 2021, 2022, 2023, 2024, 2025 and 2026.

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1 The ACM recently commissioned The Brattle Group to estimate the WACC for the Dutch Gas TSO. See Dan Harris, Lucrezio Figurelli and Massimiliano Cologgi, "The WACC for the Dutch Gas TSO", 27 July 2020 (the "Gas TSO Report"). Prior to that, the ACM (through its predecessors NMa and OPTA) also commissioned The Brattle Group to estimate first the Equity Risk Premium and the Risk Free Rate, and later the overall WACC for the Dutch Electricity and Gas TSOs and Distribution System Operators (DSOs) in 2012 and 2013. See, respectively, Dan Harris, Bente Villadsen, and Francesco Lo Passo, "Calculating the Equity Risk Premium and the Risk-free Rate", 26 November 2012 ("Brattle 2012 Report"); and Dan Harris, Bente Villadsen, and Jack Stirzaker, "The WACC for the Dutch TSOs, DSOs, water companies and the Dutch Pilotage Organisation", 4 March 2013 ("Brattle 2013 Report").

2 ACM's WACC methodology for the energy sector for the current regulatory period (2017-2021) is described in Annex 2 of the 2016 method decision. However, in preparing this report the ACM has informed us of a number of changes to the methodology it will introduce in its method decision for the next regulatory period. We discuss these changes in the body of the report. See ACM, Uitwerking van de methode voor de WACC, Annex 2 to the method decisions 2017-2021 (available at: https://www.acm.nl/nl/publicaties/publicatie/16199/WACC-methode-bij-de-methodebesluiten-2017-2021).

3 Gas TSO report (see footnote 1, above).

4 As we explain below, however, the two WACC's differ only with respect to the calculation of the cost of debt.

- The WACC for new capital in 2022, 2023, 2024, 2025 and 2026.

A. Cost of Equity

In line with ACM's methodology, we calculate the risk-free rate (RFR) as the average between the three-year average yields of ten-year government bonds in the Netherlands and in Germany. Over the three-year period 1 January 2018-31 December 2020, yields averaged -0.08% in Germany, and 0.06% in the Netherlands. Taking the average between the two gives us a RFR of -0.01%. We apply this value of the RFR to all WACCs.

We calculate the Equity Risk Premium (ERP) using long-term historical data on the excess return of shares over long-term bonds, using data from European markets. The methodology requires that the projected ERP should be based on the average of the arithmetic and geometric realized ERP for the Eurozone, using the market capitalization of each country's stock market as weights. The methodology also requires considering whether adjustments to the final ERP need to be made based on considerations of the historical average ERP, and ERP estimates based on dividend-growth models. Based on the available data, we select an ERP of 5%, which we apply to all WACCs. This value is in line with the average value selected for the ERP by other European energy regulators.

The Dutch Energy Networks are not publicly traded. Therefore, we estimate the relevant betas and gearing for the Dutch Energy Networks based on the asset betas and gearing of a 'peer group' of regulated energy networks that have similar systematic risk. To select our peer group of comparable companies, we start with the eight comparable companies used in the 2016 WACC analysis,[5] to which we add the Gas TSO in Romania. We check that the candidate peers still derive a majority of their revenues from regulated activities and test that their shares are sufficiently liquid to provide a reliable beta estimate. We end up with a group of seven peers: Elia, Enagas, Red Electrica, REN, Snam, TC Pipelines, and Terna.

The ACM has also asked us to assess whether future developments in the Dutch energy sector may affect the cost of capital in a way that the current methodology does not reflect. Over the next decades, the use of electricity in the Netherlands is expected to increase substantially, while the use of natural gas will decrease, with a phasing out to be completed by 2050.

There are two ways that the energy transition may potentially affect the cost of capital of the Dutch Energy Networks. First, expected changes in volumes may directly affect the systematic risk faced by energy networks, and hence affect the energy networks' beta. Second, significant differences in future investment requirements may create a difference in the asset betas of gas and electricity transmission and distribution networks.

[5] In 2016, the ACM commissioned the consultancy firm Rebel to estimate the WACC for the Dutch TSOs and DSOs. See Rebel, "The WACC for the Dutch TSOs and DSOs", 29 March 2016 (available at: https://www.acm.nl/nl/publicaties/publicatie/15617/Rapport-Rebel-The-WACC-for-the-Dutch-TSOs-and-DSOs).

With respect to the first effect, we conclude that any decline in volume will not be correlated with the market index, and is therefore not systematic. Hence, there should be no effect on the beta and the cost of capital of the Dutch Energy Networks.

With respect to the second affect, our analysis shows that the investment requirements for TenneT offshore are significant and likely to affect its beta. We apply of a one standard deviation uplift over the median beta to be account for the investment requirements. Our approach is consistent with regulatory precedent in similar circumstances.

Based on these considerations, we select the median asset beta (0.39) and gearing (82.6%) of the peer group to calculate the WACC of TenneT onshore and of the gas and electricity TSOs. We further apply an uplift of 0.09, equal to the standard deviation of the estimated asset betas, to the asset beta of TenneT Offshore, resulting in an asset beta of 0.48 including the uplift.

B. Cost of Debt

ACM's methodology makes a distinction between existing capital and new capital in calculating the cost of debt.

- With respect to the existing capital, the methodology requires to calculate the cost of debt based on the 'staircase model', which assumes that the regulated companies finance their existing investment with ten-year loans, and refinance 10% of their debt every year. The methodology further distinguishes between historical years and future years, which vary depending on the year for which we are estimating the WACC. For historical years, the methodology takes the average daily yield to maturity of comparable debt in any given calendar year. For future years, the methodology takes the average daily yield to maturity of comparable debt over the three years prior to the measurement date. We find this method reasonable, because it recognises that TSOs finance existing infrastructure with a mix of legacy debt and more recently issued debt, and that the cost of the debt varies over time.

- With respect to new capital, the methodology requires to calculate the cost of debt simply based on the average daily yield to maturity of comparable debt over the three years prior to the measurement date. Again, this recognises that new capital will be financed with newly issued debt, and that recent debt yields are likely to be a good estimate of future debt costs.

In calculating the cost of debt for the existing capital of TenneT offshore, the ACM acknowledges that TenneT offshore was only recognized as a TSO in 2016. Accordingly, the ACM has asked us to calculate the cost of debt for TenneT offshore using only five historical years, namely 2016 through 2020.

As a measure of comparable debt, we consider the yield on a utility index of 10-year bonds with a rating of A, which is consistent with the credit rating of network operators in the Netherlands. We add 15 basis points to cover the costs of issuing debt. This methodology results in a pre-tax cost of debt in the range 1.00%-1.63%, for Dutch Energy Networks and 1.00%-1.10% for TenneT Offshore, depending on the WACC considered.

We understand that in September 2020 the Dutch Government has announced it will no longer change the current corporate tax rate of 25.0% in 2021. Accordingly, we use 25.0% as the applicable tax rate for 2021 and for the next regulatory period, January 2022-December 2026.

We convert the estimated nominal WACC to a real WACC using an estimate of inflation for the Netherlands. ACM's methodology for the energy sector requires to calculate inflation using both historic and forecast inflation. Based on this methodology, we arrive at an estimate of inflation of 1.67% for 2021 and of 1.77% for 2022-2026.[6]

C. WACC of the Dutch Energy Networks

Table 1 and Table 2 report our estimates of the WACCs for the Dutch Energy Networks and for TenneT offshore.

TABLE 1: THE WACC OF TENNET ONSHORE AND OF THE GAS AND ELECTRICITY DSOS

			Existing capital						New capital
			2021	2022	2023	2024	2025	2026	2022-2026
			[A]	[B]	[C]	[D]	[E]	[F]	[G]
Gearing (D/A)	[1]	[2]/(1+[2])	45%	45%	45%	45%	45%	45%	45%
Gearing (D/E)	[2]	Table 10	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%
Tax rate	[3]	ACM	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Risk free rate	[4]	See note	-0.01%	-0.01%	-0.01%	-0.01%	-0.01%	-0.01%	-0.01%
Asset beta	[5]	Table 10	0.39	0.39	0.39	0.39	0.39	0.39	0.39
Equity beta	[6]	[5]x(1+(1-[3])x[2])	0.63	0.63	0.63	0.63	0.63	0.63	0.63
Equity Risk Premium	[7]	Assumed	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%
After-tax cost of equity	[8]	[4]+[6]x[7]	3.15%	3.15%	3.15%	3.15%	3.15%	3.15%	3.15%
Pre-tax cost of debt	[9]	Table 16	1.63%	1.41%	1.22%	1.10%	1.05%	1.04%	1.00%
Nominal after-tax WACC	[10]	((1-[1])x[8])+([1]x(1-[3])x[9])	2.28%	2.20%	2.14%	2.10%	2.08%	2.08%	2.07%
Nominal pre-tax WACC	[11]	[10]/(1-[3])	3.04%	2.94%	2.86%	2.80%	2.78%	2.77%	2.76%
Inflation	[12]	Table 17	1.67%	1.77%	1.77%	1.77%	1.77%	1.77%	1.77%
Real pre-tax WACC	[13]	(1+[11])/(1+[12]) -1	1.35%	1.15%	1.07%	1.02%	0.99%	0.99%	0.97%

Notes:
[4]: Average German and Dutch 10Y Government Bond yield over the period 01/01/2018 - 12/31/2020.

6 Note that our estimate of inflation is the same for each year of the regulatory period 2022-2026. This is because CPI inflation in the Netherlands forecast by the Dutch Economic Planning Bureau for the period 2022-2025 is constant.

TABLE 2: THE WACC OF TENNET OFFSHORE

			Existing capital					New capital
			2022	2023	2024	2025	2026	2022-2026
			[A]	[B]	[C]	[D]	[E]	[F]
Gearing (D/A)	[1]	[2]/(1+[2])	45%	45%	45%	45%	45%	45%
Gearing (D/E)	[2]	Table 10	82.6%	82.6%	82.6%	82.6%	82.6%	82.6%
Tax rate	[3]	ACM	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
Risk free rate	[4]	See note	-0.01%	-0.01%	-0.01%	-0.01%	-0.01%	-0.01%
Asset beta	[5]	Table 10	0.39	0.39	0.39	0.39	0.39	0.39
Asset beta upflit for TenneT Offshore	[6]	Table 13	0.09	0.09	0.09	0.09	0.09	0.09
Asset beta, TenneT Offshore	[7]	[5]+[6]	0.48	0.48	0.48	0.48	0.48	0.48
Equity beta, TenneT Offshore	[8]	[7]x(1+(1-[3])x[2])	0.78	0.78	0.78	0.78	0.78	0.78
Equity Risk Premium	[9]	Assumed	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%
After-tax cost of equity, TenneT Offshore	[10]	[4]+[8]x[9]	3.90%	3.90%	3.90%	3.90%	3.90%	3.90%
Pre-tax cost of debt	[11]	Table 16	1.10%	1.10%	1.10%	1.10%	1.07%	1.00%
Nominal after-tax WACC, TenneT Offshore	[12]	((1-[1])x[10])+([1]x(1-[3])x[11])	2.51%	2.51%	2.51%	2.51%	2.50%	2.47%
Nominal pre-tax WACC, TenneT Offshore	[13]	[12]/(1-[3])	3.34%	3.34%	3.34%	3.34%	3.33%	3.30%
Inflation	[14]	Table 17	1.77%	1.77%	1.77%	1.77%	1.77%	1.77%
Real pre-tax WACC, TenneT Offshore	[15]	(1+[13])/(1+[14]) -1	1.55%	1.55%	1.55%	1.55%	1.53%	1.50%

Notes:
[4]: Average German and Dutch 10Y Government Bond yield over the period 01/01/2018 - 12/31/2020.

II. The Risk Free Rate

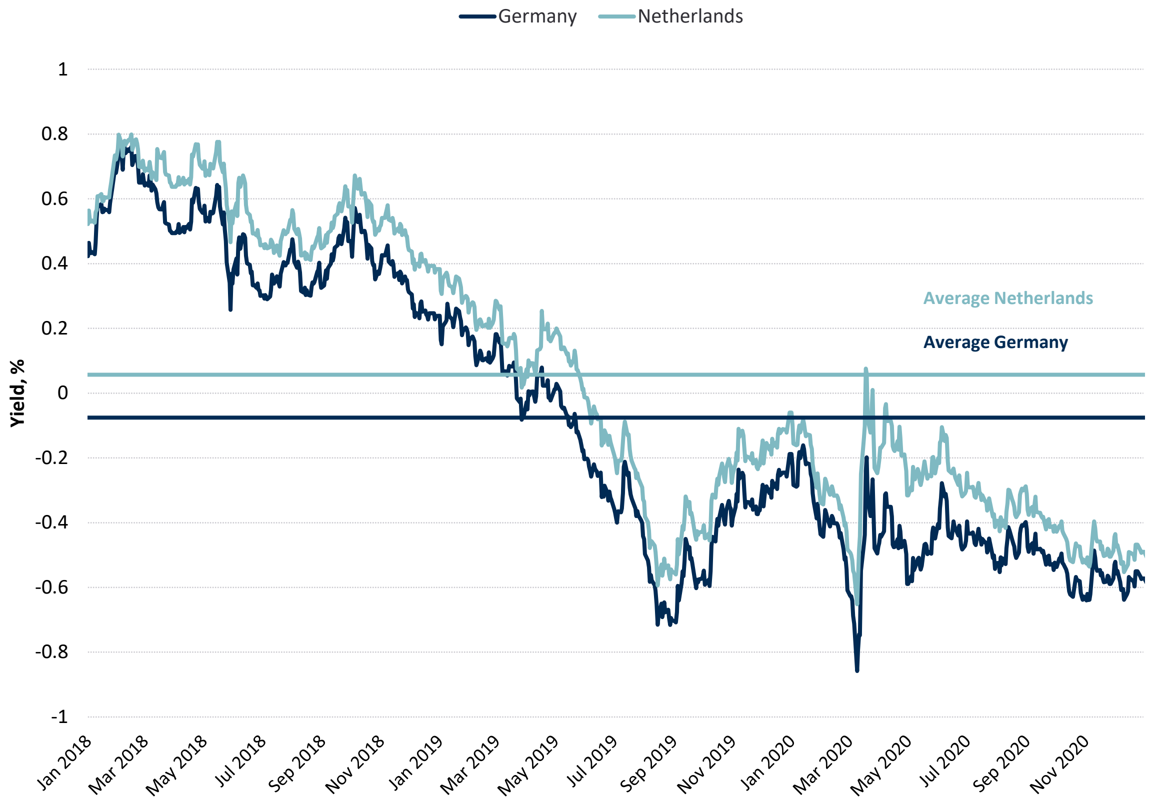
ACM's methodology calculates the risk-free rate as the average yield on 10-year government bonds over the last three years in the Netherlands and in Germany. Figure 1 illustrates the evolution of the yields of 10-year government bonds over the past three years in the Netherlands and in Germany. As a measure of the yield of 10-year government bonds, we rely on the 'GTDEM10Y Govt Generic Germany 10 Year Government Bond' index for Germany and the 'GTNLG10Y Govt Generic Netherlands 10 Year Government Bond' index for the Netherland.

Over our three-year reference period, the nominal government bond yields have remained at historical lows, fluctuating above zero until the end of 2018, when they started falling steadily, entering into negative territory around June of 2019, and remaining negative though the end of our reference period, being December 2020.[7] The steep fall in bond yields in mid-2019 was a result of the European Central Bank (ECB) re-starting its Quantitative Easing (QE) stimulus program. In response to the Covid-19 pandemic crisis, in March 2020 the ECB launched a €750 billion asset purchase programme through the Pandemic Emergency Purchase Programme (PEPP).[8] In March 2020, yields briefly dipped below minus 0.8%, but then increased again to pre-PEPP levels. This may be due to an increase in government default risk perceived by investors due to the pandemic. Since then, yields have gradually decreased over the course of 2020, averaging about minus 0.54% in December 2020. Over the three-year period ending on 31 December 2020, yields were 0.06% on average in the Netherlands, and -0.08% on average in Germany. Taking the average between the two gives us a risk-free rate of -0.01%.

7 The significant recent drop in government bond yields is largely attributable to the ECB's decision to relaunch its quantitative easing (QE) program. In December 2018, the ECB had announced that it would end its € 30 billion a month bond-buying scheme, though it would continue to reinvest the proceeds of maturing bonds purchased through the program (see "ECB ends €2.5tn Eurozone QE stimulus programme," BBC, December 13 2018). However, only a few months later, the ECB announced that it would introduce a new package of measures, including a renewed QE program from October 2019 (see "European Central Bank paves way for fresh stimulus package", Financial Times, July 25 2019).

8 See European Central Bank Press Release, "ECB announces €750 billion Pandemic Emergency Purchase Programme (PEPP)", 18 March 2020 (available at: https://www.ecb.europa.eu/press/pr/date/2020/html/ecb.pr200318_1~3949d6f266.en.html).

FIGURE 1: DUTCH AND GERMAN 10-YEAR GOVERNMENT BOND YIELDS (JANUARY 2018-DECEMBER 2020)



Source: Bloomberg.

III. The Equity Risk Premium

ACM's methodology specifies that the ERP should be based on a historical time-series of the excess return of stocks over long-term bonds for the Eurozone economies. Specifically, ACM has determined to use the simple average of the long-term arithmetic and geometric ERP for the Eurozone as the anchor for the ERP estimate. The ERP for individual countries in the Eurozone should be weighted using the current capitalization of each country's stock market.[9] The methodology reflects an estimate of the ERP in the very long run, and notably excludes countries outside of the Eurozone. This is reasonable, because a Dutch investor is more likely to be diversified over the same currency zone, rather than to incur additional currency risks by diversifying within Europe but outside of the Eurozone.

Table 3, below, illustrates the realised ERP derived from one of the most widely used sources for long-run excess returns, being the data published by Dimson, Marsh and Staunton (DMS) for individual European countries taken from the February 2020 DMS report.[10] This report contains ERP estimates

[9] Weighting based on the current market-capitalization reflects the idea that a typical investor would invest a larger share of his portfolio in countries with more investment opportunities.

[10] Credit Suisse Global Investment Returns Sourcebook 2020, Table 9.

using data up to and including 2019. Table 3 shows the simple and weighted averages of the ERP for the Eurozone countries for which DMS have data. We find that the simple average between the arithmetic and geometric ERP for the period 1900 to 2019 inclusive was 5.49% for the Eurozone. Using each country's stock market capitalization to weight the averages across the Eurozone, we derive an ERP of 4.95% for 2019.

TABLE 3: HISTORIC EQUITY RISK PREMIUM RELATIVE TO BONDS (1900 – 2019)

		Included in Eurozone averages	Risk premiums relative to bonds, 1900 - 2019			
			Geometric mean	Arithmetic mean	Average	Country Market Cap (2019)
			%	%	%	USD mln
			[A]	[B]	Average [A], [B]	[C]
Austria	[1]	1	2.70	21.00	11.85	138,000
Belgium	[2]	1	2.10	4.10	3.10	406,467
Denmark	[3]		3.40	5.10	4.25	479,237
Finland	[4]	1	5.10	8.60	6.85	266,031
France	[5]	1	3.10	5.30	4.20	2,715,221
Germany	[6]	1	4.90	8.20	6.55	2,265,358
Ireland	[7]	1	2.60	4.60	3.60	117,905
Italy	[8]	1	3.10	6.40	4.75	677,642
Norway	[9]		2.60	5.40	4.00	317,666
Netherlands	[10]	1	3.30	5.50	4.40	735,273
Portugal	[11]	1	5.00	9.10	7.05	72,138
Spain	[12]	1	1.60	3.50	2.55	724,695
Sweden	[13]		3.20	5.40	4.30	855,100
Switzerland	[14]		2.20	3.70	2.95	1,877,703
United Kingdom	[15]		3.60	4.90	4.25	3,492,623
Average Eurozone	[16]		3.35	7.63	5.49	
Value-weighted average Eurozone	[17]		3.50	6.40	4.95	

Notes and sources:
[A][1]-[15], [B][1]-[15]: Credit Suisse Global Investment Returns Sourcebook 2020, Table 9.
[16]: Average [1], [2], [4], [5], [6], [7], [8], [10], [11], [12].
[17]: Average [1], [2], [4], [5], [6], [7], [8], [10], [11], [12], weighted by [C].

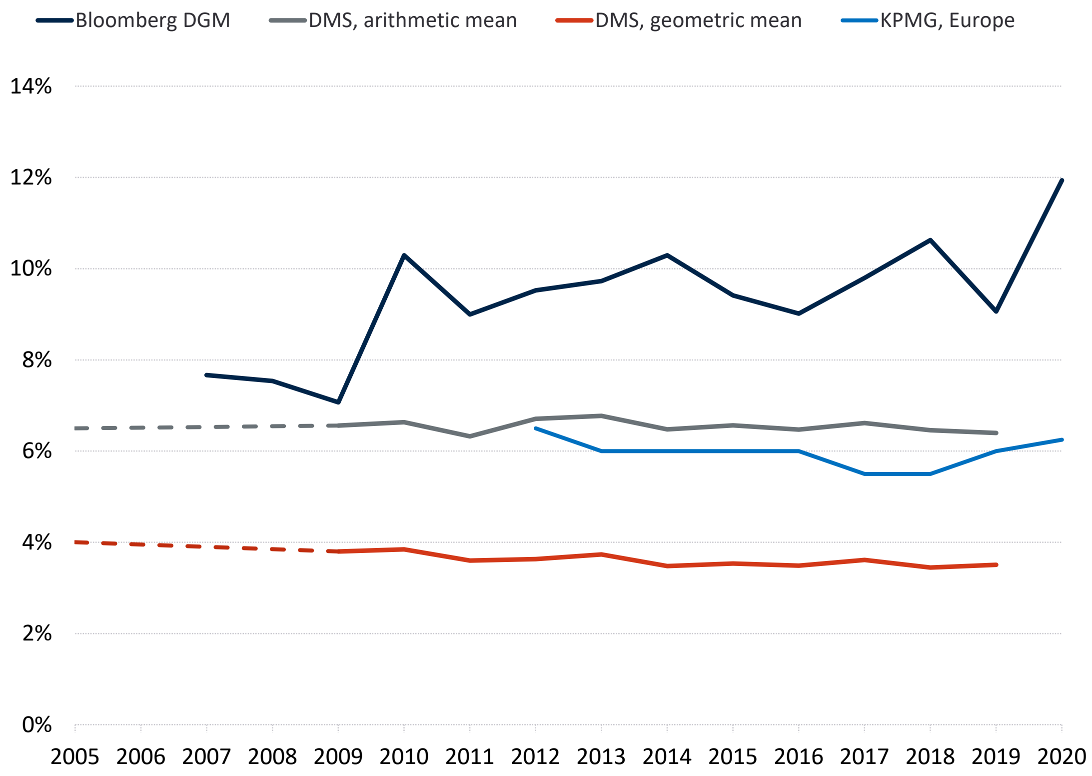
ACM's methodology requires us to look at evidence on the ERP from the dividend growth model (DGM) as a 'sanity check' on the ERP estimate based on historical data. For example, after the 2009 financial crisis, historical data indicated a decrease in the ERP, because realised returns of stocks over bonds were very low. But the DGM indicated that the ERP had if anything increased after the crisis. The DGM result made sense, since investors would likely have perceived more risk and demanded higher returns immediately after the crisis. Hence, the results of the DGM indicated that, for this period, a downward reduction in the ERP was not justified, even though this is what the unadjusted historical data indicated.

In Figure 2, below, we compare the DMS estimates of the arithmetic and geometric means of the historical ERP for the Eurozone to the forward looking estimates of the ERP based on Bloomberg's and KPMG's DGMs.[11] KPMG's estimate of the ERP has remained relatively stable over the past few years, unchanged between 2017 and 2018 at 5.5%, and increasing to 6.00% in 2019 and to 6.25% in 2020. Bloomberg's DGM estimate of the ERP increased from 9.8% in 2017 to 10.6% in 2018, decreased to

[11] KPMG provides a DGM-based estimate of the ERP for Europe based on the implied equity returns of European indices. See "Equity Market Risk Premium - Research Summary", KPMG, 30 November 2020. Bloomberg provides daily DGM-based estimates of the ERP for individual European countries under the 'Country Risk Premium' function. We use Bloomberg's DGM-based ERP estimates for individual Eurozone countries as of 31 December of each year to calculate a weighted average DGM-based ERP for the Eurozone.

9.06% in 2019 and increased to 11.94% in 2020. On the other hand, the average of the arithmetic and geometric means based on the historical DMS data decreased from 5.11% in 2017 to 4.95% in 2018, and remained unchanged between 2018 and 2019. However, the drop in the DMS historical ERP between 2017 and 2018 was primarily driven by a sharp drop in stock prices at the end of 2018.[12] Hence, the apparent fall in the ERP seen in the 2018/2019 DMS data could be an anomaly. But the DGM evidence indicates that the ERP had if anything increased during the Covid pandemic, as the increase in KPMG's and Bloomberg's DGM estimates in 2020 seem to suggest. Similar to after the financial crisis, therefore, the DGM estimates indicate that a downward reduction in the ERP, as suggested by the historical data, is not justified.

FIGURE 2: EUROZONE EQUITY RISK PREMIUMS, BY YEAR



Notes: DMS estimates for 2007 and 2008 calculated assuming a linear trend between 2005 and 2009 estimates.

In Table 4, below, we report the average of the geometric and arithmetic average DMS ERP for the Eurozone weighted by stock market capitalisation for each of the years 2015-2019 inclusive. The average ERP over this five-year period was 5.01%.[13] This is higher than the ERP of 4.95% indicated by the 2018 and 2019 DMS reports. Based on this evidence, an ERP of 5.0% seems reasonable.

[12] Overall, the stock market capitalization for the Eurozone economies fell by 20% on average.

[13] Note that the in calculating the Eurozone averages, at the request of ACM, we include Austria, for which DMS reports a value of the arithmetic mean of 21.1%. Excluding Austria would reduce the value weighted Eurozone average of the arithmetic mean from 6.46% to 6.19%, and the average between the value-weighted arithmetic and geometric means from 4.95% to 4.82%.

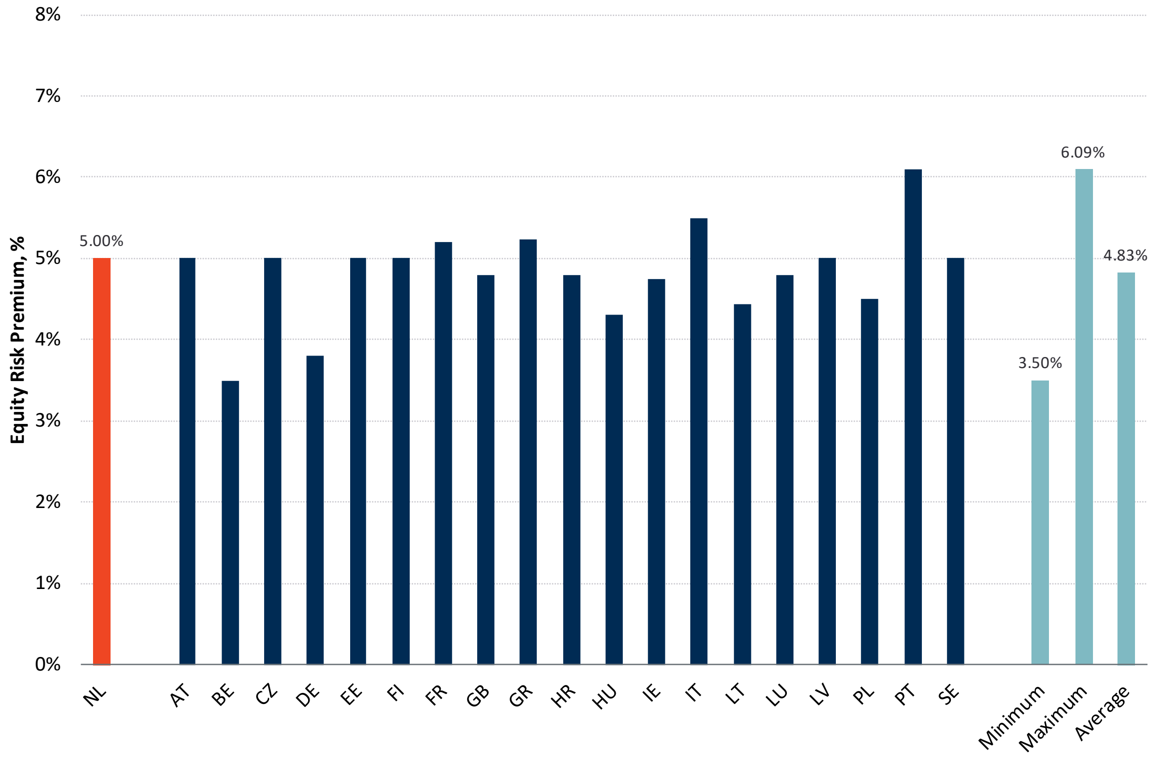
TABLE 4: DMS ERP DATA 2015 - 2019

	Geometric mean [A] %	Arithmetic mean [B] %	Average [C] %
2015	3.54	6.57	5.05
2016	3.49	6.47	4.98
2017	3.61	6.61	5.11
2018	3.45	6.46	4.95
2019	3.50	6.40	4.95
Average	3.52	6.50	5.01

Notes:
Brattle calculations using data from Credit Suisse Global Investment Returns Sourcebook, 2016-2020.
[A], [B]: Value weighted average for the Eurozone.
[C]: Average [A], [B].

We also benchmark this value against the value selected for the ERP by other European energy regulators (Figure 3 illustrates). About a third of the sampled regulators selected a value of the ERP equal to 5%. Overall, the average value is 4.83%, close to the 5.0% we propose. This further confirms that, based on the ACM's methodology, an ERP of 5.0% is reasonable.

FIGURE 3: ERP VALUES SELECTED BY OTHER EUROPEAN ENERGY REGULATORS



Source: Brattle analysis on data from CEER, Report on Regulatory Frameworks for European Energy Networks, January 2020.
For France, data from CRE, Deliberation n. 2019-270, December 2019, p. 44.

In previous reports for the ACM,[14] we have explained that the long-run historical risk premium may not reflect the ERP that investors demand now. DMS, for example, argue that a number of unexpected and positive factors might have led the realized ERP to be higher than the ERP that investors would have demanded or expected. Accordingly, they suggest to apply a downward adjustment to the historical ERP to account for events which happened in the past but, in the view of DMS, are unlikely to occur in the future.[15] The ACM noted that estimates of the ERP from DGM were higher than the historical data. On the other hand, the ACM did not apply the downward adjustment to the historical data that DMS suggested. Hence, the use of unadjusted historical data seems reasonable.

[14] See, *e.g.*, Brattle 2012 Report.

[15] For example, DMS argue technology advances have made investment diversification cheaper and easier, thus reducing risk and the expected ERP. In this light, the historical ERP would be an upward-biased forecast of the future ERP. Similarly, an upward trend in stock prices relative to dividends may suggest a declining trend in the ERP. Price-dividend ratios have indeed increased over the last 60 years, and DMS argue that this upward trend is unlikely to continue. However, while adjusting the historical averages for trends in price-dividend ratios may seem plausible, DMS ignore other reasons why price-dividend ratios have increased, including share repurchases and payments to selling shareholders in takeovers, both leading to higher price-dividend ratios. Therefore the trend of increasing price-dividend ratios does not necessarily imply that the expected ERP is lower than historical averages.

IV. Selection of Peers

A. Potential Peers

The Dutch Energy Networks are not publicly traded. Therefore, to estimate their beta and gearing we need to find publicly traded firms with similar systematic risk. We can then estimate the beta and gearing value from these firms, which we call 'comparators' or 'peers'.

In determining the number of peers, there is a trade-off. On the one hand, adding more peers to the group reduces the statistical error in the estimate of the beta. On the other hand, as more peers are added, there is a risk that they may have a different systematic risk than the regulated TSO's, which makes the beta estimate less accurate. In statistical terms, once we have 6-7 peers in the group the reduction in the error from adding another firm is relatively small.

To select our peer group of comparable companies, we start with the eight comparable companies used in the 2016 analysis.[16] To this initial list of candidate peers, we add the UK network company National Grid and the Romanian TSO Transgaz. Table 5 provides our list of the candidate peers. All peers have a credit rating at or above investment grade level.

TABLE 5: FIRMS SELECTED AS POTENTIAL PEERS

		Country	Credit rating
		[A]	[B]
Elia Group SA/NV	[1]	Belgium	BBB+
Enagas SA	[2]	Spain	BBB+
Fluxys Belgium SA	[3]	Belgium	n/a
National Grid PLC	[4]	United Kingdom	A-
Red Electrica Corp SA	[5]	Spain	A-
REN - Redes Energeticas Nacionais SGPS SA	[6]	Portugal	BBB
Snam SpA	[7]	Italy	BBB+
Terna Rete Elettrica Nazionale SpA	[8]	Italy	BBB+
Transgaz SA Medias	[9]	Romania	BBB-
TC Pipelines LP	[10]	United States	BBB

Notes:
[B]: Bloomberg. Ratings are from S&P and Fitch for Transgaz.

16 In 2016, Rebel selected Snam, Terna, Red Electrica, Enagas, Elia, REN, Fluxys and TC Pipelines. With the exception of TC Pipelines – a US company – all other peers were European.

D. Liquidity, Credit Rating and M&A Activity

Illiquid stocks tend to underestimate the true industry beta.[17] Hence, for each of the potential peers in the initial sample, we test to see if the firms' shares are sufficiently liquid.

Historically, the ACM methodology applied two criteria. First, the shares of the candidate peers had to be traded on at least 90% of the days in which the relevant market index traded over the reference period (the number of trading days test). Second, the ACM methodology required that the candidate peers had annual revenues of at least € 100 million (the annual revenue requirement), on the basis that firms with larger revenues are likely to have shares that are liquidly traded.

In previous reports for the ACM we performed additional checks that the two criteria would not produce any 'false positives'.[18] For example, we generally exclude companies involved in substantial M&A activity during the estimation window. M&A activity tends to affect a firm's share price in a way that is unrelated to the systematic risk of the business. Hence, similar to illiquid stock, the observed beta for a firm with substantial M&A activity will tend to underestimate the true beta for the business. Accordingly, excluding firms involved in 'substantial' M&A activity helps ensure a reliable beta estimate. We also only included companies with an investment grade credit rating. This is because share-prices of firms with lower credit ratings tend to be more reactive to company-specific news. For these companies, the measured beta will tend to underestimate the true beta.

More recently, in response to a court ruling,[19] the ACM commissioned a study to provide a recommendation on the appropriate criteria to select peers for efficient beta estimation. The study determined that the two existing criteria adopted by ACM should be modified, and that a bid-ask spread threshold of 1% should be applied instead as the primary liquidity criterion.[20] The ACM has asked us to follow this recommendation, and to perform additional liquidity tests as 'sanity checks' on the results. We find this to be a reasonable approach to test for liquidity.

We calculate the average bid-ask spread as a percentage of the stock price over the reference period 1 January 2018 -31 December 2020.[21] As illustrated in Figure 4, the bid-ask spread is generally below

17 To understand why this is true, for example, consider a firm with a true beta of 1.0, so that the firm's true value moves exactly in line with the market. Now suppose that the firm's shares are traded only every other day. In this case, the firm's actual share price will only react to news the day after the market reacts. This will give the impression that the firm's value is not well correlated with the market, and the beta will appear to be less than one. Using weekly returns to calculate beta mitigates this problem, since it is more likely that the firm's shares will be traded in the week. However, using weekly returns have other disadvantages, such as providing 80% less data points over any given period.

18 See, e.g., Dan Harris, Lucrezio Figurelli, Flora Triolo, Massimiliano Cologgi, "The WACC for Drinking Water Companies in the Netherlands", 9 July 2019, Sections IV.B, IV.D and IV.E.

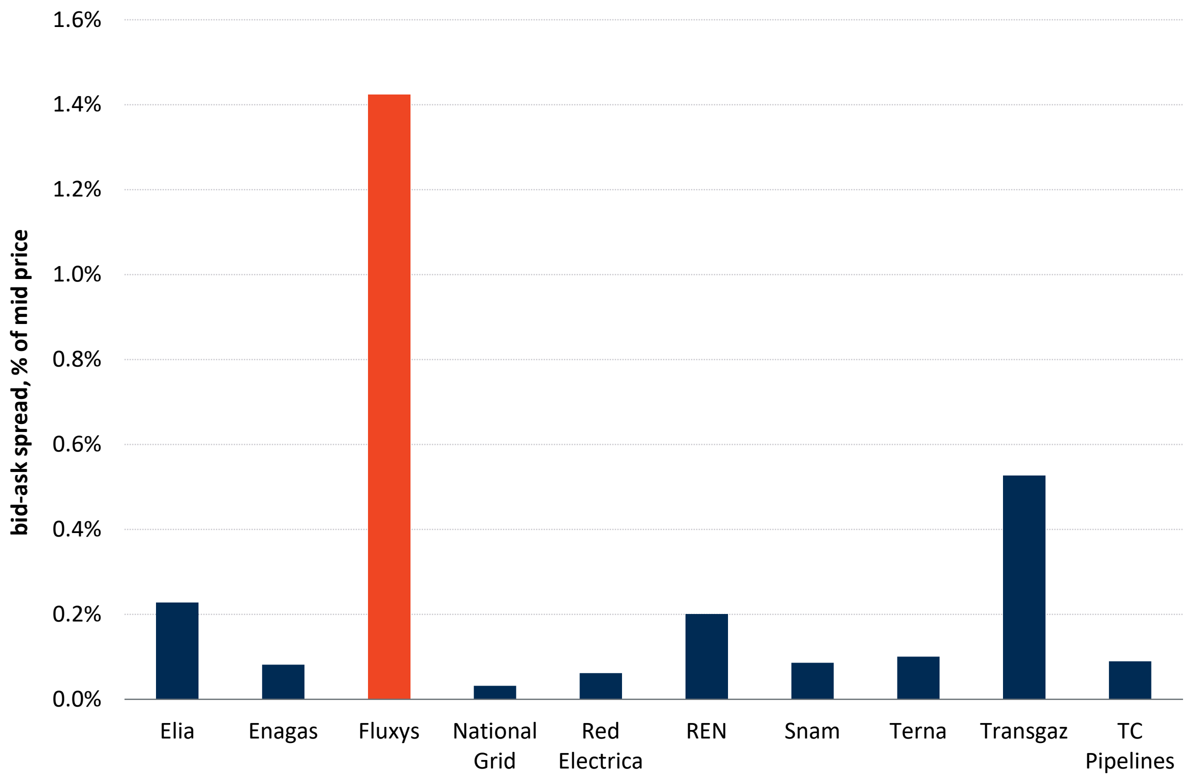
19 The court ruling was directly related to the peer group of companies used to estimate the beta for the Dutch network companies. The court found that one of the peer companies, Fluxys, did satisfy both the number of trading days and annual revenue requirements. However, the court determined that a high value of the bid-ask spread demonstrated that Fluxys' shares were illiquid.

20 Frontier Economics, "Criteria to select peers for efficient beta estimation. A report for the ACM", 8 January 2020.

21 More specifically, we calculate the daily value of the bid-ask spread as the difference between bid price and ask price at closing divided by the average between the bid price and the ask price. We then calculate the simple average of the daily bid ask spreads over the relevant period.

0.25% for most companies. Only Fluxys has a bid-ask spread above the 1% threshold, so we exclude this company from the final sample.[22]

FIGURE 4: BID-ASK SPREAD OF THE POTENTIAL PEERS



Source: Brattle calculations on Bloomberg data for the period January 2018-December 2020, and June 2019-December 2020 for Transgaz because of data availability.

As illustrated n Figure 4, the only other company with a bid-ask spread higher than 0.25% is the Romanian TSO Transgaz. Though its bid-ask spread (0.53%) is below the 1% threshold, we have excluded Transgaz from the final sample because it was only recently, in July 2019, that it obtained an investment grade credit rating.[23]

We further check that the potential peers have not been involved in sizeable M&A activity during the reference period. As explained above, M&A activity can depress the beta below its true level. Among the candidate peers considered, no one was involved in sizeable M&A activity during the reference period.[24]

22 We have also verified that the shares of the candidate peers were sufficiently liquid by reference to the number of days traded and to the volume of daily trades. These additional sanity checks confirmed that the shares of the other candidate peers (that is, excluding Fluxys) were sufficiently liquid.

23 In July 2019, Fitch assigned Transgaz a BBB- rating, which is the bottom end of investment grade. For a history of Transgaz ratings, see http://new.transgaz.ro/en/investors/history-transgaz-rating.

24 We define sizeable M&A activities as M&A transactions with a value exceeding 30% of the average market capitalization of the firm during the 30 days before the transaction takes place.

E. Regulated Revenues

Ideally, the firms we select as peers should earn most of their revenues from regulated activities similar to the Dutch Gas TSO. Accordingly, we have checked the portion of revenues that the companies in the peer group earn from regulated energy transmission and distribution. As reported in Table 6, below, with the exception of Fluxys and National Grid, all candidate peers derive the vast majority of their revenues from regulated energy transmission and distribution activities.[25]

TABLE 6: REVENUE FROM REGULATED ENERGY TRANSMISSION AND DISTRIBUTION

		Country [A]	Regulated transmission revenues [B]
Elia Group SA/NV	[1]	Belgium	99%
Enagas SA	[2]	Spain	81%
Fluxys Belgium SA	[3]	Belgium	60%
National Grid PLC	[4]	United Kingdom	n/a
Red Electrica Corp SA	[5]	Spain	90%
REN - Redes Energeticas Nacionais SGPS SA	[6]	Portugal	93%
Snam SpA	[7]	Italy	99%
Terna Rete Elettrica Nazionale SpA	[8]	Italy	91%
Transgaz SA Medias	[9]	Romania	96%
TC Pipelines LP	[10]	United States	100%

We already exclude Fluxys because of a high bid-ask spread. With respect to National Grid, we note that in 2016 ACM's consultants excluded it because it did not have a high enough share of revenues from regulated transmission and distribution activities.[26] In Table 7, we provide the breakdown of National Grid's revenues as reported in their annual accounts. On average, in 2019 and 2020 National Grid earned 30% of its revenues from regulated energy transmission activities in the UK, and 64% from regulated activities in the US. However, for US regulated activities we cannot distinguish between revenues related to energy transmission and distribution and revenues related to the sale of energy. Accordingly, we have chosen to exclude National Grid from the final sample.

[25] Note that we do not apply a strict criterion for the minimum percentage of revenues that a peer must derive from regulated activities. In practise, decisions regarding which peers to include always involve a trade-off between the comparability of the individual peers and the final number of peers. In some cases, we may accept a lower percentage of revenues from regulated revenues to expand the peer group, and vice versa.

[26] Rebel (2016), p. 5. See also, Rebel, "Memo: Onderwerp Reactie op zienswijzen WACC", 26 July 2016 (available at: https://www.acm.nl/sites/default/files/old_publication/publicaties/16168_rebel-reactie-op-zienswijzen-wacc-2016-07-26.pdf).

TABLE 7: NATIONAL GRID REVENUES

		31-Mar-20 [A] £ mln	31-Mar-19 [B] £ mln	31-Mar-20 [C] %	31-Mar-19 [D] %	Average [E] Average [C],[D]
Revenues						
UK Electricity Transmission	[1]	3,702	3,351	25%	22%	24%
UK Gas Transmission	[2]	927	896	6%	6%	6%
US Regulated Operations	[3]	9,205	9,846	63%	66%	64%
NGV and Other	[4]	736	876	5%	6%	5%
Total	[5]	14,570	14,969	100%	100%	100%
Operating Profit						
UK Electricity Transmission	[6]	1,320	1,015	40%	29%	35%
UK Gas Transmission	[7]	348	303	11%	9%	10%
US Regulated Operations	[8]	1,397	1,724	42%	50%	46%
NGV and Other	[9]	242	400	7%	12%	9%
Total	[10]	3,307	3,442	100%	100%	100%

Notes:
[1]-[5]: National Grid Full Year Results Statement, 2018-2019, pp. 23, 26, 28, 35, 2019-2020, p.121.
[6]-[10]: National Grid Full Year Results Statement, 2018-2019, p. 17, 2019-2020, p.131.

F. The Final Sample of Peers

In Table 8, below, we provide a summary of the results of the screening tests we applied to arrive at our final sample of peers.

TABLE 8: SCREENING TESTS SUMMARY

		Country [A]	Bid-ask spread [B]	M&A [C]	Regulated transmission revenues [D]	Investment grade [E]	Final sample [F]
Elia Group SA/NV	[1]	Belgium	✓	✓	✓	✓	✓
Enagas SA	[2]	Spain	✓	✓	✓	✓	✓
Fluxys Belgium SA	[3]	Belgium	×				×
National Grid PLC	[4]	United Kingdom	✓	✓	×		×
Red Electrica Corp SA	[5]	Spain	✓	✓	✓	✓	✓
REN - Redes Energeticas Nacionais SGPS SA	[6]	Portugal	✓	✓	✓	✓	✓
Snam SpA	[7]	Italy	✓	✓	✓	✓	✓
Terna Rete Elettrica Nazionale SpA	[8]	Italy	✓	✓	✓	✓	✓
Transgaz SA Medias	[9]	Romania	✓	✓	✓	×	×
TC Pipelines LP	[10]	United States	✓	✓	✓	✓	✓

V. Beta and Gearing

A. Peer Group Betas and Gearing

As explained above, the Dutch Energy Networks are not publicly traded. Accordingly, we estimate their systematic risk by reference to our peer group of firms which are publicly traded and derive the majority of their revenues from regulated transmission and distribution activities.

1. Equity Betas

ACM's methodology specifies a three-year daily sampling period for the beta. We agree that this sampling period and frequency should give sufficient observations for a robust beta estimate. Accordingly, we estimate equity betas for the peer group of firms by regressing the daily returns of individual stocks on market returns over the last three years.[27]

The systematic risk of each peer, as summarised in its beta parameter, must be measured against an index representing the overall market. A hypothetical investor in the Dutch TSO would likely diversify its portfolio within a single currency zone so as to avoid exchange rate risk. Using indices from the relevant country or currency zone avoids exchange rate movements depressing the betas, and should result in a higher beta estimate than if we estimated betas against an index derived in a different currency.[28] Accordingly, to calculate market returns we use a broad Eurozone index for companies operating in the Eurozone (the Stoxx Europe 600 (SXXP)), and a national US index for TC Pipelines (the S&P 500).[29]

We perform a series of diagnostic tests to assess if the beta estimates satisfy the standard conditions underlying Ordinary Least Squares (OLS) regression. We test for autocorrelation using the Breusch-

[27] As mentioned above, we use the three-year period 1 January 2018 through 31 December 2020 as our estimation window for the beta of all firms on the peer group.

[28] For example, suppose we calculate the beta of a US firm, whose shares are priced in USD and which earns most of its profits in USD, against an index denominated in Euros. Large changes in USD-EUR exchange rates would reduce the beta. This is because, in Euro terms, the depreciation of the Euro would cause the returns of the US firm to increase, while the Euro-denominated index has not changed. This reduces the covariance between the returns on the index and the return on the US firm, which results in a lower estimate of beta. From the perspective of a Eurozone investor, the lower beta represents the diversification benefits of investing in another currency. However, it would not be correct to then apply this beta for a Eurozone investor investing in a firm in the Eurozone, which does not have the same diversification benefit, or for a US investor investing in a US firm.

[29] The Stoxx Europe 600 (SXXP) and the S&P 500 indices are the most commonly followed stock market indices for the Eurozone and the U.S. They are both broad equity indices considered to be representative of the Eurozone and U.S: stock markets. The Stoxx Europe 600 qualifies as a 'broad Eurozone index for companies operating in the Eurozone' even though it includes countries outside of the Eurozone, namely the UK, Denmark, Norway and Sweden. This is because the economy in these countries is connected tightly to the economy of Eurozone countries. Furthermore, companies traded in the UK, Denmark, Norway and Sweden included in the index earn large portions of their revenues and profits in Euros, so that stock returns for these companies are more correlated to returns in the Eurozone than to their local stock market.

Godfrey test, but rely on the OLS estimate of the beta parameter even in the presence of autocorrelation.[30] We test for the presence of heteroscedasticity using the White's test and use White's-Huber robust standard errors.

In addition to the above diagnostic tools and adjustment procedures, the ACM has asked us to apply a new test for market imperfections. This test requires us to use a weekly beta instead of the daily beta, if it appears that share prices react to news the day before or the day after the market index reacts. This could occur because of differences in market opening times and trading hours, or differences in the liquidity of the firm's shares relative to the average liquidity of the market. If such an effect is present, a beta estimated using daily returns on the firm's share and on the market index may be biased. Similarly, financial market frictions caused by information asymmetries, transaction costs, limit orders, and overreaction to news may also affect the way information is incorporated in the share price. In contrast, weekly betas are less sensitive to the speed at which share prices assimilate information, because they use returns over five trading days.

In practice, the new test is a modified version of the Dimson adjustment applied by the ACM in its previous method decision. The Dimson adjustment regresses a company's daily returns using the market index returns one day before and one day after as additional regressors.[31] If the market is perfectly efficient, all information should be dealt with on the same day. The new test considers that if the lag or the lead coefficient are either significantly different from zero or jointly significantly different from zero, this suggests that information about the true beta may be lost by considering only the simple regression. This problem can be largely resolved using weekly data to estimate the equity beta.

We have performed this test for the firms in our peer group. The test for market imperfections yields positive results for three firms out of the total sample, suggesting that information on systematic risk is contained within the adjacent days. Hence, for these three firms we take the weekly beta. For the remaining firms we take the daily OLS beta. Table 9 shows our results.

30 We test for autocorrelation up to three lags. Note that the OLS estimator of the beta is unbiased (not systematically too high or too low) and consistent (converges to the correct value) even in the presence of autocorrelation.

31 More days of leads and lags can be applied, but in this case we look at only one.

TABLE 9: EQUITY BETAS

		Results		
		Beta	Robust standard error	Beta selected
		[A]	[B]	[C]
Elia Group SA/NV	[1]	0.66	0.10	Daily
Enagas SA	[2]	0.73	0.11	Daily
Red Electrica Corp SA	[3]	0.54	0.10	Daily
REN - Redes Energeticas Nacionais SGPS SA	[4]	0.63	0.10	Weekly
Snam SpA	[5]	0.92	0.13	Daily
Terna Rete Elettrica Nazionale SpA	[6]	0.72	0.09	Weekly
TC Pipelines LP	[7]	0.63	0.18	Weekly

2. Asset Betas and Gearing

As well as reflecting the systematic risk of the underlying business, equity betas also reflect the risk of debt or financial leverage. As debt is added to the company, the equity will become riskier as more cash from profits goes towards paying debt in each year before dividends can be distributed to equity. With more debt, increases or decreases in a firm’s profit will have a larger effect on the value of equity. Hence if two firms engage in exactly the same activity, but one firm has more debt, that firm will have a higher equity beta than the firm with less debt.

To measure the relative risk of the underlying asset on a like-for-like basis it is necessary to ‘unlever’ the betas, imagining that the firm is funded entirely by equity. The resulting beta is referred to as an asset beta or an unlevered beta. To accomplish the un-levering, the methodology specifies the use of the Modigliani and Miller formula.[32]

Consistent with the three-year reference period used to estimate the beta, we calculate the gearing of each comparator as the three-year average of quarterly gearing ratios obtained dividing quarterly net debt over quarterly market capitalization.

Table 10 reports our estimates of the gearing and asset betas for the peer group of companies. Overall, the asset betas range between 0.27 (REN) and 0.57 (Snam), with a median asset beta of 0.39.

32 The specific construction of this equation was suggested by Hamada (1972) and has three underlying assumptions: a constant value of debt; a debt beta of zero; that the tax shield has the same risk as the debt.

TABLE 10: EQUITY AND ASSET BETA

		Equity beta [A]	Gearing (D/E) [B]	Tax rate [C]	Asset beta [D]
Elia Group SA/NV	[1]	0.66	104.8%	29.0%	0.38
Enagas SA	[2]	0.73	79.0%	25.0%	0.46
Red Electrica Corp SA	[3]	0.54	61.0%	25.0%	0.37
REN - Redes Energeticas Nacionais SGPS SA	[4]	0.63	162.4%	21.0%	0.27
Snam SpA	[5]	0.92	82.6%	24.0%	0.57
Terna Rete Elettrica Nazionale SpA	[6]	0.72	74.1%	24.0%	0.46
TC Pipelines LP	[7]	0.63	84.1%	27.0%	0.39
Median	[8]		82.6%		0.39

Notes and sources:
[A]: Brattle calculations on Bloomberg data.
[B]: Brattle calculations on Bloomberg data. Average values from Q1 2018 to Q4 2020.
[C]: KPMG Corporate Tax Rates. Average values from H1 2018 to H2 2020.
[D]: [A]/(1+(1-[C])x[B]).

ACM's methodology requires us to select a gearing by reference to the peer group of companies. However, the gearing should also be consistent with a single A credit rating for an energy network in the Netherlands. In Table 11, below, we show that the rating of the peers has remained stable and generally below the single A rating. Gearing, however, is only one of the metrics considered by rating agencies for making their rating determinations. Dutch Energy Networks benefit from the stability of the Dutch regulatory framework and from the higher rating of the Dutch government debt (AAA) relative to Belgium (AA), Italy (BBB), Portugal (BBB) and Spain (A).[33] Therefore, a Dutch Energy Network with the gearing of the comparator group would likely be able to maintain a single A rating.

As reported in Table 10, the gearing of the peer group of companies ranges between 61.0% (Red Electrica) and 162.4% (REN), with a median gearing level of 82.6%.

[33] In rating the Dutch energy networks Gasunie and TenneT, for example, the rating agency Moody's applies two-notch uplift to the networks' baseline ratings to account for the Dutch government's ownership interest and the strategic importance of the business to national energy policy in the Netherlands. Moody's applies a two-notch uplift also to the baseline ratings of Alliander and Enexis. Importantly, the regulatory environment and the local government rating directly affect the baseline credit ratings. See, *e.g.*, Moody's Investor Service, "TenneT Holding B.V.: Update following 2019 results", May 2020, pp. 1 and 12; "N.V. Nederlandse Gasunie: Update following the publication of Draft Method Decisions", November 2020, pp. 2 and 11; "Alliander N.V.: Update to credit analysis" December 2020, p. 1; and "Enexis Holding N.V.: Update to credit analysis", April 2020, p.1. Government bond ratings are from Bloomberg.

TABLE 11: CURRENT AND HISTORICAL CREDIT RATINGS

		Country	2020	2019	2018
		[A]	[B]	[C]	[D]
Elia Group SA/NV	[1]	Belgium	BBB+	BBB+	BBB+
Enagas SA	[2]	Spain	BBB+	BBB+	BBB+
Red Electrica Corp SA	[3]	Spain	A-	A-	A-
REN - Redes Energeticas Nacionais SGPS SA	[4]	Portugal	BBB	BBB	BBB
Snam SpA	[5]	Italy	BBB+	BBB+	BBB+
Terna Rete Elettrica Nazionale SpA	[6]	Italy	BBB+	BBB+	BBB+
TC Pipelines LP	[7]	United States	BBB	BBB	BBB

Notes:
Bloomberg, S&P LT Local Issuer Rating.

B. Accounting for the Energy Transition

Over the next decades, the use of electricity in the Netherlands is expected to increase substantially, while the use of natural gas will decrease progressively, with a phasing out to be completed by 2050. The ACM has asked us to assess whether this 'energy transition' could affect the cost of capital of the Dutch Energy Networks in ways that the current methodology does not reflect.

In the Gas TSO Report[34] we analysed the impact of the energy transition on the cost of capital of GTS, the Dutch Gas TSO. In that report, we explained that there are broadly two ways that the energy transition could affect the beta of energy networks in the Netherlands and Europe. The two ways generally relate to expected volumes and investments:

- **Volumes**: expected changes in volumes (and particularly expected declines in natural gas volumes) may directly affect the systematic risk faced by energy networks, and hence affect the energy networks' beta.

- **Investments**: significant differences in future investment requirements may create a difference in the asset betas of gas and electricity transmission and distribution networks.

With regards to **volumes**, in the Gas TSO Report we explained that expected changes in demand or volumes are unlikely to affect the beta of either the Dutch Gas TSO or the peers we used to estimate the beta, for a number of reasons. First, both the Dutch Gas TSO and the peers face limited or no volume risk.[35] If gas volumes fall, then tariffs will adjust to compensate. Second, the risk for network assets being stranded is limited, because network assets generally remain in the asset base until they

34 See Gas TSO Report, Section VI (Energy Transition).

35 All of the European peers are subject to revenue cap regulation and, therefore, face very limited volume risk. The US comparator TC Pipelines operates instead under long-term contracts at FERC-approved rates. However, volume risk is limited, because pipelines can file with FERC for a rate revision if revenues no longer provide a reasonable opportunity to recover costs.

are fully depreciated.[36] Third, the gas network will continue to be used because natural gas will be partly substituted by hydro and green gas. Fourth, even if there was a risk of assets being stranded, the risk of asset stranding is not likely to be systematic. Rather, the risk of volume decline and asset stranding is related to policy decisions that are independent of the performance the financial market or the wider economy.[37] In other words, the risk of volume decline and asset stranding has a 'zero beta'.

Similar considerations also apply to the Dutch Energy Networks. Because electricity volumes are expected to increase, the issue of volume risk and asset stranding is only relevant for the Dutch Gas DSOs.

Gas DSOs do not face short-term volume risk, in the sense that they will receive lower revenues if the volume of gas consumed decreases. Rather, Gas DSOs derive most of their revenue from capacity or connection charges. Hence, Gas DSOs potentially face 'capacity' risk if either large number of individual customers or even entire neighborhoods decided to disconnect from the gas network.

While the volume of Gas consumed on the distribution networks may be expected to decline over the next regulatory period,[38] it is unlikely that large numbers of individual customers will decide to disconnect entirely from the distribution networks over the next five years. However, though unlikely, there remains the possibility of large-scale disconnection events, so that part of a gas distribution network may no longer be needed.[39]

Under the current regulation, assets remain in the asset base until they are fully depreciated. The ACM, however, plans to change the regulation in order to take account of the decreasing utilization of the gas networks that will happen in the long run. In particular, the ACM has informed us that it is planning to:

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36 The only exception for the Gas GTO relates to assets that are 'divested', i.e. taken out of the network. The ACM has informed us that in the method decision for the next regulatory period it will change the way it treats divested assets. More specifically, if assets are divested, they will be charged into the tariffs at their efficient cost, whereas the inefficient portion of the historical cost will be stranded. However, if the divested assets are then sold, then 90% of the sale price will be charged to reduce tariffs, compensating users for the efficient cost of the divestment that was charged to tariffs. The other 10% will go to the network operator to provide it with the appropriate incentives to sell at a higher price. In sum, even in the case of asset divestiture, the risk for assets being stranded is limited.

37 The transition to alternative energy sources is likely to lead to a steady decline in the volume of gas consumed. But this is different from a decrease in gas demand due to a downturn in the economy. The first is a long-term trend, while the second is a short-term effect that is related to the wider economy. Similarly, asset stranding, which may result from asset divestitures (see footnote above), is not related to the overall performance of the economy and of financial markets.

38 For example, because homes and boilers continue to become more energy efficient.

39 Large number of disconnections could emerge, for example, if a number of neighborhoods decided to disconnect entirely. However, the ACM has informed us that this is highly unlikely. A number of municipalities have started experimenting with disconnecting households from the gas distribution network, but they are all experiencing problems for two main reasons. First, because private users cannot be forced to leave the gas network. Second, because disconnecting from the gas network requires making a big investment. Individual households may also leave the gas network on their own initiative. Even in this case, however, it takes a rather big investment (in insulation, equipment and upfront costs) to leave the network. Hence, the ACM does not expect that the number of individual households leaving the grid will be large.

1. Front load depreciation, so that DSOs will recover the cost of investments more quickly, thereby reducing the value of assets that will no longer be in use and will be taken out of the asset base.

2. Increase tariffs of the Gas DSOs to recover the remaining value of assets taken out of the asset base.

3. Reimburse the Gas DSOs for the costs of removal of the assets that are no longer in use and no longer part of the asset base.

Taken together, these measures imply that even in the case of asset divestiture, Gas DSOs are likely to be fully compensated. Hence, based on the current expectations for the Gas DSO regulatory regime, we do not see any need to adjust the Gas DSO betas to account for volume risk resulting from the energy transition.

With regards to **investments**, in the Gas TSO Report we explained that the commitment to make large investments may have an effect on the cost of capital – and specifically the firm's beta – similar to that of debt or leverage.[40] When a firm commits to investments that are large relative to the existing assets, the firm's value is more sensitive to changes in market conditions. To understand why, suppose that two regulated firms, A and B, both have a market value of 100 today, based on their current assets or RAB. Further, assume that the two firms face the same systematic risk on the assets, which may result in a gain or loss of 10% of market value. Hence, the value will vary between 90 and 110.

Now suppose that firm B plans to increase its assets by 100. Because the new investments will be remunerated at the firm's cost of capital, the expected value of firm B is also equal to 100. This is because the firm will create additional assets with a value of 100, but needs to spend 100 to create these assets.[41] However, assuming that the investment on the new assets has the same systematic risk of the existing assets, the expected value of the new assets will also vary by plus or minus 10%. That is, the present value of the new assets could be 110, but it could be 90. Thus, the net value of the new assets varies from -10 (in the case that the assets cost 100, but have a value of only 90) and +10 (in the case that the assets cost 100, but have a value of 110). Hence, the value of Firm B now varies between 80 (being 90 for the existing assets and -10 from the new assets) and 120 (being 110 from the existing assets and +10 from the new assets). This is variation of ±20%. The value of firm A, which has no new investments planned, varies from 90 to 110, or ±10%. Hence, the higher investment commitment of firm B increases the volatility of the firm's value.

Financial analysts refer to this issue with the notion of operating leverage. Firms with higher investment requirements – higher operating leverage – will have higher betas. Hence, increased investment requirements for electricity networks could increase their asset beta, relative to historic asset betas. Similarly, estimating the asset beta for Dutch electricity networks based on firms with

40 Note that the relevant question here is not whether the investment risk is systematic or not. Investment risk has a systematic and non-systematic component, and the systematic component of the investment risk is properly measured by the parameter beta. The relevant question is whether the planned investments of electricity and gas networks in the Netherlands may affect their betas differently, and differently from the network operators in the peer group.

41 That is, the present value of the cash flows the assets will generate is equal to the investment needed to realise the assets. Hence, the investment is 'NPV neutral'.

lower investment commitments could result in an underestimate of beta. Conversely, if gas networks will be making relatively few investments, then their asset beta for the next regulatory period may be lower than the betas for past regulatory periods.

In the Gas TSO report, we analysed the relative size of historical and planned investments for GTS and for the peer group of companies used to estimate the beta. We determined that no strong shift in investment behaviour was expected as a result of the energy transition, either for GTS or for the peers, and concluded that at least for the next regulatory period, there was no need to adjust the beta of GTS because of the energy transition.

Over the next few years, however, the Dutch electricity networks are expected to make significant investments to meet the increasing capacity requirements. Electricity DSOs have announced publicly that they need more capital to fund these investments. Enexis, for example, recently issued about € 500 million in green bonds to finance investments in automation, smart meters and grid extensions, and successfully attracted an additional € 500 million financing in the form of subordinated loans from shareholders.[42] Similarly, Liander has recently issued about € 500 million in green bonds,[43] while Stedin is undergoing discussions with shareholders about a large equity capital injection.[44] TenneT has already issued about € 1 billion in hybrid securities, which are deeply subordinated instruments accounted for as equity,[45] and about € 1.35 billion in green bonds,[46] and will require new capital injections exceeding € 5 billion, 50% of which relate to the Dutch TSO.[47]

As we explained in our simplified example above, the key factor to determining the effect on beta is not the absolute level of future investments, but their size relative to the current RAB. Accordingly, to determine whether and to what extent an adjustment to the beta of the Dutch Energy Networks is warranted, we have analysed the size of the investment plans relative to the existing RAB in 2019.

The ACM has provided us with data on the RAB, annual depreciation, annual additions to the RAB from investments and planned capex expenditures for TenneT and for the gas and electricity DSOs. We estimate the future RAB over 2020-2022 (2020-2024 for TenneT) by updating the 2019 RAB to account for (i) planned investments, (ii) depreciation and (iii) indexation to inflation. We calculate depreciation each year over 2020-2024 as equal to the RAB in the previous year times a company specific depreciation factor. We define the company specific depreciation factor as the ratio of 2019 depreciation divided by the 2018 RAB.[48] We update the depreciated RAB from the previous year by applying the expected rate of inflation of 1.77% (see section VII, below). We acknowledge that by

42 See Energeia.nl, "Enexis sluit groene lening af voor uitbreiding en verslimming stroomnet", 11 June 2020, and "Enexis stelt in eerste ronde grootste deel van de lening veilig", 29 July 2020.

43 See Energeia.nl, "Alliander haalt €500 mln op met groene obligaties", 5 June 2020.

44 See Energeia.nl, "Stedin: komende jaren tot €1 mrd aan extra kapitaal nodig", 13 May 2020, and "Aandeelhouders Stedin willen 'onder voorwaarden' financieel bijspringen", 29 September 2020.

45 See TenneT Holding B.V., Integrated Annual Report 2020, pp. 98 and 128 (available at: https://annualreport.tennet.eu/2020/downloads/qSzBp7HNbwVX/TenneT-IAR-2020.pdf) and

46 See Energeia.nl, "Tennet haalt €1,35 mrd op met nieuwe groene obligaties", 18 November 2020.

47 Letter of the Minister of Finance and of the Minister of Economics and Climate to the Parliament of 19 May 2020, 28165, no. 325, p.2. See also, Energiea.nl, "Berlijn zint ineens op overname van Duitse deel Tennet", 3 February 2021.

48 Because TenneT offshore had a RAB of zero in 2018, we calculate its depreciation by applying the depreciation factor of TenneT onshore.

adding planned capital expenditures to the RAB, we are potentially overestimating the expected increase in the RAB. This is because investments are generally added to the RAB when they are put into use, whereas planned capital expenditures reflect the time when the investments are made. On the other hand, however, we are potentially *underestimating* the expected increase in the RAB, because assets that are currently under construction are excluded from this calculation. The issue, however, is only about timing, because the planned capex will eventually be included in the RAB.

In Table 12, below, we report the expected evolution of the RAB for the Dutch Energy Networks. For TenneT and each of the electricity and gas DSOs, Table 12 reports the value of the RAB in 2019, and an estimate of the RAB over the 2020-2022 period (2020-2024 for TenneT onshore and offshore). The table further reports the expected change in RAB and the compound annual growth rate (CAGR) in the RAB over the 2019-2022 period (2019-2024 for TenneT). Table 12 shows that:

- The RAB of TenneT's **onshore** transmission will increase by 77.08% over the 2019-2024 period, representing a compound annual growth rate of 12.11%.

- The RAB of TenneT's **offshore** transmission will increase by 793.98% over the 2019-2024 period, representing a compound annual growth rate of 54.98%.

- The RAB of the Dutch Electricity DSOs will increase by 20.92% on average over the 2019-2024 period, representing a compound annual growth rate of 6.54%.

- The RAB of the Dutch Gas DSOs will increase by 8.78% on average over the 2019-2024 period, representing a compound annual growth rate of 2.84%.

TABLE 12: EXPECTED EVOLUTION OF THE RAB FOR THE DUTCH ENERGY NETWORKS

		End of year RAB							
		2019	2020	2021	2022	2023	2024	Expected change	CAGR
		[A]	[B]	[C]	[D]	[E]	[F]	[G]	[H]
		€ '000	€ '000	€ '000	€ '000	€ '000	€ '000	%	%
TenneT									
TenneT Onshore	[1]	4,376,573	4,882,194	5,670,890	6,510,340	7,179,101	7,750,244	77.08%	12.11%
TenneT Offshore	[2]	439,070	893,719	1,389,731	1,851,983	2,833,162	3,925,199	793.98%	54.98%
Electricity DSOs									
Liander	[3]	4,250,028	4,566,172	4,969,591	5,405,706			27.19%	8.35%
Enexis	[4]	3,646,924	3,770,151	3,972,265	4,134,635			13.37%	4.27%
Stedin	[5]	3,171,673	3,433,842	3,707,619	3,950,498			24.56%	7.59%
Coteq	[6]	53,385	55,842	59,175	62,330			16.75%	5.30%
Rendo	[7]	28,612	32,473	34,586	36,614			27.97%	8.57%
Westland	[8]	244,596	250,264	257,631	266,108			8.80%	2.85%
Enduris	[9]	331,134	357,639	388,437	423,091			27.77%	8.51%
Average E DSOs	[10]	**1,675,193**	**1,780,912**	**1,912,758**	**2,039,855**			**20.92%**	**6.54%**
Gas DSOs									
Liander	[11]	2,014,399	2,076,347	2,123,364	2,164,452			7.45%	2.42%
Enexis	[12]	1,636,295	1,766,344	1,879,870	1,991,882			21.73%	6.77%
Stedin	[13]	1,676,546	1,741,693	1,811,786	1,884,669			12.41%	3.98%
Coteq	[14]	87,139	94,118	97,992	100,690			15.55%	4.94%
Rendo	[15]	133,675	131,852	130,052	128,625			-3.78%	-1.28%
Westland	[16]	114,565	114,017	112,367	110,771			-3.31%	-1.12%
Enduris	[17]	137,188	143,096	147,959	152,796			11.38%	3.66%
Average G DSOs	[18]	**828,544**	**866,781**	**900,484**	**933,412**			**8.78%**	**2.84%**

Notes:
[1][A] to [9][F] and [11][A] to [17][F]: Data provided by ACM.
[10]: Average [3] to [9].
[18]: Average [11] to [17].
[G][1], [G][2]: [F]/[A] -1.
[G][3] to [G][18]: [D]/[A] -1.
[H][1], [H][2]: (1+[G])^1/5 -1.
[H][3] to [H][18]: (1+[G])^1/3 -1.

As the table above suggests, and unlike our conclusion for the Dutch Gas TSO, the investment requirements for TenneT offshore, and to a lesser extent for TenneT onshore and for some of the electricity DSOs are significant.

We have researched other cases where regulators have made allowances for large capital investment programs in the cost of capital. A prominent example comes from the airport sector, with the construction of Heathrow Terminal 5. In 2003, the UK Civil Aviation Authority (CAA) selected a WACC at the top of the range selected to remunerate the BAA's investments in Heathrow Terminal 5 (see box 1).[49] In that circumstance, the CAA found that BAA's investments in Heathrow Terminal 5 would increase Heathrow's RAB by over 70% over the following regulatory period, and that the construction of the new terminal would increase BAA's risks, not only with respect to regulatory and construction risk, but with respect to uncertain demand.

49 Note that the CAA decision made a separate determination on the WACC of each one of the three London airports owned by the BAA – that is, Heathrow, Gatwick and Stanstead. Although the CAA decision is not explicit about the level of the uplift, we understand that the CAA ultimately set a real pre-tax WACC of 7.75%, 51 bps higher than the midpoint estimate presented by the Competition Commission. Economic Regulation of BAA London Airports (Heathrow, Gatwick and Stansted) 2003 – 2008, CAA Decision (February 2003): paragraphs 4.35–4.80.

We adopt a similar approach in this case. Specifically, we look for cases where planned investments are expected to increase the RAB significantly over the next few years. We note that unlike the construction of Heathrow Terminal 5, the Dutch Energy Networks face limited volume risk. In the case of the Dutch Energy Networks it is mainly the increase in operating leverage that may potentially affect the beta. Accordingly, a beta uplift is only warranted in case of an extraordinary increase in the RAB, significantly higher than in the case of Heathrow.

TenneT's offshore transmission business definitely meets this criterion. While there is no exact method to determine the correct size of the required uplift, we find the application of a one standard deviation uplift over the median beta to be appropriate. Such an approach is consistent with regulatory precedent in similar circumstances. We note that the increase in beta in offshore transmission should only be temporary. Once the large capital investment programs are completed, and spending levels are similar to other peer TSOs, then ACM can revert to using the unadjusted median beta.

In contrast, the expected increase in investment levels for TenneT onshore and for the DSOs is not sufficiently high to justify an adjustment to the respective betas. Annual RAB increases between 5% and 10% a year are not out of the ordinary. Furthermore, there is no additional demand risk associated to these investments. Accordingly, we recommend making no adjustment to the beta of TenneT onshore and of the DSOs.

A final consideration relates to gearing. Given the investment requirements for TenneT offshore, and to a lesser extent for TenneT onshore and the electricity DSOs, a reasonable question to ask is whether selecting the median gearing of the peer group is still appropriate. There are two main reasons why the use of the median gearing remains reasonable. *First*, in calculating gearing, regulators are generally free to determine whether they are estimating the WACC of an efficient network, or alternatively whether they want to recognize the actual capital structure and cost of debt of the regulated entity. In this light, ACM's methodology considers the gearing of an efficient network, which is properly estimated through the median gearing of the peer group. An increase in the investment requirements does not directly affect the efficient level of gearing. *Second*, if any new investments are funded with the same mix of debt and equity as the current assets, then the average level of gearing would not change. It is unclear why new investments would be funded only through debt, or with a higher percentage of debt than the existing assets.[50] Therefore, we apply the median asset gearing of the peer group (82.6%, see Table 10) in calculating the WACC of the Dutch Energy Networks.

Box 1: The construction of Heathrow terminal 5

In 2003, the CAA approved a capex plan for 2003-2008 equivalent to over 100% of the opening RAB of Heathrow in 2003. The RAB was expected to grow by over 70%. In that circumstance, the CAA selected a WACC for Heathrow at the "top of the range" because of the size of the investment program. In its cost of capital decision, the CAA argued that:[51]

[50] Above, we reported examples of TenneT and Electricity DSOs relying on both new bond issues and capital injections to finance their required investments.

[51] Economic Regulation of BAA London Airports (Heathrow, Gatwick and Stansted) 2003 – 2008, CAA Decision (February 2003): paragraphs 4.65–4.71.

> *Large investment projects tend to be risky in a number of ways. The scale of Terminal 5 will increase BAA's risks, not only with respect to construction risk but also risks of uncertain demand and risks associated with the Terminal 5 triggers as pointed out by the Competition Commission […].*
>
> *This results in a cost of equity figure above the mid-point of the range as determined by the Competition Commission […].*
>
> *In the view of the CAA a point estimate of 7.75% pre-tax real for Heathrow's cost of capital is appropriate and reasonable. This figure reflects the uncertainty surrounding the cost of equity, and especially the cost of new equity, and the importance of enabling BAA to finance Terminal 5 on a commercial basis given the risks involved.*

The Competition Commission had estimated a mid-point WACC for the British Airport Authority (BAA, the owner of Heathrow and Gatwick at the time) of 7.21% (pre-tax real). The Competition Commission had said:[52]

> *In our view there are four special factors linked to T5 which could affect BAA's cost of capital of which account needs to be taken:*
>
> *(a) Our proposals for the price control include a trigger mechanism under which the level of permitted airport charges will increase only when the specified construction landmarks have been met. Were delays in construction to occur, some of which might be outwith the control of BAA, the company would suffer a significant financial penalty. This represents a definite increase in the risks faced by BAA.*
>
> *(b) In a competitive market companies will tend to delay capital projects and only embark on them at the latest possible moment, as the option to discontinue a project has a value to the company. It is arguable that, in keeping with its responsibilities as a regulated company, BAA is undertaking construction of T5 earlier than might otherwise have been the case and in doing so is giving up its option on timing; something for which it should be compensated.*
>
> *(c) The increase in borrowing to fund the construction of T5 is expected to increase BAA's gearing from [ ] per cent to more than [ ] per cent by the end of Q4. The increase in gearing will have an effect both through an increase in the debt premium through the perceived greater risk of default, and an increase in the equity beta reflecting the greater risks to equity shareholders. In particular, any major adverse change in the financial circumstances of BAA could lead to the requirement for a rights issue by the company. At present the possibility of a rights issue is implicitly being regarded as a contingency against either another major event such as 11 September or the need to raise funds should the SERAS study lead to construction of one or more new runways at BAA's London airports. A rights issue would represent a definite cost to the BAA, including the possible cost of an adverse change in market sentiment, and the fact that T5 increases BAA's exposure to one in Q4 needs to be recognized.*
>
> *(d) In the course of the construction of T5 the scope for BAA to outperform the price control set for Q4 is limited, but there is real scope for the expectations incorporated in the price control not to be met and for BAA thereby to be financially disadvantaged.*

[52] BAA plc: a report on the economic regulation of the London airports companies (Heathrow Airport Ltd, Gatwick Airport Ltd and Stansted Airport Ltd), Competition Commission (November 2002), Chapter 4, paragraphs 4.70–4.72.

> *[…] In our view the[se] factors […] can best be recognized by way of a further T5-related uplift to the WACC […]*
>
> *We consider that a WACC of 7.75 per cent should be sufficient to enable BAA to raise the finance needed for T5, to compensate the company for the loss of its real option on the T5 project and to recognize the increased risk to the company as a whole.*

C. Conclusions on Beta and Gearing

Based on the considerations above, we select the median asset beta (0.39) and gearing (82.6%, see Table 10) of the peer group to calculate the WACC of TenneT Onshore and of the gas and electricity TSOs. We further apply an uplift of 0.09, equal to the standard deviation of the estimated asset betas, to the asset beta of TenneT Offshore, resulting in an asset beta of 0.48 including the uplift.

TABLE 13: ASSET BETAS

		Asset beta [A]
Elia Group SA/NV	[1]	0.38
Enagas SA	[2]	0.46
Red Electrica Corp SA	[3]	0.37
REN - Redes Energeticas Nacionais SGPS SA	[4]	0.27
Snam SpA	[5]	0.57
Terna Rete Elettrica Nazionale SpA	[6]	0.46
TC Pipelines LP	[7]	0.39
Median	[8]	0.39
Average	[9]	0.41
Standard Deviation	[10]	0.09
Median + 1 Standard Deviation	[11]	0.48

Notes and sources:
[A][1] to [7]: See Table 10.

VI. Cost of Debt

ACM's methodology for calculating the cost of debt in the energy sector makes a distinction between existing capital and new capital.

With respect to the existing capital, the methodology requires to calculate an "embedded" cost of debt based on the 'staircase model'. The staircase model assumes that network operators finance their existing investment with ten-year loans, and refinance 10% of their invested capital every year.

Accordingly, the model calculates the embedded cost of debt of a hypothetical loan portfolio, 10% of which was issued in every one of the past 10 years. We find this method reasonable, because it recognises that the Dutch Energy Networks finance existing infrastructure with a mix of legacy debt and more recently issued debt, and that the cost of the debt varies over time.

While the cost of debt will always be based on an average of 10-years, the methodology will apply different numbers of 'historical' years and 'future' years, depending on when the WACC will apply. For example, we calculate the cost of debt for the 2022 WACC based on eight historical years (2013-2020) and two future years (2021-2022). We calculate the cost of debt for the 2026 WACC based on four historical years (2017-2020) and six future years (2021-2026).

For historical years, the methodology takes the average daily yield to maturity of comparable debt in any given calendar year. For future years, the methodology takes the average daily yield to maturity of comparable debt over the three years prior to the measurement date.

With respect to new capital, the methodology requires to calculate the cost of debt based on the forward looking estimate of the cost of debt, thus taking the average daily yield to maturity of comparable debt over the three years prior to the measurement date. Again, this recognises that new capital will be financed with newly issued debt, and that recent debt yields are likely to be a good estimate of future debt costs.

As a measure of comparable debt, we have considered the yield on a utility index of 10-year bonds with a rating of A.[53] A rating of A is consistent with the credit rating of Dutch TSOs and DSOs.[54]

In Table 14, below, we summarise our calculation for Dutch Energy Networks. For each year between 2013 and 2020, the table reports the average annual yield on the utility index. The Table further reports the average yield for historical and future years for the 2022-2026 WACCs (rows [9] and [10]). Overall, for existing capital we estimate a debt yield between 1.48% for 2021 and 0.89% for 2026. For new capital, we estimate a debt yield of 0.85%.

[53] Specifically, we use the 'BFV EUR Utility (A) 10 Year Index' (C58310Y).

[54] As of December 2020, the credit rating of Dutch Network companies was between A- and AA based on S&P's rating scale. More specifically, according Moody's outlook for regulated networks, Gasunie, TenneT, Alliander and Enexis had a credit rating of A1 (equivalent to A+), A3 (equivalent to A-), Aa2 (equivalent to AA) and Aa3 (equivalent to AA-), respectively.

TABLE 14: SUMMARY OF YIELDS ON COMPARABLE DEBT

		Utility Index Yields (A)					
Year ending 31 December		2021	2022	2023	2024	2025	2026
2012	[1]	3.09%					
2013	[2]	2.70%	2.70%				
2014	[3]	2.03%	2.03%	2.03%			
2015	[4]	1.38%	1.38%	1.38%	1.38%		
2016	[5]	1.00%	1.00%	1.00%	1.00%	1.00%	
2017	[6]	1.19%	1.19%	1.19%	1.19%	1.19%	1.19%
2018	[7]	1.36%	1.36%	1.36%	1.36%	1.36%	1.36%
2019	[8]	0.72%	0.72%	0.72%	0.72%	0.72%	0.72%
2020	[9]	0.49%	0.49%	0.49%	0.49%	0.49%	0.49%
Hisotrical Years' Average	[10] Average([1]-[9])	1.55%	1.36%	1.17%	1.02%	0.95%	0.94%
January 2018-December 2020 Average	[11] Average([7]-[9])	0.85%	0.85%	0.85%	0.85%	0.85%	0.85%
Share of loans							
Historical	[12] Share of historical years	90%	80%	70%	60%	50%	40%
New (estimated)	[13] Share of future years	10%	20%	30%	40%	50%	60%
Total	[14] [12]+[13]	100%	100%	100%	100%	100%	100%
Debt Yields for Existing Capital	[15] [10]x[12]+[11]x[13]	1.48%	1.26%	1.07%	0.95%	0.90%	0.89%
Debt Yields for New Capital	[16] Equal to [11]	0.85%	0.85%	0.85%	0.85%	0.85%	0.85%

Notes:
Brattle calculations on Bloomberg data.

Acknowledging that TenneT offshore was only recognized as a TSO in 2016, the ACM has asked us to calculate the cost of debt on existing capital for TenneT offshore using only five 'steps' of the staircase in calculating the cost of debt of existing capital in 2022-2026. This is because TenneT offshore only started investing in 2016, so there are no steps 'expiring' in 2022-2025 in need of replacement. Only in 2026, will the 2016 financing need replacement. For the cost of debt of existing capital in 2026, we use the forecast year 2021 as the fifth step, thus taking the average daily yield to maturity of comparable debt over the three-year period January 2018-December 2020. Table 15 summarises our calculation for TenneT offshore.

TABLE 15: SUMMARY OF YIELDS ON COMPARABLE DEBT, TENNET OFFSHORE

		Utility Index Yields (A)				
Year ending 31 December		2022 [A]	2023 [B]	2024 [C]	2025 [D]	2026 [E]
2016	[1]	1.00%	1.00%	1.00%	1.00%	
2017	[2]	1.19%	1.19%	1.19%	1.19%	1.19%
2018	[3]	1.36%	1.36%	1.36%	1.36%	1.36%
2019	[4]	0.72%	0.72%	0.72%	0.72%	0.72%
2020	[5]	0.49%	0.49%	0.49%	0.49%	0.49%
January 2018-December 2020 Average	[6] Average([3]-[5])	0.85%	0.85%	0.85%	0.85%	0.85%
Debt yield for existing capital	[7]	0.95%	0.95%	0.95%	0.95%	0.92%
Debt Yields for New Capital	[8] Equal to [6]	0.85%	0.85%	0.85%	0.85%	0.85%

Notes:
Brattle calculations on Bloomberg data.
[7][A]-[D]: Average([1]-[5])
[7][E]: Average([2]-[6])

ACM's methodology calculates the cost of debt by adding 15 basis points to the yield on comparable debt to account for the cost of issuing debt. This results in a cost of debt for existing capital ranging between 1.63% in 2021 and 1.04% in 2026 for Dutch Energy Networks, and between 1.10% in 2022 and 1.07% in 2026 for TenneT Offshore. The cost of debt for new capital is equal to 1.00% for both the Dutch Energy Networks and TenneT Offshore.

TABLE 16: PRE-TAX COST OF DEBT

				Existing Capital					
			New Capital	2021	2022	2023	2024	2025	2026
TenneT Onshore and Gas & Electricity DSOs									
Debt Yield	[1]	Table 14	0.85%	1.48%	1.26%	1.07%	0.95%	0.90%	0.89%
Non-interest fees	[2]	Assumed	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%	0.15%
Cost of debt	[3]	[1]+[2]	1.00%	1.63%	1.41%	1.22%	1.10%	1.05%	1.04%
TenneT Offshore									
Debt Yield	[4]	Table 15	0.85%		0.95%	0.95%	0.95%	0.95%	0.92%
Non-interest fees	[5]	Assumed	0.15%		0.15%	0.15%	0.15%	0.15%	0.15%
Cost of debt	[6]	[4]+[5]	1.00%		1.10%	1.10%	1.10%	1.10%	1.07%

VII. Tax and Inflation

The ACM requires to estimate the WACC of the Dutch Energy Networks in nominal pre-tax terms. We understand that in September 2020 the Dutch Government has announced it will no longer change the current corporate tax rate of 25.0% in 2021. Accordingly, we use 25.0% as the applicable tax rate for 2021 and for the next regulatory period, January 2022-December 2026.

The ACM has also asked us to calculate a real WACC. Accordingly, we convert the estimated nominal WACC to a real WACC using an estimate of inflation for the Netherlands.

ACM's methodology for inflation requires to calculate inflation as the average between historic and forecast rates of inflation in the Netherlands.

- As a measure of historical inflation, the methodology requires to calculate the three year average inflation as measured by the CPI in the Netherlands. Over the three-year period January 2018 - December 2020, average CPI inflation in the Netherlands was 1.94%.

- As a measure of forecast inflation, we need inflation forecasts for 2021 and for each year of the regulatory period 2022-2026. We use forecast CPI inflation in the Netherlands produced by the Dutch Economic Planning Bureau for 2021-2025, and forecast inflation in 2026 equal to 2025.

Based on this methodology, we arrive at an estimate of inflation of 1.67% for 2021 and 1.77% for 2022-2026. Our estimate of inflation is constant throughout the regulatory period because CPI inflation in the Netherlands forecast by the Dutch Economic Planning Bureau for the period 2022-2025 is constant. Table 17 summarises.

TABLE 17: INFLATION

Historical CPI inflation, January 2018 - December 2020	[1]	See note	1.94%
Forecast Inflation 2021	[2]	See note	1.40%
Forecast Inflation 2022-2026	[3]	See note	1.60%
Inflation estimate for 2021	[4]	([1]+[2])/2	1.67%
Inflation estimate for 2022-2026	[5]	([1]+[3])/2	1.77%

Notes:
[1]: Average compound inflation between January 2018 and December 2020 from De Nederlandsche Bank.
[2],[3]: Dutch Central Planning Bureau (CPB), Forecast CPI inflation for 2021-2025 (Novemberraming: Economische vooruitzichten 2021, dated November 2020). Inflation in 2026 is assumed equal to 2025.