

Comparison of Brattle vs PwC regulated WACC heat sector

9 September 2022

Final report





Energie Nederland
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9 September 2022

Subject: Comparison of Brattle vs PwC regulated WACC heat sector

Dear [REDACTED],

We are pleased to send you our memo that we have compiled concerning the comparison of the Brattle and PwC calculated regulatory return for the Dutch heat sector.

We refer to the agreed award decision and commission called 'Return and regulation of heat companies' of 20 April 2022. We do not accept any liability (also not for negligence) to any party other than you or for any other use of this report than that for which it is intended. We refer to the applicable disclaimers at the end of this document.

Kind regards,

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1. Introduction

1.1 Background

Sector association Energie-Nederland asked PricewaterhouseCoopers Advisory N.V. (“PwC”, “we” or “us”) to calculate a reasonable return for collective heat. Determining a reasonable return for collective heat companies is particularly relevant because these returns are monitored by the ACM (Heat Act, article 7).

PwC issued a final report called ‘A reasonable return on collective heat’ dated 20 June 2022 to Energie-Nederland (hereinafter: the “Report”). This Report has been shared with ACM. The Report addressed the following two main research questions:

- What are the inherent characteristics of the heat sector and what are its implications for regulation and return?
- What is a ‘reasonable return’ for heat companies and how does this differ depending on the characteristics?

In our Report, we have determined our reasonable return (“WACC”) assuming that the current regulation will remain in place, i.e. our conclusions were not necessarily valid for any future regulations. We understand that the current regulation is being reassessed.

ACM has engaged the Brattle Group (“Brattle”) to provide an opinion on the WACC for the heat sector and rental for the historic period 2018-2022 and the forward-looking period 2023-2025 and the WACC for rental of heat exchangers for the period 2023-2025. Brattle issued a draft report called ‘The WACC for Heating Companies and Heat Exchangers in the Netherlands’ dated 19 July 2022 in which the preliminary results are shown.

Our WACC differs from the results by Brattle and therefore Energie-Nederland has requested PwC to prepare a high-level comparison and provide our views on of the key differences. This memo (hereinafter: the “Memo”) is prepared for benefit of Energie-Nederland in order for them to prepare a reaction during the consultation phase.

It should be noted that our Report has only focused on the WACC for the heat sector and not on the WACC for rental of heat exchangers. Hence, our Memo and Report do not provide any view on the WACC for the rental of heat exchangers.

1.2 Important Notice

In April 2022, PricewaterhouseCoopers Advisory N.V., operating under the name Strategy& (hereinafter: ‘PwC’, ‘we’ or ‘us’), was requested by Energie-Nederland (hereinafter: ‘Client’) to perform an engagement in accordance with the letter of engagement signed on 20 April 2022.

At the client's request, PwC prepared a public report called “‘A reasonable return on collective heat’, which is dated 20-6-2022 (hereinafter: the ‘Report’). In addition, at the client's request, PwC prepared a public memo called ‘Comparison of Brattle vs PwC regulated WACC heat sector’, which is dated 03-08-2022 (hereinafter: the ‘Memo’).

This Report and Memo were compiled to enable a proper discussion about a reasonable return in the collective heat sector, in the light of the authority assigned to the ACM to intervene in the event of unreasonable returns. The Report and Memo has thus not been prepared for, and is not suitable for, other policy issues within the heat and/or energy sector. The Report and Memo can only be shared externally after receiving consent from the client, namely Energie-Nederland.

When compiling the Report and Memo, PwC based itself (partly) on documents and information that PwC received from various parties (including the client): ‘third party information’. PwC used the third-party information under the assumption that this information is correct, complete and not misleading. PwC did not verify or determine the reliability of the third-party information. PwC did not perform an audit on the third-party

information, nor did it evaluate completeness and accuracy in accordance with international audit or review standards. PwC makes no explicit or implicit statement or guarantee concerning the accuracy or completeness of the third-party information or the related references in the Report and Memo.

The scope, context and limitations of the work done by PwC are explained in the Report. The Report was prepared for the exclusive use of the Client and solely for the purpose stated in the Report. No other parties than the Client are authorised to use or rely on the Report. PwC accepts no responsibility, duty of care or liability in relation to (information contained in) the Report – whether in contract, tort (including negligence) or otherwise, to any other party than the Client.

The Report and Memo, and any dispute arising from or relating to (the content of) the report shall be governed exclusively by Dutch law.

2. Comparison regulated WACC heat sector Brattle and PwC

2.1 Summary of key differences

The table below lists the summary overview of the WACC as derived by Brattle and PwC and a summary of the key differences.

WACC Calculation As per 1 May 2022

Item	Symbol / Formula		PwC 2022	Brattle 2022
Risk-free rate (20 years)	Rf	a	1.1%	0.0%
Risk-free rate (20 years)	$Rf = Rf + CRP + ID$	$d = a + b + c$	1.1%	0.0%
Debt risk premium	$DRP = Rd - Rf$	e	1.6%	2.9%
Pre-tax cost of debt	$Rd \text{ pre-tax} = Rf + DRP$	$f = e + d$	2.7%	2.9%
Taxes	T	g	25.8%	25.0%
Post-tax cost of debt	$Rd \text{ post-tax} = Rd \text{ pre-tax} * (1 - T)$	$h = f * (1 - g)$	2.0%	2.2%
Unlevered beta	B unlevered		0.52	0.54
Relevered beta	B relevered	i	1.04	0.81
Equity market risk premium	EMRP	j	6.5%	5.0%
Cost of equity	$Re = Rf + B \text{ relevered} * EMRP$	$l = d + i * j + k$	7.8%	4.1%
Pre-IFRS 16				
Total debt-to-equity ratio	D / E		100.0%	66.8%
Total debt-to-total capital ratio	$D / (D + E)$		50.0%	40.0%
Total equity-to-total capital ratio	$E / (D + E)$		50.0%	60.0%
Weighted cost of debt	$WCoD = Rd * (D / \text{total capital})$	r	1.0%	0.9%
Weighted cost of equity	$WCoE = Re * (E / \text{total capital})$	s	3.9%	2.4%
WACC (post-tax)	$WACC = WCoD + WCoE$	$u = r + s + t$	4.9%	3.3%
WACC (pre-tax)	$WACC = WCoD + WCoE$		6.6%	4.4%
Asymmetric regulatory risk premium (post tax)			2.0%	0.0%
Sector WACC average (post-tax)			7.0%	3.3%
Bandwidth based on project risk (post tax)			-2% / 2%	
Asymmetric regulatory risk premium (pre tax)			2.7%	0.0%
Sector WACC average (pre-tax)			9.3%	4.4%
Bandwidth based on project risk (pre tax)				

Please note that ultimately the relevant WACC percentage applied is the so called pre-tax WACC. However, given that this is derived from the observable post-tax WACC and in calculating the pre-tax WACC Brattle and PwC use approximately the same tax percentage and methodology, our focus below is on comparing the

nominal post-tax WACC. Please note that Brattle used the 25% tax rate, which is slightly different from the statutory tax rate in the Netherlands (25.8%).

The key differences between the Brattle and PwC approach are as follows:

- **Risk free rate:** Brattle uses a three-year historical risk-free rate based on 20-year German and Dutch government bonds. This is consistent with the ACM approach which it has used also in the regulation for regional and national grid operators (e.g. refer to 'Methodebesluit regional netbeheer elektriciteit'). Our WACC has been based on the spot-rate for the risk free rate as per 1 May 2022 for 20-year German government bonds (Bloomberg ticker: B1577). This is consistent with our approach on the Equity Market Risk Premium (see below), which also takes a view as per 1 May 2022 based on available market information at that point in time.
- **Equity Market Risk Premium ("EMRP"):** Brattle uses an EMRP based on historical averages without downward adjustments by using data from Eurozone markets from 1900 till 2019. Again, this approach has been adopted by ACM also in other regulatory decisions (such as the grid companies). The PwC approach is based on the implied (forward-looking) EMRP as per 1 May 2022 and determined based on the Internal Rate of Return of the European stock market by using a forecast of dividend / buybacks of multiple European indices (plus terminal value) and the indices values as per valuation date.
- **Beta:** Brattle has arrived at an asset beta of 0.54. This is based on the (unweighted) average of four different industry beta's (Grid companies, Telecom, Renewables and Integrated Utilities) and based on three year daily historical data points. In unlevering and relevering the beta Brattle takes into account taxes. Our asset beta of 0.52 takes in general the same industries but is based on two year weekly and five year monthly datapoints. Moreover, we use the Harris-Pringle method for unlevering / relevering the beta (excluding taxes). In addition, we have weighted various industries differently based on their similarities with the heat sector. Due to the different methodology in unlevering / relevering, the unlevered beta arrived at – while looking similar at first sight - cannot be directly compared to the Brattle approach. Below we explain the differences in further detail and the impact thereof.
- **Cost of debt and gearing ratio:** Brattle has used the actual cost of debt and gearing ratio based on data provided by ACM. This is in line with the CBB ruling. Brattle calculated this cost of debt over the period 2017 – 2021. As we did not have access to the actual cost of borrowing and gearing ratios, our approach was based on BBB rated bonds (being the average of the peer group) and the average gearing was also determined on peer companies. As the approach by Brattle is more consistent with the CBB ruling, we agree that using this data is more appropriate. Below we have sensitized our results for this.
- **Additional risk premiums:** Brattle has not included any additional risk premiums in their WACC. We have included additional risk premiums for (1) asymmetric risk in regulation and (2) company/project specific risks. Brattle has not taken a view on the first risk premium and we understand that this is currently still under examination by ACM. On the second risk premium they have indicated that this risk requires no further adjustment to their WACC in their view.

In the below paragraphs, items one, two, three and five are being discussed in more detail. Given that the risk-free rate and EMRP in our view are to a certain extent interlinked, we discuss these together in section 2.2. We do not further discuss the cost of debt and gearing ratio, given that we in principle agree to the use of actual data as this is more consistent with the CBB ruling. As such, we recalculated our WACCs in chapter 4 based on these actual datapoints.

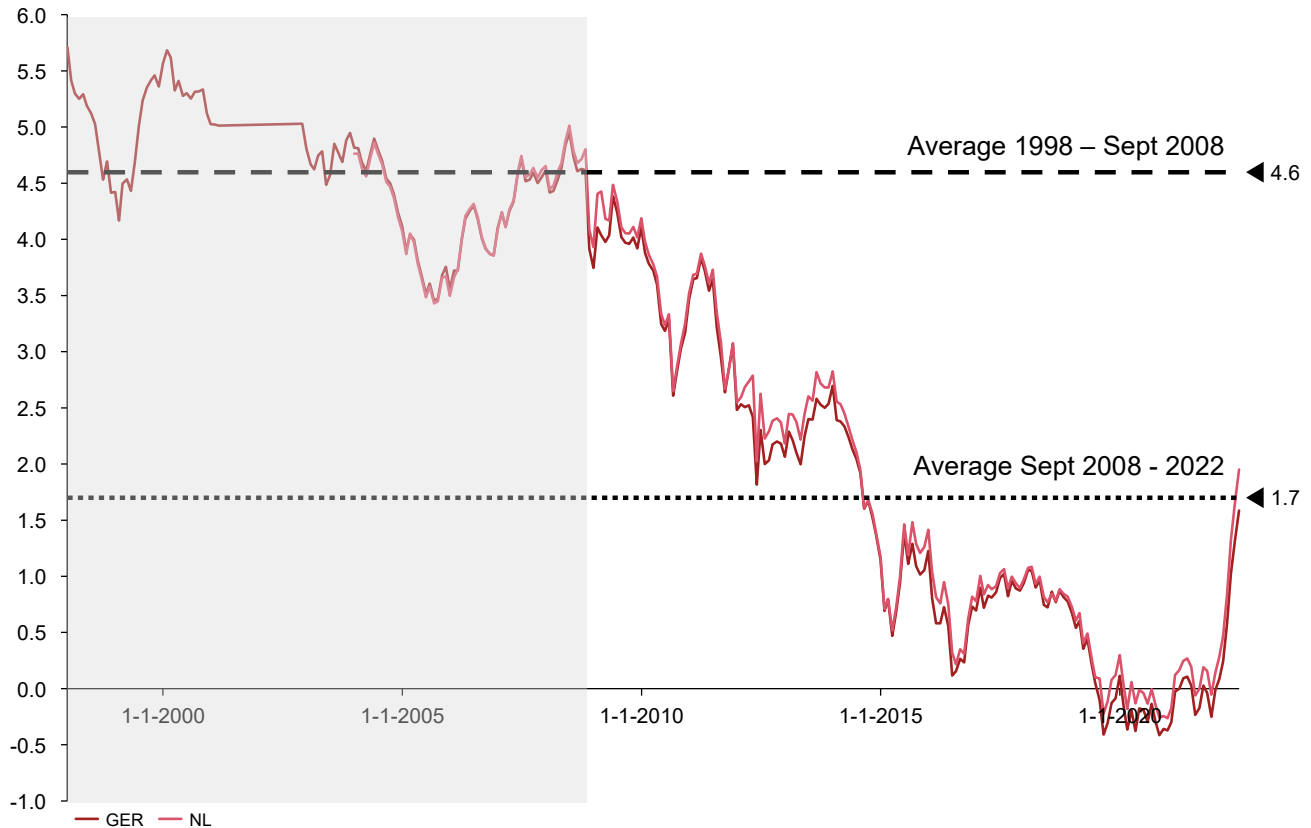
2.2 Risk free rate and EMRP

The EMRP and the and the risk-free rate are interlinked to a certain extent since the EMRP is the excess return that investors require for investing in equity securities over and above the risk free rate. Hence, if there would be an equity market return which is rather stable over time, then in a low interest rate environment the EMRP would be higher and vice versa. As a result, we discuss both the EMRP and risk-free rate together in this section.

Since the financial crisis started around September 2008 with the collapse of Lehman Brothers, risk free rates in the Eurozone have been decreasing to all time low levels compared to historical figures. This is illustrated by the chart below which shows the data on Dutch and German 20-year government bonds since 1998. For the Eurozone these rates are usually considered risk free, given that both governments have an AAA rating. The

average over the period 1998 – September 2008 equals 4.6%, whereas the average over the period September 2008 – 2022 equals 1.7%. In particular during recent years, governments of both Netherlands and Germany faced low and even negative interest rates, whereas since the start of this year interest rates have been rising again rapidly.

Figure 1 Yield on 20 year Dutch and German government bonds, 1998 - 2022



(source: PwC analysis)

The low interest rate environment poses challenges to valuation professionals and regulators in setting the WACC. They have to address the question whether historical excess returns for equity (the EMRP), can be used in setting expected cost of equity returns or whether implied (future looking) EMRPs need to be used. This question is relevant since the historical excess returns might not be reflective of the low interest rate environment. As an alternative to the historical EMRP, one can use the forward looking or implied EMRP based on current stock prices, expected dividends and interest rates. Another method that practitioners sometimes apply is to use historical average (normalized) risk-free rates based on a longer period of time rather than using a current or implied EMRP.

Brattle has adopted a historical (1900-2019) EMRP in combination with an average risk-free rate measured over the period of three years proxied by German 20 year government bonds. Over the three-year period ending on 31 May 2022, yields were 0.13% on average in the Netherlands, and minus 0.05% on average in Germany according to Brattle. As can be seen from the graph this is measured over an all-time low level. The average between the two (+0.02%) has been applied in the calculation by Brattle in combination with an EMRP of 5%, which it has derived from a study performed by Dimson Marsh and Staunton (2022). This study is based on historical data between 1900 and 2021 for Eurozone countries and therefore picks up most of the historical data from prior to September 2008, which could be considered less relevant for the current economic environment and historically low interest rates. The method applied by Brattle is consistent with the approach taken for ACM's earlier regulatory decisions (e.g. grid companies) in the Netherlands by ACM. The combination

of the risk-free rate and EMRP applied by Brattle implies a total equity return of 5.0% for the market as a whole (i.e. assuming a market beta of 1)¹.

In the PwC approach, we have – until the start of the financial crisis in 2008 - also relied on the historical EMRPs. However, our current approach is to adopt a spot-rate for the risk-free rate in combination with a forward looking EMRP which considers available market information as per the same date. We have determined the risk-free rate based on based on the spot rate for 20-year German government bonds as per 1 May 2022 (Bloomberg ticker: BI577). We consider this a more sound approach in the current interest rate environment. Our risk-free rate was determined at 1.1% and our EMRP was determined at 6.5% by reference to implied equity returns at the same date. This is higher than the data that Brattle has used and implies a 7.6%² return on equity in Eurozone countries for the stock market as a whole.

Below we provide two main arguments why we consider our approach and outcomes to be reasonable and why Brattle’s overall equity market return of around 5% is too low in historical perspective:

- **Historical real returns on equity (excluding inflation) have been consistent around 6-7%**

Based on studies performed by McKinsey³ the real return on equity (excluding inflation) has been remarkably constant around 7% for US stocks. This study is based on S&P500 data over a period of 1962 to 2018, refer to below chart. McKinsey have found that historical returns are significantly influenced by inflation levels. Using similar estimation techniques McKinsey found a real return of 6% for UK based companies using data since the 1920s. We have no indication to believe that the return on equity for Eurozone countries would be significantly below or above the US / UK and therefore adding a long-term inflation target for Eurozone of 1.5% - 2% would provide an expected nominal equity return of 7.5% - 9%. In addition, the chart below shows that the real expected return has remained similar after September 2008, despite decreasing interest rates both in US, Europe and UK. Our market return estimated as per 1 May 2022 of 7.6% is within but at the lower end of that range, whilst the market return estimated by Brattle is clearly below that range.

Figure 2 S&P 500 real and nominal expected returns, 1962 - 2018



(source: McKinsey 2020)

- **Forward looking EMRPs have been consistently higher over the last 10 years than the historical EMRP used by Brattle**

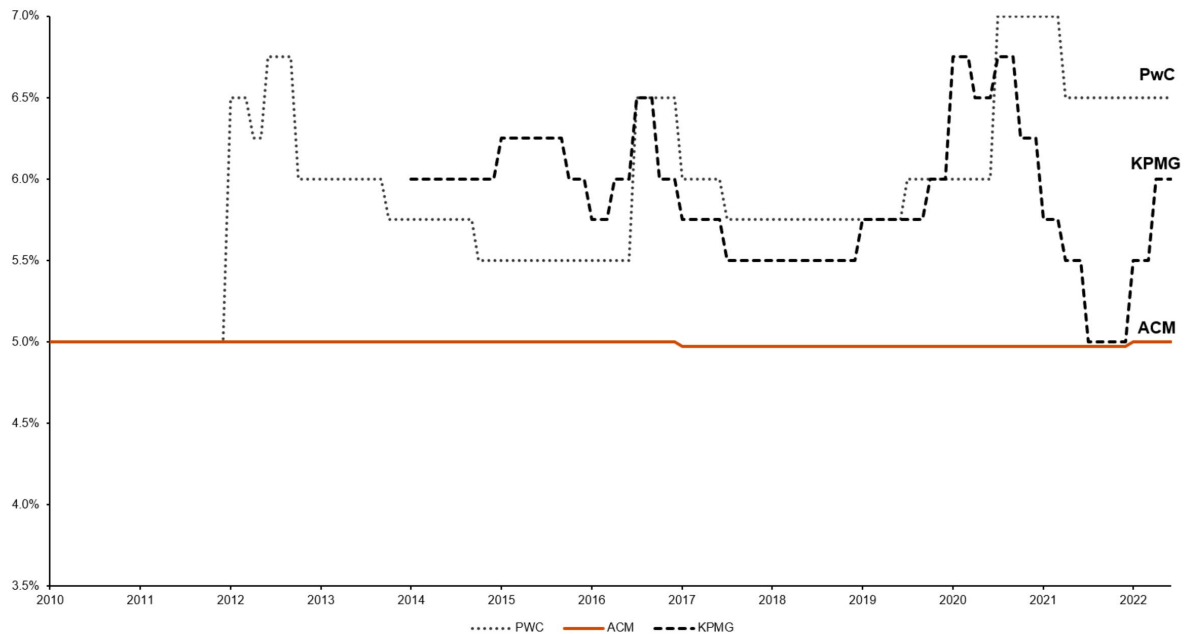
¹ CoE (market) Brattle = $R_f + \text{Beta} \times \text{EMRP} = 0.02\% + 1 \times 5\% = 5.02\%$

² CoE (market) PwC = $R_f + \text{Beta} \times \text{EMRP} = 1.1\% + 1 \times 6.5\% = 7.6\%$

³ Refer to Koller, Goedhardt and Wessels (2020), Measuring and managing the valuation of companies, 7th edition, p326

Both KPMG and PwC have assessed the implied EMRP over the last ten years or so. In the below chart the implied EMRP (excess return over risk-free rate) is presented for Brattle, KPMG and PwC over the period 2010 – 2022 based on available data⁴. The conclusion can be derived from this chart that the ACM EMRP derived from historical numbers is consistently lower than the KPMG and PwC implied EMRPs calculated over the last decade. In Q1 2022 KPMG derived an EMRP of 5.5%, whereas PwC derived an EMRP of 6.5%. However, KPMG recently published their updated EMRP as per Q2 2022, which is 6.0% and therefore closer to the PwC point estimate as per 1 May 2022 and significantly above the ACM historically derived EMRP of 5%.

Figure 3 EMRP applied by KPMG, PwC and ACM, 2010 – 2022



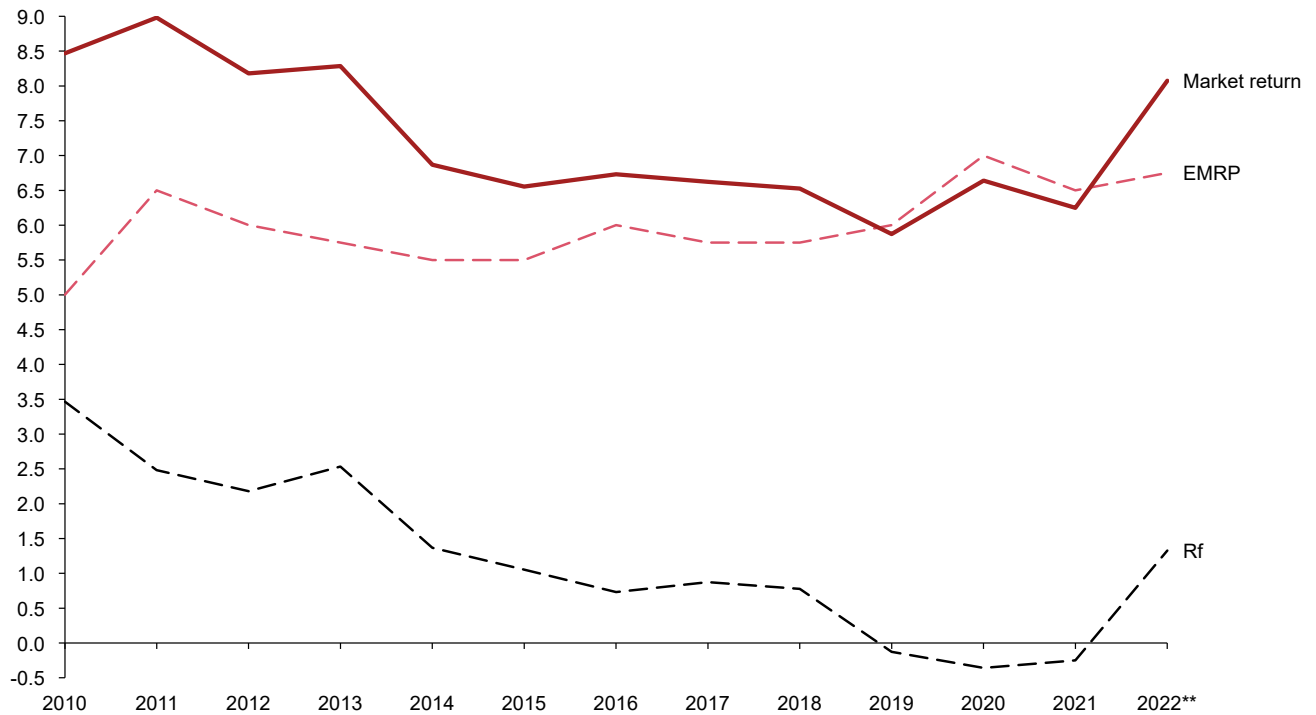
(source: PwC analysis, KPMG and ACM)

- PwC forward looking EMRP in combination with risk free rate has been relatively consistent with findings of McKinsey over last decade**

In the below chart, we present our implied market return for equity (based on the sum of the risk-free rate and implied EMRP at the time). Our market return has been consistently between 6.5% and 9.0% since the last decade, despite risk free rates decreasing over time. This is largely consistent with the findings by Mckinsey as shown above which indicates a nominal equity return of 7.5% - 9%.

⁴ The KPMG EMRP is only available from 2014 onwards, refer to: <https://indialogue.io/clients/reports/public/5d9da61986db2894649a7ef2/5d9da63386db2894649a7ef5>

Figure 4 EMRP and risk free rate applied by PwC, 2010 - 2022



In the above analysis we have shown that the combination of the EMRP and risk-free rate used by Brattle is too low in historical perspective as the implied market return of 5.0% as calculated by Brattle for the market as a whole (assuming a beta of 1), is considered unsupported by the McKinsey study which points to a range of 7.5% - 9.0%. In addition, the periodically updated research performed by both KMPG and PwC points out that the implied market return has been structurally higher over the last decade than the historical equity risk premiums which has formed the basis for the conclusions by Brattle.. Whilst valuation theory does not necessarily provide a clear preference for the use of either method, we consider the use of implied EMRPs more sound in the current low interest rate environment and this leads to an overall market return which is supported by the historical analysis of McKinsey. Hence, we did not consider updating our approach for the views expressed by Brattle.

2.3 Beta

As mentioned in chapter 2.1, the differences in the beta arise from the following differences in methodology:

- Difference in methodology for the determination of the beta;
- Difference in methodology in unlevering and relevering the beta with respect to the treatment of taxes;
- Different industry weights used for the weighted beta; and
- Difference in peer group.

As a result of the differences in methodology with respect to the unlevering and relevering of the beta, it is difficult to compare the asset betas arrived at by Brattle and PwC. This is shown in the below illustrative example. The asset beta is unlevered / relevered including taxes in the “Brattle” methodology. In the “PwC” methodology no taxes are included in unlevering / relevering the beta. This leads to a lower asset beta (unlevered beta), even though the equity beta used as a starting point is the same and the relevered beta is also the same.

Impact analysis derivation of unlevered beta based on different methodologies

Methodology	Equity Beta	D/E	Tax rate	Unlevered	Relevering	Relevered
				beta	D/E	beta
Brattle	1.00	67%	25.00%	0.67	67%	1.00
PwC	1.00	67%	0.00%	0.60	67%	1.00

Due to the lack of comparability between the unlevered betas as a result of the different treatment of taxes, we mainly focus on comparing the initially arrived equity (or observed) beta as well as the capital structure because the equity betas beta should be comparable as shown by the above graph. We will also focus mainly on differences in outcome at first, rather than discussing in detail the peer group used and different estimation techniques.

In arriving at the beta, Brattle uses a different regression period compared to the PwC methodology. Brattle / ACM use a daily 3-year regression whereas we take the average of beta based on 5-year monthly and 2-year weekly data. This results in the following equity beta comparison by peer group used.

Equity Beta comparison

Sector	PwC	Brattle	Difference
Grid operators	0.57	0.68	(0.11)
Telecom	0.87	0.77	0.10
Integrated Utilities	0.85	0.73	0.12
Renewables	0.81	0.96	(0.15)

The table above displays the differences in equity betas per sector. There is some difference in the betas observed for various sectors. However, the differences across sectors seem to roughly offset each other when summed together. This could have an impact when different weightings are used for the derivation of the weighted beta. In arriving at the beta, Brattle uses an unweighted average between the sectors, whereas PwC has weighted the sectors differently based on their similarities with the heat sector.

The matrix below shows the outcomes of the equity betas using based on either taking (1) PwC betas or Brattle betas and (2) using either PwC weighting methodology or Brattle weighting methodology. The conclusion can be drawn from this table that the differences observed are at current very minor and therefore would not lead to a significantly different observed beta. However, we still believe it would be more appropriate to take our weightings which are based on weightings of similarities for each individual sector. This approach could lead to differences in the future if betas would change.

	PwC Equity Betas	Brattle / ACM Equity Betas
PwC Industry Weightings	0.80	0.81
Brattle / ACM Industry Weightings	0.78	0.79

As a result, we conclude that the difference in regression period, estimation technique, peers and industry weightings does not lead to significantly different outcomes and therefore the differences in the WACC outcomes are mainly caused by other factors.

There could be however a difference as well in the gearing ratio applied to unlever the observed equity betas. A higher gearing ratio would lead to lower unlevered betas and vice versa based on the same observed beta. In the table below, we show the difference in the observed gearing ratio between various sectors. This shows that the PwC observed gearing ratios are similar for three out of four industries, but for utilities we generally arrive at a slightly lower D/E ratio. Given that this is only applicable to one industry, the impact of this would be quite small and therefore we took no further exception to this issue.

Median D/E per industry for unlevering the beta

Sector	PwC	Brattle / ACM	Difference
Grid operators	76.4%	79.9%	-3.5%
Telecom	42.6%	42.5%	0.1%
Integrated Utilities	45.9%	63.1%	-17.2%
Renewables	45.3%	49.9%	-4.6%

With respect to relevering the beta, we agree with Brattle that in line with the CBB ruling this should be based on actual data. We have reflected this in our updated WACC calculation in section 4.

2.4 Additional risk premiums

In our Report we have identified two additional risk premiums:

- **Asymmetric regulatory risk**

In our Report we have highlighted that the current regulation of the Dutch heating sector contains asymmetric risk and therefore a premium to the WACC is justified in our view. This asymmetric risk is the result of (1) the combination of the NMDA tariff and return test which effectively limits upside potential, and (2) heat companies have no 'downside' risk protection e.g. in relation to construction risks, volume risk, occupancy risk, production and delivery risks.

In addition, start-up losses may not be compensated under the current regulation with more profitable years due to the measurement in the return test, which only looks at specific years of profitability. This means heat companies can make unlimited losses, but nothing is said about these losses being compensated for in the future because the maximum permitted return has been capped.

Moreover, there is general uncertainty around future regulation, as there will be a new Collective Heat Supply Act (WcW) which will introduce a new market structure with potentially fundamentally different regulation. This exposes investors in heat companies to the regulatory risks.

On the basis of historical decisions made by OPTA (one of the predecessors of ACM) we have therefore preliminary included an additional risk premium between 0% and 4% (mid-point 2%). We understand that this additional risk premium is currently being considered by ACM and Brattle has excluded this from their scope of analysis.

- **Company / project specific risks**

In our analysis we have also recommended to consider differences between heat companies / projects as not every company / project has the same amount of occupancy and sourcing risks. We have therefore recommended to take a range of -2% to +2% (after tax) around the sector average to adjust for these differences, based on PBL advice about risks concerning heat sources as well as risk premiums mentioned by investors.

Brattle / ACM seem to disagree to this adjustment by pointing out that this risk is non-systemic and would therefore not affect the companies' cost of capital. In addition, Brattle argues that determining the beta for the heating sector is to a certain extent judgmental and prone to potential error and therefore distinguishing further between heat companies would not be practical. According to Brattle differences in betas are more likely to be driven by the statistical error for 'comparable' companies chosen rather than representing a true difference in systemic risk and beta.

We agree with Brattle that it is not practical to find a solution in estimating the difference in the beta and have therefore opted to include a risk premium on the total WACC. We note that based on the analysis presented in our Report significant differences exist between companies in the heat sector and

therefore applying a single return to the whole sector would practically mean overcompensation to relatively 'lower risk' companies vs. 'higher risk' companies or projects. In addition, it would not simulate investments in certain projects, projects that are likely to be required considering the importance of the heat sector in the energy transition and decarbonization policy of the Netherlands. We do not believe that these risks can be fully diversified away, also given the nature of the current shareholders (e.g. for municipalities this would not be allowed).

3. Updated outcomes of PwC WACC

As highlighted in section 2, we have adopted the actual cost of borrowing and gearing ratios as derived by Brattle in our calculated WACC since this is more consistent with the CBB ruling. The table below includes the updated results. As a result of this update, our WACC (post-tax, before additional risk premiums) does not differ significantly because the change in capital structure offsets the slight increase in the cost of debt.

We have not updated our WACC for other differences as outlined in this document and for the reasons mentioned. We highlight that in addition to performing a bottom-up calculation of the WACC based on market observable data, our views have also been tested in interviews with operators / developers of heat networks and financial institution providing capital to these companies. In our view it is important to test the WACC arrived at with views in the market.

WACC Calculation As per 1 May 2022

Item	Symbol / Formula		PwC Revised	Brattle 2022
Risk-free rate (20 years)	Rf	a	1.1%	0.0%
Risk-free rate (20 years)	Rf = Rf + CRP + ID	d = a + b + c	1.1%	0.0%
Debt risk premium	DRP = Rd - Rf	e	1.8%	2.9%
Pre-tax cost of debt	Rd pre-tax = Rf + DRP	f = e + d	2.9%	2.9%
Taxes	T	g	25.8%	25.0%
Post-tax cost of debt	Rd post-tax = Rd pre-tax * (1 - T)	h = f * (1 - g)	2.2%	2.2%
Unlevered beta	B unlevered		0.52	0.54
Relevered beta	B relevered	i	0.87	0.81
Equity market risk premium	EMRP	j	6.5%	5.0%
Cost of equity	Re = Rf + B relevered * EMRP	l = d + i * j + k	6.7%	4.1%
Pre-IFRS 16				
Total debt-to-equity ratio	D / E		66.8%	66.8%
Total debt-to-total capital ratio	D / (D + E)		40.0%	40.0%
Total equity-to-total capital ratio	E / (D + E)		60.0%	60.0%
Weighted cost of debt	WCoD = Rd * (D / total capital)	r	0.9%	0.9%
Weighted cost of equity	WCoE = Re * (E / total capital)	s	4.0%	2.4%
WACC (post-tax)	WACC = WCoD + WCoE	u = r + s + t	4.9%	3.3%
WACC (pre-tax)	WACC = WCoD + WCoE		6.6%	4.4%
Asymmetric regulatory risk premium (post tax)			2.0%	0.0%
Sector WACC average (post-tax)			6.9%	3.3%
Bandwidth based on project risk (post tax)			-2% / 2%	
Asymmetric regulatory risk premium (pre tax)			2.7%	0.0%
Sector WACC average (pre-tax)			9.3%	4.4%
Bandwidth based on project risk (pre tax)				