Europe Economics

# WACC calculation for the Caribbean Netherlands

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# 1 Introduction

Since the Dutch Parliament adopted the BES Electricity and Drinking Water Act, the ACM has been tasked with regulating the production and distribution of electricity and drinking water in the islands of Bonaire, Saint Eustatius and Saba (together known as the Caribbean Netherlands). As part of its duties, the ACM needs to set the efficient costs of the companies which will underpin the calculation of the allowed tariffs. The WACC is an important component used to determine those efficient costs.

Each of the Caribbean islands has separate arrangements for water and electricity, being sourced by four different companies: "Water- en Elektriciteitsbedrijf Bonaire" (WEB), "Contour Global" (CG), "Statia Utility Company" (STUCO), and "Saba Electricity Company" (SEC).

The companies provide different type (or combination) of services: Electricity Production (EP), Electricity Distribution (ED), Water Production (WP) and Water Distribution (WD).

The companies and their location and characteristics are summarised below:

- WEB (Bonaire, EP, ED, WP, WD): is owned by the public body of Bonaire.
- CG (Bonaire, EP only): is the main electricity producer on Bonaire. It uses wind energy and diesel generators to produce electricity and then sells it to WEB. CG is part of a larger British company that operates in the Caribbean, Latin America and other regions across the world[1].
- STUCO (Saint Eustasius, EP, ED, WP and WD): sole utility provider on the island. Owned by the public body of Saint Eustasius.
- SEC (Saba, EP and ED): owned by the public body of Saba, provides electricity to approximately the whole population of Saba.

With this background, the ACM requested Europe Economics to provide a study to propose a credible peer group of companies (with similar risk profile and comparable activities to the companies in the Caribbean Netherlands) and to calculate the different parameters and the WACC, for each of the four regulated entities.

[1] CG is based in London but since it was founded in 2005, has been a subsidiary of RCGM LLC (an investment management firm based in New York).

# 2 Methodological approach

The calculations of the WACC are based on the recognition that, in addition to their normal depreciation costs, regulated entities also incur "opportunity costs" from having capital invested in those and not in other businesses. The opportunity cost concept recognises that investors investing in Caribbean Netherlands' energy or water distribution companies are losing the potential returns they could have earned from investing in another company or in an alternative portfolio of firms with the same systematic risk exposure.

The calculation of these returns needs to recognise the different risks of the investment. Some risks are inherent of the company itself (which might be related to company-specific factors or poor management) and are understood that can be reduced by diversification (using a geographic and industry-diversified portfolio). The systematic risks, on the other hand, are those that cannot be reduced with diversification. These are the result of economy-wide or uncontrollable factors and require compensation, otherwise investors would not invest in such assets. It is in recognition of this second type of risks that a rate of return needs to be reflected in the cost of capital.

The calculation of these returns is based on the so-called weighted average cost of capital (WACC) and includes the recognition of a reference market (where investors could have invested) and a set of comparator companies (the alternative portfolio of investments with similar risks).

## 2.1 Search of a comparator group

In order to determine the risks and opportunity costs of investing in alternative assets to those in the Caribbean Netherlands, it is essential to determine the alternative investment options for investors. These options should be constituted from known possibilities to the investors and ideally be close to the region.

As in the previous determination, we accept that investors can be international. This would include investors with an interest in Latin and North America which would invest in the Caribbean Netherlands in order to geographically diversify their portfolio and mitigate the non-systematic risks of their specific investments. It also encompasses investments in Europe: as the Caribbean Islands are part of the Netherlands, it is accepted that these are seen as a viable addition to European investment portfolios. Following this line of argumentation, it means that comparators in both Latin and North America would be suitable geographical alternatives to the Caribbean Islands, and also Europe, as these equally reflect the opportunity cost of investing in the Islands.

In addition to geographic location, the peer group should include, as far as possible, firms with similar cost-structure, level of competition, and offering similar products to similar customers.

## 2.2 Method

The WACC gives the return that investors would achieve by investing both debt and equity capital in similar projects in the market. Therefore, the WACC is a weighted average of equity and debt of those projects (using gearing as the weights):

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

Where $R_e$ is the return on equity; $R_d$ is the return on debt; $T_C$ is the percentage tax; and $g$ is the percentage financed by debt (also known as gearing) and is defined as debt over assets.

The ACM has provided guidelines on the method to be used for the WACC calculations.

**Cost of equity ($R_e$)**

Under the ACM method the cost of equity is obtained from the capital asset pricing model (CAPM). Developed in the 1960s, the key feature of CAPM is that it assumes investment returns can be expressed as: $R_e = r_f + (TMR - r_f) * \beta$, where $R_e$ is the (expected) return on the asset; $r_f$ is the return that would be required for a perfectly risk-free asset; $TMR$ is the total market return, i.e. the return that would be delivered by a notional perfectly diversified portfolio consisting of all assets ("the whole market"). Finally, $\beta$ is a measure of the correlation between movements in the value of the asset of interest and in the value of assets as a whole. It is also called "beta" (or sometimes the "asset beta").

**Cost of debt ($R_d$)**

The ACM calculates the cost of debt using a "debt premium approach" (assuming that the cost can be obtained as the sum of three different components: risk free, debt premium and a fee): $R_d = r_f + DP + Fee$, where, $R_d$ is the return on debt; $r_f$ is the risk free rate, $DP$ is the debt premium and $Fee$ is a Non-interest fee (compensation for transaction costs of issuing debt).

**The parameters**

There are 8 parameters that need to be calculated in the ACM's methodology. The explicit calculations to be used are described in the following table. All calculations use the guidelines provided by the ACM and the approach used in the previous determination.

**Table A: Summary of WACC calculations**

| Parameter | # | Calculation method / Source |
|---|---|---|
| **Tax** | [1] | Parameter / Chapter 4 |
| **Gearing (D/A)** | [2] | Parameter / Chapter 4 |
| **Gearing (D/E)** | [3] | = [2] / (1 - [2] ) |
| **Asset beta** | [4] | Parameter / Chapter 5 |
| **Equity beta** | [5] | = [4] * ( 1 + (1 - [1] ) * [3] ) |
| **Risk free rate (equity)** | [6] | Parameter / Chapter 5 |
| **Equity risk premium** | [7] | Parameter / Chapter 5 |
| **Cost of Equity** | [8] | = [6] + [5] * [7] |
| **Risk free rate (debt)** | [9] | Parameter / Chapter 6 |
| **Debt premium** | [10] | Parameter / Chapter 6 |
| **Non-interest fees** | [11] | Parameter / Chapter 6 |
| **Cost of Debt (pre-tax)** | [12] | = [9] + [10] + [11] |
| **Nominal WACC (after tax)** | [13] | = ( 1 - [2] ) * [8] + [2] * ( 1- [1] ) * [12] |
| **Nominal WACC (pre-tax)** | [14] | = [13] / ( 1 - [1] ) |

Note: D/A = Debt over Assets. D/E Debt over Equity.
Source: ACM (2016) "Calculating the WACC for energy and water companies in the Caribbean Netherlands". August.

## 2.3 Data sources and cleansing methods

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

We note that some of the companies are not traded every day. Where liquidity is low, there is the risk that movements in the company's share value are influenced by such illiquidity (for example, due to opening times and trading hours). Our approach to deal with lack of stock liquidity is to select only firms whose stocks meet certain conditions (details are provided further below). We also undertake several econometric tests to check the specification of the different models.

# 3 The peer group

For the peer group, different criteria are used to select companies which are similar to the ones for which the cost of capital is to be calculated. The criteria are typically related to: firms offering similar products and services, with similar cost structure (or business model), serving similar type of customers, facing similar levels of competition, operating under the same type of regulatory framework and in similar economies or geographical location. Besides the economic and political context it is important to take into account a firm's main business activity.

To keep consistency with the previous determination, the initial list of comparators has been selected to match the group used in the previous determination. This will provide an initial view on the WACC on the basis of the same comparators that were used the last time (so that like-with-like comparisons can be made). To complement the list, we selected some additional comparators from a long-list of peers identified according to the selection criteria detailed in Annex 2.

## 3.1 The approach

The ACM method for the inclusion of companies has established selection criteria related to the location and activities of the companies to be used, and also the requirements on the liquidity of the stocks and the sample size of the comparator group.

However, the particularity of the regulated entities in this study (most noticeably, the fact that they are based in the Caribbean Netherlands) allows some flexibility on the approach (in the previous determination, adjustments were made to take into account the specificities of the regions the companies are active in). Hence, we have used the method from the WACC report for the electricity and water companies in the Caribbean Netherlands for the period 2017 to 2019, as the basis of our approach.

This has implied that in terms of the sector, comparable companies have been selected from those that have comparable activities and a comparable risk profile to the ones regulated (this is described further below). We have looked for a size of the comparator group of preferably at least 10 companies (the ACM method establishes that the peer group should ideally consist of at least 10 companies). Finally, two conditions for the liquidity of the stocks have been imposed. These are that the selected comparators should:

- (a) Achieve at least €100 million in annual sales and
- (b) Trade in at least 90% of trading days.

## 3.2 The regulated entities

A summary of the four companies follows. A detailed description of the companies is provided in Annex 1.[2]

**ContourGlobal Bonaire B.V. (CG)**
Since 2013, the 24 MW integrated wind and diesel power plant in Bonaire is part of the ContourGlobal plc, a multinational UK-based company set up for acquiring and developing wholesale power generation with long-term contracts diversified across fuel types and geographies. The power plant contains: a diesel plant (five 2.85 MW MAN diesel engines), 12 Enercon wind turbines (900kW each and an additional 330kW turbine), and three sets of batteries (that can sustain up to 3MW for 2 minutes).

[2] The description is based on information provided on each company's website.

**Saba Electric Company N.V. (SEC)**
The Saba Electric Company (SEC) was established in 1959 as the sole supplier of electricity on the Island Saba, providing electricity to approximately 1,200 customers. It operates a power plant (with diesel generators, 2 solar parks and a battery storage system) and the transmission and distribution network across the island. SEC believes in providing affordable and sustainable electricity in an environmentally-conscious manner for its customers.

**Statia Utility Company N.V. (STUCO)**
From January 1st 2014 STUCO NV is the sole utility company for the island of St. Eustatius after the split up of the previous energy company, GEBE (Common Energy Company of the Windward Islands). Therefore, STUCO is responsible for the production, distribution and supply of electricity and drinking water to end-users. The energy source consists of diesel generators and solar plants.

**Water- en Energiebedrijf Bonaire N.V. (WEB)**
WEB is a multi-utility company controlled by the Public Entity of Bonaire (Openbaar Lichaam Bonaire). Founded in 1963, it is responsible for the electricity grid and the supply of electricity and drinking water to over 17,000 households, companies and organisations in Bonaire. Since March 2013 the company also provides collection and treatment of wastewater services, managing the Waste Water Treatment Plant (WWTP), and the distribution of irrigation water.

**Summary of the regulated entities**
In broad terms, the different regulated entities can be grouped into three different streams of activities, which we have summarised with different initials (EP, EPD, and EPD-WPD):

- Energy production [EP],
- Energy production and distribution [EPD] and
- Energy (production and distribution) and water (production and distribution) [EPD-WPD].

According to the ACM, there is a possibility that WEB discontinues the production of energy in the near future. For that company the activity has been summarised in row WEB2 (using [ED] to denote electricity distribution only).

The previous determination contained three groups of comparators for each combination of the activities undertaken by the regulated entities. We have labelled the peer group containing the comparators for "Electricity production and distribution" as Group 1, the peer group for "Electricity production" as Group 2, and the peer group for "Combined electricity and water" as Group 3. A new Group 4 has been included showing the possibility of WEB undertaking electricity distribution only (in addition to water supply and distribution). The schematic results are shown in Table 3.1.

**Table 3.1: Summary of regulated entities**

| | | Electricity | | Water | | Group |
|---|---|---|---|---|---|---|
| Company | Island | Production | Distribution | Production | Distribution | |
| CG | Bonaire | EP | | | | 2 |
| SEC | Saba | EPD | | | | 1 |
| STUCO | St. Eustasius | EPD | | WPD | | 3 |
| WEB | Bonaire | EPD | | WPD | | 3 |
| WEB2 | Bonaire | | ED | WPD | | 4 |

## 3.3 Previous list

Our analysis has considered the suitability of the previous comparators based on the two liquidity test undertaken with up-to-date data: trade at least 90% of trading days and achieve at least €100 million in annual sales (we undertake some further refinements to the list as part of the analysis of the equity betas, as will be shown further below).

- The traded days were calculated as the number of days where the equity was traded divided by the total number of trading days (and expressed in percentage terms). The number of equity-trading days was calculated using the number of shares traded for a stock on a particular day (a figure that is expressed in thousands). To calculate the number of trading days we used, for each stock exchange, two variables (the Return Index and the Price Index) which show the days where there was activity in the exchange (the variables reflect volume and market capitalisation; hence, if there is no information, it means that the market is closed).
- For each of the companies used in our analysis we obtained a measure of annual sales, calculated as "revenues from the sale of merchandise goods, manufactured products and services" (from Thomson Reuters). In some instances, data contained missing information. For such cases data were complemented with "revenue from all of a company's operating activities after deducting any sales adjustments and their equivalents" (also from Thomson Reuters).

The results are provided in Table 3.2 and show that two companies have been excluded from the list: "Centralschweizerische Kraftwerke AG" (previously in both Group 1 and 3) has been delisted since ACM's last WACC determination; the other ("Talen Energy Corp") has merged (with an affiliate of "Riverstone Holdings LLC"). One company ("Tractebel Energia SA") has undergone a name change (new name "Engie Brasil Energia SA" as a comparator in Group 2) and another one ("Endesa Americas SA") is shown as part of Group 1 and 3 (this is as a result of a recent acquisition by "Enel Americas SA" and a company restructuring).[3]

[3] The company previously recorded as Endesa Americas SA was acquired by Enel in 2016. After this acquisition, the Chilean functions of the two companies were merged to create Enel Chile (with two subsidiaries, Enel Generation Chile and Enel Distribution Chile). The remaining electrical generation, transmission and distribution components of Endesa Americas SA were then combined with Enels's subsidiary, Enel Americas SA. As a result, Enel Americas SA now has both production and distribution activities and is categorised as part of Group 1 and 3. This means that because of the recent merger, Endesa America SA is shown as having moved from Group 2 to Group 1 and Group 3 (this is as a consequence of the distribution activities of the new merged entity).

**Table 3.2: List of comparators based on previous list**

| Group | Company name | Country | Sector | Trade (%) | Revenue (mil€) |
|---|---|---|---|---|---|
| 1 | Verbund AG | Austria | Distribution | 100 | 2,727 |
| 1 | Public Power Corporation SA | Greece | Distribution | 100 | 4,594 |
| 1 | Pampa Energia SA | Argentina | Distribution | 100 | 2,551 |
| 1 | EDP Energias do Brasil SA | Brazil | Distribution | 100 | 3,109 |
| 1 | Eneva SA | Brazil | Fossil | 100 | 703 |
| 1 | Enel Americas SA [Previously Endesa Americas SA] | Chile | Fossil | 100 | 11,495 |
| 1 | PNM Resources Inc | US | Other | 100 | 1,253 |
| 1 | American Electric Power Company Inc | US | Hydro | 100 | 13,887 |
| 1 | Edison International | US | Hydro | 100 | 11,036 |
| 1 | Centralschweizerische Kraftwerke AG ----- DELISTED---- | - | - | - | - |
| 2 | Albioma SA | France | Other | 100 | 428 |
| 2 | Falck Renewables SpA | Italy | Other | 100 | 336 |
| 2 | Zespol Elektrowni Patnow Adamow Konin SA[4] | Poland | Fossil | 100 | 585 |
| 2 | CPFL Energias Renovaveis SA | Brazil | Other | 100 | 435 |
| 2 | Engie Brasil Energia SA | Brazil | Hydro | 100 | 1,986 |
| 2 | Atlantic Power Corp | US | Hydro | 100 | 246 |
| 2 | Clearway Energy Inc | US | Fossil | 100 | 918 |
| 2 | Talen Energy Corp ---- MERGED ----- | - | - | - | - |
| 3 | Aguas Andinas SA | Chile | Water | 100 | 691 |
| 3 | Companhia de Saneamento do Parana Sanepar | Brazil | Water | 100 | 935 |
| 3 | Companhia de Saneamento de Minas Gerais Copasa MG | Brazil | Water | 100 | 1,064 |
| 3 | California Water Service Group | US | Water | 100 | 609 |
| 3 | Aqua America Inc | US | Water | 100 | 731 |
| 3 | American States Water Co | US | Water | 100 | 287 |
| 3 | Acea SpA | Italy | Distribution | 100 | 3,028 |
| 3 | United Utilities Group PLC | UK | Water | 100 | 1,974 |
| 3 | Severn Trent PLC | UK | Water | 100 | 1,927 |
| 3 | Verbund AG | Austria | Distribution | 100 | 2,727 |
| 3 | Public Power Corporation SA | Greece | Distribution | 100 | 4,594 |
| 3 | Pampa Energia SA | Argentina | Distribution | 100 | 2,551 |
| 3 | EDP Energias do Brasil SA | Brazil | Distribution | 100 | 3,109 |
| 3 | Eneva SA | Brazil | Fossil | 100 | 703 |
| 3 | Enel Americas SA [Previously Endesa Americas SA] | Chile | Fossil | 100 | 11,495 |
| 3 | PNM Resources Inc | US | Other | 100 | 1,253 |
| 3 | American Electric Power Company Inc | US | Hydro | 100 | 13,887 |
| 3 | Edison International | US | Hydro | 100 | 11,036 |
| 3 | Centralschweizerische Kraftwerke AG ----- DELISTED---- | - | - | - | - |

During the course of our research, the ACM brought to our attention that "American States Water Co" due to its activity in military activities (providing drinking water services to military bases) will be excluded as a comparator in the WACC determination for Dutch drinking water companies. For consistency across studies we decided to exclude such comparator.

We also noticed that "Aqua America Inc" announced its acquisition of natural gas provider "Peoples" in a $4.3 billion deal on 23rd October 2018 and this created some disruptions in the price of its shares.[5] However, analysing the results closely we did not find any major change in the series of stock returns. Moreover, the

[4] On the 13th November 2017, the sale of one of Zespol's competitors, EDF Polska, was completed (it was sold to PGE Polska Grupa Energetyczna SA, 58% held by the Polish state). However, this is unlikely to have any implications on the systematic risk of Zespol (we also note that the asset beta for Zespol is at the low range but because the use of a median this is unlikely to affect the median asset beta being used in the report).

[5] The deal is expected to be completed by mid-2019.

betas do not show any statistical differences between the two periods (before and after the announcement on 23/10/2018).

## 3.4 Additional comparators

To increase the sample we looked for a list of potential additional comparators. For these, the geographic scope was delimited by taking into account the specific characteristics of the Dutch Caribbean region, and the fact that these can be described in terms of: (a) small islands, (b) situated in the Caribbean ocean and (c) part of a Western European country/economy. The geographical scope is therefore determined by the following geographical areas: Caribbean, comparable islands and/or islands groups (Hawaii, Canary Islands, Mauritius, Channel Islands, France Polynesia, Açores, and the Falkland Islands), Europe, the United States of America and Latin America.

The relevant activities were constructed using a list of companies from energy production, energy production and distribution and energy and water companies (undertaking both production and distribution activities).[6] This constituted our initial long-list of comparators.

The long list was narrowed down using different criteria. We excluded companies that did not fulfil the liquidity criteria (L1 and L2) and/or when relevant data (gearing) was missing. We then undertook a detail review of the description of the activities of all the companies in the list.

For each of the groups of analysis (G1, G2, G3 and G4) we then proceeded as follow (a detailed description of the criteria for selecting the peer group is provided in Annex 2):

- For the potential additional comparators for G2, we included companies that reflected the type of activity of the regulated companies. This included companies describing themselves as being involved in wind or solar generation. The additional companies where hence selected to reflect the trend towards using more renewable energy projects of the regulated companies.
- For G1, we included companies from G2 and also companies that were described as being active in distribution and transmission of electricity. To reflect the trend towards more renewable energy of the regulated companies, the additional comparators to be considered did not consider those for which distribution was undertaken in parallel with the production of energy using sources of inputs other than solar and wind; comparators active in large transmission networks; and companies that described their main activities as related to the production and distribution of gas, steam or heat.[7]
- For G3 we included companies active in the production and distribution of water and treatment of wastewaters. Companies from G1 were also considered as candidates for this group.
- For G4 we included comparators from G1 and G3 that were not active in the production of electricity.

All companies that operated together with other activities very different from the activities of the regulated companies (real estate, wine production, construction, ….) were also excluded (the different selection criteria meant that potential comparators in the Caribbean and island groups were excluded from the list.). This provided a list of additional 23 potential companies. Their final inclusion in the comparator groups depends on some other characteristics, as we explain below.

[6] This follows previous practice. BCCF (2016) considered "pure players" in: (i) energy companies active in production and distribution, (ii) energy companies only active in production and (iii) water companies active in production and distribution.

[7] The companies in the original list do not report any major activities in such sectors either.

## 3.5 Identification of the new peer group

To keep consistency with previous exercises we started from the most recent list of comparators used. In cases where the list was short or did not contain enough regional representation (across the three main regions: Europe, North and Latin America), this was expanded from the pool of additional candidates.

- For G1, the list based on the original group fell short of the preferred minimum of 10 (only 9 comparators).[8] The group was subsequently expanded using 3 additional comparators. This produced a group of 12 comparators (4 from each of the different regions). We considered this a sufficiently large group with a good regional representation.
- The group for G2 based on the original list only contained 7 comparators and we included 4 more from the additional pool. This produced a list of 11 comparators (represented by 5 European companies, 3 from North America and 3 from Latin America). We consider this to be a good representation of the three regions.
- Based on the original list, G3 consisted of 17 comparators, one less than in the previous determination.[9] To keep consistency with G1 we also included the same additional comparators from that group. To keep consistency in the number of companies in the water sector we included one additional comparator from North America. The resulting group consisted of 21 companies, 7 from each of the regions.
- For the new group G4 we used the companies from G3 but excluding those that are active in production of electricity only. As the number of companies for North America was only 2, we included two additional companies from that region. This produced a group of 14 companies (4 from North America and 5 from the other two regions).

The list of additional comparators added to the different groups is provided in Table 3.3.

**Table 3.3: Additional comparators**

| Group | Company name | Country | Sector | Trade (%) | Revenue (mil€) |
|---|---|---|---|---|---|
| **1, 2, 3** | **Eolus Vind AB (publ)** | Sweden | Other | 100 | 129 |
| **1, 2, 3** | **EDP Renovaveis SA** | Portugal | Other | 100 | 1,512 |
| **1, 3, 4** | **AES Corp** | US | Distribution | 100 | 9,361 |
| **2** | **Renova Energia SA** | Brazil | Other | 100 | 185 |
| **2** | **Pattern Energy Group Inc** | US | Other | 100 | 421 |
| **3, 4** | **Middlesex Water Co** | US | Water | 100 | 120 |

[8] The group excludes "Centralschweizerische Kraftwerke AG" (as this has been delisted since ACM's last WACC determination) and contains one more observation due to the change of group of Enel Americas SA (from Group 2 to Group 1 and 3), as a result of the merger.

[9] The group excludes "Centralschweizerische Kraftwerke AG" (as this has been delisted since ACM's last WACC determination) and American States Water Co, but contains one more observation due to the change of group of Enel Americas SA (from Group 2 to Group 1 and 3), as a result of the merger.

# 4 Generic parameters

In this section we will set out the generic parameters for the WACC calculation for the energy and water companies in the Caribbean Netherlands. This is: the gearing and the tax rate.

**Gearing**

Gearing is defined as net debt ($D$) over enterprise value ($D + E$) using the following formula: gearing $= D/(D + E)$. For this report we have used the average gearing from Jan 2016 to Dec 2018 (provided in Thomson Reuters).[10]

For ACM decisions, gearing calculations are based on the actual gearing of comparable companies. These comparable companies must have "healthy financial positions". Following the previous determination we use companies from the comparator group with a credit rating "investment grade" (this is ratings of BBB- or above, as defined by Thomson Reuters).[11]

The results are shown in Table 4.1 for the different four groups. The median gearing for groups 1, 2 and 3 is 39%, 38%, and 35% respectively, which compares to the value of 42% used for the three groups in the previous determination. For the new Group 4 the gearing shows a median value of 35%.

[10] Net debt calculated as the sum of [Total Debt, Redeemable Preferred Stock, Preferred Stock – Non Redeemable, Net, Minority Interest], less [Cash and Short-Term Investments]. Cash and Short-Term Investments, in turn is calculated as the sum of [Cash, Cash & Equivalents, and Short Term Investments]. Enterprise value is given by the sum of [Company Market Cap, Net Debt, Preferred Stock, and Minority Interest]. Although net debt is usually of quarterly / semi-annually or yearly frequencies, daily data for gearing are typically provided using daily enterprise value data.

[11] The ACM method prescribes that "companies with healthy positions" should be those with a credit rating A or higher. However, in the previous determination "investment grade" was used to allow for more companies to be included in the sample.

### Table 4.1: Gearing

| Company name | Rating | Group 1 | Group 2 | Group 3 | Group 4 |
|---|---|---|---|---|---|
| **AES Corp** | BBB- | 62 | | 62 | 62 |
| **Acea SpA** | BBB- | | | 45 | 45 |
| **Aguas Andinas SA** | A | | | 26 | 26 |
| **American Electric Power Company Inc** | A | 39 | | 39 | |
| **Aqua America Inc** | BBB- | | | 25 | 25 |
| **Atlantic Power Corp** | BBB- | | 59 | | |
| **CPFL Energias Renovaveis SA** | BBB- | | 44 | | |
| **California Water Service Group** | A- | | | 28 | 28 |
| **Companhia de Saneamento de Minas Gerais Copasa MG** | BBB+ | | | 39 | 39 |
| **Companhia de Saneamento do Parana Sanepar** | A- | | | 31 | 31 |
| **EDP Energias do Brasil SA** | BBB- | 29 | | 29 | 29 |
| **EDP Renovaveis SA** | A- | 32 | 32 | 32 | |
| **Enel Americas SA** | BBB- | 19 | | 19 | |
| **Eneva SA** | A- | 55 | | 55 | |
| **Engie Brasil Energia SA** | BBB+ | | 10 | | |
| **Eolus Vind AB (publ)** | A | 29 | 29 | 29 | |
| **Middlesex Water Co** | AA- | | | 20 | 20 |
| **PNM Resources Inc** | BBB | 47 | | 47 | |
| **Severn Trent PLC** | BBB+ | | | 50 | 50 |
| **United Utilities Group PLC** | BBB- | | | 55 | 55 |
| **Verbund AG** | A- | 41 | | 41 | 41 |
| **Zespol Elektrowni Patnow Adamow Konin SA** | BBB | | 47 | | |
| **Average** | | **39** | **37** | **37** | **38** |
| **Median** | | **39** | **38** | **35** | **35** |
| **Median (previous report)** | | **42** | **42** | **42** | **42** |

## Tax

The ACM method prescribes that the tax rate is equal to the applicable rate for the regulated entities. The ACM provided the relevant tax rate, which is 0% for Caribbean Netherlands.

The tax rate for the comparators is needed to convert the equity beta into an asset beta. As in the past determination, we use the effective tax rate from KPMG's corporate tax table (the publication provides a view of corporate tax rates around the world up to 2018).

# 5 Cost of equity

In this section we set out our estimates on the cost of equity. As stated in the methodology section, the cost of equity is estimated using the CAPM, which estimates the expected return of the equity using its different components of: risk free rate, the average return of the market (the ERP) and the beta of a company. First, we will provide our estimates for the Risk Free Rate. Then we will provide the beta parameter, and finally we will provide the Equity Risk Premium.

## 5.1 Risk-free Rate

The ACM method prescribes estimating the RFR using 10-year government bonds over the previous 3-years. The approach envisages using a simple average of Dutch and German bonds. Given the fact that the current context includes companies which are far from Europe's mainland, and following previous precedent, the estimation of the RFR is done differently in the current study. This is in relation to the three important decisions that need to be made in terms of:

- A representative bond maturity.
- A representative statistic (spot or mean values).
- A representative bond.

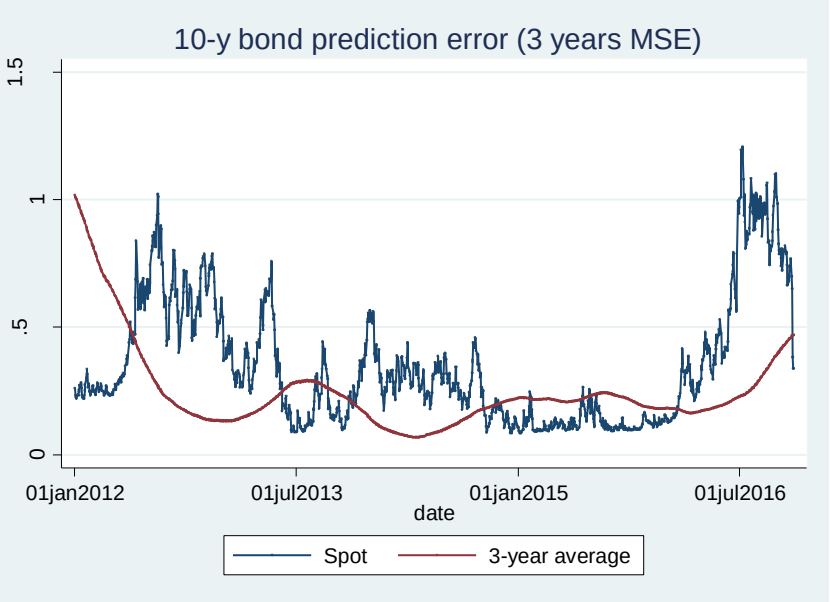
**The representative bond maturity**
The representative maturity is taken as 10-year. The same maturity has also been used in other previous determinations (the ACM has also stated that a maturity of ten years is also preferred on the basis of liquidity, as these are the most frequently traded bonds). This seems an uncontroversial decision and is in line with the approach used in most regulatory WACC analyses.

**The representative statistic (spot or mean?)**
A forward-looking RFR estimate needs to be constructed as representative for the regulatory period ahead. The ACM method suggests estimating the RFR as a simple average (of Dutch and German 10-year government bonds) over the previous 3-years. However, there have been other suggested ways to compute the RFR (there are small differences in the prescriptions from different regulations in the Netherlands, and there are also discussions which include different views on the use of spot rates as the best forward-looking RFR estimate).

Although the spot rate is considered the best indicator for tomorrow (as it contains all most recent information), this has been criticised by the ACM for not being representative enough (the ACM argued that the spot rates short-term volatility make it "undesirable"). In the previous determination a historical reference period of 3 years was used, on the basis of this being the best predictor (a reference to Hartog van Banda and Mulder, 2013 in *International Research Journal of Applied Finance* is made to support this).

Regardless of the precise method used, what is relevant is that there is reassurance in that the estimate obtained is informative of the expected market developments. In order to provide a robust estimate we have tested the implications of using each of the different predictors. We have estimated the Mean Squared Error (MSE) of the predictions obtained for 3 years ahead using a spot rate and an average rate (obtained over the last 3 years). Starting on 01-01-2012 the MSE (for spot and average rate) are calculated on 3-year rolling windows until 31-12-2018. Our results, for US 10-year bonds show a different prediction capacity of the two estimators (spot and average) across different periods. However, the results seem to confirm that a) spot rate predictions are more volatile and b) that the average predictions outperform the spot rates for the prediction of more recent past times (the MSE are smaller with the 3-year average predictor).

**Figure 5.1: Prediction error (MSE) of spot and average rates (repeated samples)**




**The representative bond**

As done in the previous determination, we have selected the bonds from Germany, US, and Chile, as representative of each of the considered regions. Having obtained the risk-free asset in each of the reference markets a representative measure is constructed using an average of the most recent 3 years. The RFR is then constructed as the average of the three regions. In Table 5.1 we report the results obtained for each region and the overall risk free rate, as well as the results from the previous determination.

**Table 5.1: Risk Free Rate, current and previous determination**

| Region | Average (2016-2018) | Average (previous report) |
|---|---|---|
| **Latin America** | 4.42 | 4.84 |
| **North America** | 2.36 | 2.33 |
| **Western Europe** | 0.32 | 1.13 |
| **Average** | **2.37** | **2.77** |

## 5.2 Beta regressions

For each peer, the equity beta is calculated from market data as the covariance of the company's returns and the returns on the market index. As in previous determinations we have used daily frequency and an estimation period of 3 years.

As equity betas are not directly comparable across companies asset betas are used. The Modigliani Miller equation (accounting for taxes) is used to de-leverage the equity betas.

Several tests have been undertaken to assess the robustness of the estimates.

- Test the stock liquidity using the bid-ask spread.
- Test for autocorrelation and heteroscedasticity.
- Test for statistical significance of the estimates.
- Assess the betas against Dimson-corrected betas.

### Test the stock liquidity using the bid-ask spread

Following guidance from ACM, we have undertaken one additional test for liquidity. This is based on the daily bid-ask spread (for days where both bid and ask price are observed, the bid-ask spread is calculated as ask price minus bid price, divided by the average of both prices). As there is no guidance on how to assess such spread, we use the threshold used in previous precedents which defined stocks as illiquid if the 3-year average of the spread is larger than 1%.[12]

According to this criterion, four comparators "Atlantic Power Corp", "CPFL Energias Renovaveis SA", "Eneva SA", and "Renova Energia SA" appear with low liquidity (Table 5.2). These companies will be excluded in the calculation of the different group medians.

**Table 5.2: Peer Companies – Bid-ask spreads averages and liquidity results**

| Company name | 3-year Average | Spread liquidity? |
|---|---|---|
| Acea SpA | 0.3% | YES |
| AES Corp | 0.1% | YES |
| Aguas Andinas SA | 0.8% | YES |
| Albioma SA | 0.6% | YES |
| American Electric Power Company Inc | 0.0% | YES |
| Aqua America Inc | 0.0% | YES |
| Atlantic Power Corp | 1.6% | NO |
| California Water Service Group | 0.1% | YES |
| Clearway Energy Inc | 0.1% | YES |
| Companhia de Saneamento de Minas Gerais Copasa MG | 0.4% | YES |
| Companhia de Saneamento do Parana Sanepar | 0.7% | YES |
| CPFL Energias Renovaveis SA | 3.4% | NO |
| Edison International | 0.0% | YES |
| EDP Energias do Brasil SA | 0.3% | YES |
| EDP Renovaveis SA | 0.3% | YES |
| Enel Americas SA | 0.7% | YES |
| Eneva SA | 1.9% | NO |
| Engie Brasil Energia SA | 0.3% | YES |
| Eolus Vind AB (publ) | 0.8% | YES |
| Falck Renewables SpA | 0.6% | YES |
| Middlesex Water Co | 0.1% | YES |
| Pampa Energia SA | 0.5% | YES |
| Pattern Energy Group Inc | 0.1% | YES |
| PNM Resources Inc | 0.1% | YES |
| Public Power Corporation SA | 0.6% | YES |
| Renova Energia SA | 1.8% | NO |
| Severn Trent PLC | 0.1% | YES |
| United Utilities Group PLC | 0.1% | YES |
| Verbund AG | 0.2% | YES |
| Zespol Elektrowni Patnow Adamow Konin SA | 0.9% | YES |

### Test and correct for autocorrelation and heteroscedasticity

We have carried the standard autocorrelation and heteroscedasticity tests envisaged in the ACM method (Breusch-Godfrey for autocorrelation and White for heteroscedasticity, Table 5.3).

[12] Nera (2016): "Update of the Equity Beta and Asset Beta for BT Group and Comparators: For the Office of Communications (Ofcom)". March. Also by the German Energy Regulator (BNetzA) for setting WACC allowance for gas/electricity transmission and distribution (citation from the same Nera report).

**Table 5.3: Autocorrelation [A] and heteroscedasticity [H] tests (chi-squared, p-values and result)**

| Company name | [A] Chi2 | [A] p-val | Auto-correlation? | [H] Chi2 | [H] p-val | Heteroscedasticity? |
|---|---|---|---|---|---|---|
| AES Corp | 6.88 | 0.01 | YES | 2.94 | 0.23 | NO |
| Acea SpA | 0.42 | 0.52 | NO | 0.68 | 0.71 | NO |
| Aguas Andinas SA | 10.87 | 0 | YES | 37.63 | 0 | YES |
| Albioma SA | 1.18 | 0.28 | NO | 4.17 | 0.12 | NO |
| American Electric Power Company Inc | 0 | 0.96 | NO | 19.27 | 0 | YES |
| Aqua America Inc | 0.69 | 0.4 | NO | 6.98 | 0.03 | YES |
| Atlantic Power Corp | 20.83 | 0 | YES | 0.98 | 0.61 | NO |
| CPFL Energias Renovaveis SA | 41.61 | 0 | YES | 0.21 | 0.9 | NO |
| California Water Service Group | 0.96 | 0.33 | NO | 4.61 | 0.1 | NO |
| Clearway Energy Inc | 0.34 | 0.56 | NO | 6.53 | 0.04 | YES |
| Companhia de Saneamento de Minas Gerais Copasa MG | 5.57 | 0.02 | YES | 4.91 | 0.09 | NO |
| Companhia de Saneamento do Parana Sanepar | 0.29 | 0.59 | NO | 6 | 0.05 | NO |
| EDP Energias do Brasil SA | 21.46 | 0 | YES | 0.31 | 0.85 | NO |
| EDP Renovaveis SA | 0.41 | 0.52 | NO | 19.33 | 0 | YES |
| Edison International | 0.98 | 0.32 | NO | 1.72 | 0.42 | NO |
| Enel Americas SA | 8.29 | 0 | YES | 5.84 | 0.05 | NO |
| Eneva SA | 44.18 | 0 | YES | 1.95 | 0.38 | NO |
| Engie Brasil Energia SA | 1.14 | 0.29 | NO | 2.79 | 0.25 | NO |
| Eolus Vind AB (publ) | 3.04 | 0.08 | NO | 7.34 | 0.03 | YES |
| Falck Renewables SpA | 2.32 | 0.13 | NO | 5.57 | 0.06 | NO |
| Middlesex Water Co | 0.54 | 0.46 | NO | 4.63 | 0.1 | NO |
| PNM Resources Inc | 1.52 | 0.22 | NO | 11.13 | 0 | YES |
| Pampa Energia SA | 0.11 | 0.74 | NO | 119.09 | 0 | YES |
| Pattern Energy Group Inc | 0.41 | 0.52 | NO | 3.16 | 0.21 | NO |
| Public Power Corporation SA | 0.61 | 0.44 | NO | 0.03 | 0.99 | NO |
| Renova Energia SA | 0.65 | 0.42 | NO | 0.23 | 0.89 | NO |
| Severn Trent PLC | 0 | 0.97 | NO | 2.26 | 0.32 | NO |
| United Utilities Group PLC | 0.01 | 0.91 | NO | 3.5 | 0.17 | NO |
| Verbund AG | 0.21 | 0.65 | NO | 0.05 | 0.98 | NO |
| Zespol Elektrowni Patnow Adamow Konin SA | 1.38 | 0.24 | NO | 4.72 | 0.09 | NO |

Where the tests detect autocorrelation or heteroscedasticity, estimates are compared to those obtained using a GLS method which corrects for first-order autocorrelation (Prais–Winsten and Cochrane–Orcutt) with heteroscedasticity-robust variance estimates (Huber/White/sandwich estimator).

The results do not show major differences between the two methods (this shows consistency of the beta estimates under OLS and GLS, Table 5.4).

### Table 5.4: Results of OLS and GLS beta estimates

| Company name | Asset betas [OLS] | Standard error [OLS] | Asset betas [GLS] | Standard error [GLS] |
|---|---|---|---|---|
| AES Corp | 0.37 | 0.07 | 0.38 | 0.08 |
| Acea SpA | 0.32 | 0.04 | 0.32 | 0.04 |
| Aguas Andinas SA | 0.60 | 0.05 | 0.59 | 0.12 |
| Albioma SA | 0.36 | 0.05 | 0.35 | 0.06 |
| American Electric Power Company Inc | 0.14 | 0.04 | 0.14 | 0.06 |
| Aqua America Inc | 0.34 | 0.05 | 0.34 | 0.06 |
| Atlantic Power Corp | 0.44 | 0.10 | 0.42 | 0.10 |
| CPFL Energias Renovaveis SA | 0.03 | 0.04 | 0.05 | 0.04 |
| California Water Service Group | 0.46 | 0.07 | 0.46 | 0.08 |
| Clearway Energy Inc | 0.39 | 0.08 | 0.39 | 0.10 |
| Companhia de Saneamento de Minas Gerais Copasa MG | 0.56 | 0.06 | 0.54 | 0.07 |
| Companhia de Saneamento do Parana Sanepar | 0.49 | 0.06 | 0.50 | 0.07 |
| EDP Energias do Brasil SA | 0.48 | 0.04 | 0.47 | 0.04 |
| EDP Renovaveis SA | 0.51 | 0.04 | 0.52 | 0.05 |
| Edison International | 0.25 | 0.07 | 0.25 | 0.09 |
| Enel Americas SA | 0.88 | 0.06 | 0.88 | 0.09 |
| Eneva SA | 0.18 | 0.08 | 0.17 | 0.09 |
| Engie Brasil Energia SA | 0.49 | 0.03 | 0.49 | 0.03 |
| Eolus Vind AB (publ) | 0.32 | 0.06 | 0.34 | 0.08 |
| Falck Renewables SpA | 0.42 | 0.06 | 0.42 | 0.07 |
| Middlesex Water Co | 0.54 | 0.08 | 0.54 | 0.09 |
| PNM Resources Inc | 0.21 | 0.05 | 0.21 | 0.07 |
| Pampa Energia SA | 0.85 | 0.03 | 0.85 | 0.06 |
| Pattern Energy Group Inc | 0.62 | 0.07 | 0.62 | 0.09 |
| Public Power Corporation SA | 0.16 | 0.06 | 0.16 | 0.05 |
| Renova Energia SA | 0.23 | 0.13 | 0.23 | 0.12 |
| Severn Trent PLC | 0.32 | 0.05 | 0.32 | 0.06 |
| United Utilities Group PLC | 0.30 | 0.06 | 0.30 | 0.06 |
| Verbund AG | 0.44 | 0.06 | 0.45 | 0.06 |
| Zespol Elektrowni Patnow Adamow Konin SA | 0.29 | 0.10 | 0.29 | 0.11 |

### Statistical significance

The analysis of statistical significance shows slight different results for t-statistics calculated with OLS and GLS. OLS t-statistics show all but one coefficient significant ("CPFL Energias Renovaveis SA" shows an asset beta of 0.03 and not significant). GLS estimated with corrected standard errors shows all coefficients as significant. Because "CPFL Energias Renovaveis SA" will be excluded on the basis of bid-ask spread liquidity, this discrepancy has no further implications.

All estimated coefficients have a positive sign and less than 1. The positive sign of the coefficient means that the stocks of the comparators move in the same direction as the rest of the market. The fact that the coefficients are less than 1 means that the stocks are less volatile than the market (the comparators are less risky than their corresponding market index).

**Table 5.5: t-test results (OLS and GLS)**

| Company name | t-test [OLS] | t-test [GLS] |
|---|---|---|
| AES Corp | 12.18 | 10.81 |
| Acea SpA | 13.77 | 12.35 |
| Aguas Andinas SA | 15.06 | 6.36 |
| Albioma SA | 11.72 | 9.46 |
| American Electric Power Company Inc | 4.49 | 3.38 |
| Aqua America Inc | 8.8 | 6.98 |
| Atlantic Power Corp | 9.15 | 8.54 |
| CPFL Energias Renovaveis SA | 1.11 | 2.07 |
| California Water Service Group | 9.04 | 7.82 |
| Clearway Energy Inc | 10.49 | 8.15 |
| Companhia de Saneamento de Minas Gerais Copasa MG | 14.43 | 11.51 |
| Companhia de Saneamento do Parana Sanepar | 11.4 | 9.01 |
| EDP Energias do Brasil SA | 14.44 | 13.95 |
| EDP Renovaveis SA | 19.66 | 13.35 |
| Edison International | 4.91 | 3.86 |
| Enel Americas SA | 17.54 | 12.06 |
| Eneva SA | 3.75 | 3.33 |
| Engie Brasil Energia SA | 19.78 | 17.92 |
| Eolus Vind AB (publ) | 6.66 | 5.73 |
| Falck Renewables SpA | 14.4 | 12.7 |
| Middlesex Water Co | 7.86 | 6.78 |
| PNM Resources Inc | 6.45 | 5.19 |
| Pampa Energia SA | 30.28 | 17.17 |
| Pattern Energy Group Inc | 12.05 | 10.09 |
| Public Power Corporation SA | 17.67 | 18.85 |
| Renova Energia SA | 3.68 | 3.85 |
| Severn Trent PLC | 10.79 | 9.53 |
| United Utilities Group PLC | 10.77 | 9.17 |
| Verbund AG | 11.8 | 11.95 |
| Zespol Elektrowni Patnow Adamow Konin SA | 5.18 | 4.34 |

### Assess the betas against Dimson-corrected betas

Finally, we have also assessed the betas obtained from the Dimson correction (estimates using the same-day market index as independent variable, supplemented with the market index from one period earlier and one period later). Where the lag- and forward-variables are found jointly significant the Dimson beta is calculated as the sum of the three coefficients.

The results are shown in Table 5.6. The F-test of joint significance of the lag- and forward-variables indicates that the Dimson adjustment is not needed except in three cases. For "Companhia de Saneamento de Minas Gerais Copasa MG", "Eolus Vind AB (publ)" and "Pampa Energia SA", the F-test shows significance of the adjustment. The Dimson betas for such companies will be used to assess the sensitivity of the results.

**Table 5.6: Results of OLS and Dimson betas, and results of the test (F-test p-value denotes joint significance of lag- and forward-values)**

| Company name | Asset betas [OLS] | Asset betas [Dimson] | F-test p-value | Correction needed? |
|---|---|---|---|---|
| AES Corp | 0.37 | 0.43 | 0.25 | NO |
| Acea SpA | 0.32 | 0.38 | 0.09 | NO |
| Aguas Andinas SA | 0.60 | 0.52 | 0.12 | NO |
| Albioma SA | 0.36 | 0.35 | 0.95 | NO |
| American Electric Power Company Inc | 0.14 | 0.09 | 0.34 | NO |
| Aqua America Inc | 0.34 | 0.31 | 0.59 | NO |
| Atlantic Power Corp | 0.44 | 0.30 | 0.05 | NO |
| CPFL Energias Renovaveis SA | 0.03 | 0.11 | 0.08 | NO |
| California Water Service Group | 0.46 | 0.41 | 0.51 | NO |
| Clearway Energy Inc | 0.39 | 0.41 | 0.71 | NO |
| Companhia de Saneamento de Minas Gerais Copasa MG | 0.56 | 0.68 | 0.03 | YES |
| Companhia de Saneamento do Parana Sanepar | 0.49 | 0.58 | 0.21 | NO |
| EDP Energias do Brasil SA | 0.48 | 0.48 | 0.78 | NO |
| EDP Renovaveis SA | 0.51 | 0.54 | 0.44 | NO |
| Edison International | 0.25 | 0.33 | 0.27 | NO |
| Enel Americas SA | 0.88 | 0.87 | 0.94 | NO |
| Eneva SA | 0.18 | 0.19 | 0.73 | NO |
| Engie Brasil Energia SA | 0.49 | 0.46 | 0.37 | NO |
| Eolus Vind AB (publ) | 0.32 | 0.55 | 0.00 | YES |
| Falck Renewables SpA | 0.42 | 0.47 | 0.18 | NO |
| Middlesex Water Co | 0.54 | 0.48 | 0.58 | NO |
| PNM Resources Inc | 0.21 | 0.13 | 0.11 | NO |
| Pampa Energia SA | 0.85 | 0.93 | 0.02 | YES |
| Pattern Energy Group Inc | 0.62 | 0.73 | 0.14 | NO |
| Public Power Corporation SA | 0.16 | 0.15 | 0.75 | NO |
| Renova Energia SA | 0.23 | 0.30 | 0.47 | NO |
| Severn Trent PLC | 0.32 | 0.33 | 0.72 | NO |
| United Utilities Group PLC | 0.30 | 0.28 | 0.52 | NO |
| Verbund AG | 0.44 | 0.44 | 0.95 | NO |
| Zespol Elektrowni Patnow Adamow Konin SA | 0.29 | 0.40 | 0.15 | NO |

## 5.3 Beta results

Table 5.7, Table 5.8, Table 5.9, and Table 5.10 contain asset betas for the groups G1, G2, G3 and G4, respectively. Our mean beta estimate is calculated iteratively in different stages showing the results of different tests in separate columns: S1, S2, and the final result in S3.

- S1 shows the OLS asset betas.
- S2 shows estimates excluding the companies that did not show liquidity according to the bid-ask spread. These are denoted with a "[L]" suffix in each table.
- S3 shows the betas using Dimson adjustment (for those where the adjustment was found statistically significant). These are denoted with a "[D]" suffix in each table.

At the bottom of each table, the average and median are provided for each case, together with the value provided in the previous study.

### Asset betas for Group 1

The asset betas for the 12 companies from G1 are provided in Table 5.7. The results in column S1 show a median asset beta of 0.35. This value is up to 0.37 after exclusion of "Eneva SA". Substituting the asset betas by their Dimson correction yields a median of 0.44 in S3, which is higher to the value provided in the previous study (0.39).

**Table 5.7: Asset betas for Group 1 (different calculations)**

| Company name | S1 | S2 | S3 |
|---|---|---|---|
| American Electric Power Company Inc | 0.14 | 0.14 | 0.14 |
| Public Power Corporation SA | 0.16 | 0.16 | 0.16 |
| Eneva SA -- [L] | 0.18 | | |
| PNM Resources Inc | 0.21 | 0.21 | 0.21 |
| Edison International | 0.25 | 0.25 | 0.25 |
| Eolus Vind AB (publ) -- [D] | 0.32 | 0.32 | 0.55 |
| AES Corp | 0.37 | 0.37 | 0.37 |
| Verbund AG | 0.44 | 0.44 | 0.44 |
| EDP Energias do Brasil SA | 0.48 | 0.48 | 0.48 |
| EDP Renovaveis SA | 0.51 | 0.51 | 0.51 |
| Pampa Energia SA -- [D] | 0.85 | 0.85 | 0.93 |
| Enel Americas SA | 0.88 | 0.88 | 0.88 |
| Average | **0.40** | **0.42** | **0.45** |
| Median | **0.35** | **0.37** | **0.44** |
| Median (previous study) | **0.39** | **0.39** | **0.39** |

### Asset betas for Group 2

Table 5.8 shows the asset betas for the 11 companies from G2. The medians for S1 and S2 show values of 0.39 and 0.40. When using Dimson adjusted betas (in S3) the median increases to 0.46.

**Table 5.8: Asset betas for Group 2 (different calculations)**

| Company name | S1 | S2 | S3 |
|---|---|---|---|
| CPFL Energias Renovaveis SA -- [L] | 0.03 | | |
| Renova Energia SA -- [L] | 0.23 | | |
| Zespol Elektrowni Patnow Adamow Konin SA | 0.29 | 0.29 | 0.29 |
| Eolus Vind AB (publ) -- [D] | 0.32 | 0.32 | 0.55 |
| Albioma SA | 0.36 | 0.36 | 0.36 |
| Clearway Energy Inc | 0.39 | 0.39 | 0.39 |
| Falck Renewables SpA | 0.42 | 0.42 | 0.42 |
| Atlantic Power Corp -- [L] | 0.44 | | |
| Engie Brasil Energia SA | 0.49 | 0.49 | 0.49 |
| EDP Renovaveis SA | 0.51 | 0.51 | 0.51 |
| Pattern Energy Group Inc | 0.62 | 0.62 | 0.62 |
| Average | **0.37** | **0.42** | **0.45** |
| Median | **0.39** | **0.40** | **0.46** |
| Median (previous study) | **0.39** | **0.39** | **0.39** |

### Asset betas for Group 3

The asset betas for group G3 are shown in Table 5.9, for the 21 comparators used. The median in S1 is 0.39, but this gets reduced to 0.34 after the exclusion of "Eneva SA". Using a Dimson-corrected beta for "Eolus Vind AB (publ)", "Companhia de Saneamento de Minas Gerais Copasa MG" and "Pampa Energia SA" the median increases to 0.45.

### Table 5.9: Asset betas for Group 3 (different calculations)

| Company name | S1 | S2 | S3 |
|---|---|---|---|
| American Electric Power Company Inc | 0.14 | 0.14 | 0.14 |
| Public Power Corporation SA | 0.16 | 0.16 | 0.16 |
| Eneva SA -- [L] | 0.18 | | |
| PNM Resources Inc | 0.21 | 0.21 | 0.21 |
| Edison International | 0.25 | 0.25 | 0.25 |
| United Utilities Group PLC | 0.30 | 0.30 | 0.30 |
| Severn Trent PLC | 0.32 | 0.32 | 0.32 |
| Acea SpA | 0.32 | 0.32 | 0.32 |
| Eolus Vind AB (publ) -- [D] | 0.32 | 0.32 | 0.55 |
| Aqua America Inc | 0.34 | 0.34 | 0.34 |
| AES Corp | 0.37 | 0.37 | 0.37 |
| Verbund AG | 0.44 | 0.44 | 0.44 |
| California Water Service Group | 0.46 | 0.46 | 0.46 |
| EDP Energias do Brasil SA | 0.48 | 0.48 | 0.48 |
| Companhia de Saneamento do Parana Sanepar | 0.49 | 0.49 | 0.49 |
| EDP Renovaveis SA | 0.51 | 0.51 | 0.51 |
| Middlesex Water Co | 0.54 | 0.54 | 0.54 |
| Companhia de Saneamento de Minas Gerais Copasa MG -- [D] | 0.56 | 0.56 | 0.68 |
| Aguas Andinas SA | 0.60 | 0.60 | 0.60 |
| Pampa Energia SA -- [D] | 0.85 | 0.85 | 0.93 |
| Enel Americas SA | 0.88 | 0.88 | 0.88 |
| Average | **0.42** | **0.43** | **0.45** |
| Median | **0.37** | **0.41** | **0.45** |
| Median (previous study) | **0.42** | **0.42** | **0.42** |

### Asset betas for Group 4

Table 5.10 shows the results of the estimations for the 14 comparators of G4. The medians in S1, S2 and S3 are around the order of 0.45.

**Table 5.10: Asset betas for Group 4 (different calculations)**

| Company name | S1 | S2 | S3 |
|---|---|---|---|
| Public Power Corporation SA | 0.16 | 0.16 | 0.16 |
| United Utilities Group PLC | 0.30 | 0.30 | 0.30 |
| Severn Trent PLC | 0.32 | 0.32 | 0.32 |
| Acea SpA | 0.32 | 0.32 | 0.32 |
| Aqua America Inc | 0.34 | 0.34 | 0.34 |
| AES Corp | 0.37 | 0.37 | 0.37 |
| Verbund AG | 0.44 | 0.44 | 0.44 |
| California Water Service Group | 0.46 | 0.46 | 0.46 |
| EDP Energias do Brasil SA | 0.48 | 0.48 | 0.48 |
| Companhia de Saneamento do Parana Sanepar | 0.49 | 0.49 | 0.49 |
| Middlesex Water Co | 0.54 | 0.54 | 0.54 |
| Companhia de Saneamento de Minas Gerais Copasa MG -- [D] | 0.56 | 0.56 | 0.68 |
| Aguas Andinas SA | 0.60 | 0.60 | 0.60 |
| Pampa Energia SA -- [D] | 0.85 | 0.85 | 0.93 |
| Average | **0.45** | **0.45** | **0.46** |
| Median | **0.45** | **0.45** | **0.45** |
| Median (previous study) | . | . | . |

**Final Asset beta estimates**

We use the median values reported in column S3 as our final estimates i.e. 0.44 (Group 1), 0.46 (Group 2), 0.45 (Group 3), and 0.45 (Group 4).

## 5.4 Equity Risk Premium (ERP)

The ACM approach sets that the equity risk premium should be based on an ex post measure (the historical ERP) and/or on an ex ante estimation (based on expectations of the ERP).

**Ex post (historical ERP)**

The historical ERP is determined using the premium investors were able to get in the previous years (i.e. compensation for the market circumstances). In order to calculate this ex post measure of the ERP, a period of data as long as possible is needed. In this way, the ERP estimate will reflect several circumstances that happened in the capital market in the past and that may happen again in the future. Moreover, taking a long period of data would avoid specific distortions to the ERP (by specific circumstances, such as the great depression). Having said that, using a long period of data is considered to be the best estimator for the future premium.

To calculate the ex post ERP we use the last published report from Dimson, Marsh and Staunton (DMS)[13]. This is a study which, among others, analyses the level of ERP in 23 countries for the period 1900-2018. The study reports both the arithmetic and the geometric average. As in the previous WACC determination we used a historical ERP figure based on a simple average of both statistics. Data are provided in Table 5.11, for European countries and for the US. The total for each region is constructed weighting for market capitalisation of each country's stock market (data as of 31st December 2018). This way, averages for Europe and the US can be obtained, but not for Latin America (as such data is not provided in DMS). The ERP for Latin America has been obtained using the Total Risk Premium for Central and South America, as provided in Damodaran[14], and it is shown further below.

[13] Dimson, Marsh and Staunton (2019) "Credit Suisse Research Institute: Credit Suisse Global Investment Returns Yearbook 2019"

[14] *Country Default Spreads and Risk Premiums*, Last updated: January 2019. http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/ctryprem.html

**Table 5.11: Equity Risk Premium DMS – Europe and US**

| | [1] Geometric Mean (%) | [2] Arithmetic Mean (%) | [3] Average [1] & [2] (%) | [4] Market Cap (€m)* |
|---|---|---|---|---|
| **Austria** | 2.70 | 21.10 | 11.90 | 75,649 |
| **Belgium** | 2.10 | 4.10 | 3.10 | 287,056 |
| **Finland** | 5.10 | 8.60 | 6.85 | 235,325 |
| **France** | 3.00 | 5.30 | 4.15 | 1,295,901 |
| **Germany** | 4.80 | 8.20 | 6.50 | 877,699 |
| **Ireland** | 2.50 | 4.50 | 3.50 | 77,488 |
| **Italy** | 3.10 | 6.40 | 4.75 | 325,176 |
| **The Netherlands** | 3.20 | 5.50 | 4.35 | 594,394 |
| **Portugal** | 5.10 | 9.20 | 7.15 | 54,081 |
| **Spain** | 1.60 | 3.60 | 2.60 | 444,178 |
| **USA** | 4.30 | 6.40 | 5.35 | 18,394,314 |

*Sources: "Credit Suisse Global Investment Returns Sourcebook 2019", Thomson Reuters EIKON, Europe Economics calculation. * Market capitalisation (in €) as of 31/12/2018.*

Three different averages can be obtained for the three regions: Europe and USA calculated from DMS, and Latin America, provided by Damodaran (Table 5.12). The average is then obtained across the three regions (this is consistent with the previous determination).

**Table 5.12: ERP: regional and global average (current and previous determination).**

| | Average | Average (previous report) |
|---|---|---|
| **Europe [weighted]** | 4.79 | 4.87 |
| **USA [single value]** | 5.35 | 5.35 |
| **Latin America [single value]** | 10.61 | 11.27 |
| **Average [arithmetic]** | **6.92** | **7.16** |

*Sources: "Credit Suisse Global Investment Returns Sourcebook 2018", dataset of Damodaran and Europe Economics calculation.*

### Ex ante (adjustments)

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

However, it is worth noticing, that although there have been different estimates for corrections by different analysts, in ACM (2016, and following a report by Brattle in 2012) it was advised not to apply a downward correction[15] (results of DGM can be quite volatile and often depend on subjective estimates of financial analysts, all of which results in regulatory uncertainty around the figures). In other recent ACM decisions, estimates have not been adjusted either.

[15] The estimates from the DGM in the previous research were higher than the DMS estimates and so the downward adjustment was not undertaken.

## 5.5 Conclusion

Our analysis took in consideration all the relevant variables necessary to estimate the cost of Equity. We applied the ACM previous approach in the estimation of all the variables. To sum up:

- We have estimated the relevant risk free rate using the average of 10-year government bonds in each of the regions used previously. Our risk free rate estimate is 2.37 percent.
- We have estimated betas and equity betas for the peer companies. Our asset beta estimates are: 0.44 (Group 1), 0.46 (Group 2), 0.45 (Group 3), and 0.45 (Group 4).
- We have analysed the ERP as reported by DMS and Damodaran. Our final estimate for the ERP is 6.92 percent.

# 6 Cost of debt

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

**Interest costs**

The ACM calculation of cost of interest debt differentiates between existing (issued in the past) and new debt (to be issued in the next regulatory period). The allowed return is therefore based on a model which assumes a schedule for existing and new debt for each year (with the portfolio existing/new debt being evenly spread across 10 years).

Hence, in the first year of the regulatory period, new debt is assumed 20% (the remaining 80% evenly spread across the 8 previous years); in the second year new debt is assumed 30% (the remaining 70% evenly spread across the previous 7 years); in the third year the spread of new and existing debt is 40% and 60%.[16] This method is consistent with the one used for calculating the WACC of energy entities in the Netherlands.

The total cost of debt over the regulatory period is therefore constructed as a weighted average of new and existing cost of debt (with weights given as 10% for each of the periods of consideration). The cost of debt is based on the following:

- For the cost of existing debt, the returns associated with company's bonds in each of the regions are used. Previously, an index on the return on corporate bonds (of maturity 10 years) of BBB-rated utility companies was used.[17] Yearly averages are used for past years (2011-2018).
- For the cost of new debt, a cost forecast is used for each of the years of the regulatory period. The average of the last three years is used to get the forecast for the years of the regulatory period (2020-2022).

Our calculations are based on Bloomberg indices for North America and Europe, and an index provided by LVA for Latin America (a Bloomberg index is not available for Latin America).

- For North America and Europe we used Bloomberg's BBB rated utility (bonds) indices with 10 years to maturity.[18]
- For Latin America, we used a Corporate Fixed Income Index of Utilities with duration between 9 and 12 years provided by LVA-Chile.[19]

The cost of debt calculations are based on 12 years of data: 8 years of historical data (2011-2018) and 4 years of forecast data (2019f, 2020f, 2021f and 2022f, estimated as the average of the years 2016-2018). The rolling average in each region is taken for the 10 years leading up to the regulation year (i.e. the 2020 figure is the average of the historical values 2011 – 2018 and the forecast values for 2019 and 2020). Once the average for each region is obtained the simple arithmetic average is taken for all three regions to get the cost of debt estimate for the Caribbean Netherlands. The results are shown in Table 6.1.

[16] For calculation purposes this implies that for the first year, 2020, the cost of debt is based on 80% of the cost of 2011-2018, 10% of 2019 (forecast) and 10% of 2020 (also forecast).
[17] Note: BBB means BBB-, BBB and BBB+
[18] ACM provided Europe Economics with values for these indices aggregated at a yearly level.
[19] This index is the closest to international BBB rated index available.

**Table 6.1 Cost of debt interests (%) for each region**

| | Interest cost of Debt (%) | | | Risk-free Rate | | | Debt Premium | | |
|---|---|---|---|---|---|---|---|---|---|
| | EU | US | LA | EU | US | LA | EU | US | LA |
| **2011** | 4.68 | 4.32 | 6.62 | 2.65 | 2.76 | 5.92 | 2.04 | 1.56 | 0.69 |
| **2012** | 3.91 | 3.68 | 6.44 | 1.57 | 1.79 | 5.45 | 2.34 | 1.89 | 0.99 |
| **2013** | 3.51 | 3.95 | 6.43 | 1.63 | 2.34 | 5.31 | 1.89 | 1.61 | 1.12 |
| **2014** | 2.32 | 3.70 | 5.91 | 1.24 | 2.53 | 4.72 | 1.08 | 1.17 | 1.19 |
| **2015** | 1.59 | 3.65 | 5.68 | 0.54 | 2.13 | 4.47 | 1.05 | 1.52 | 1.21 |
| **2016** | 1.12 | 3.52 | 5.43 | 0.14 | 1.84 | 4.41 | 0.98 | 1.68 | 1.02 |
| **2017** | 1.33 | 3.61 | 4.81 | 0.38 | 2.33 | 4.24 | 0.96 | 1.29 | 0.56 |
| **2018** | 1.66 | 4.23 | 4.91 | 0.46 | 2.91 | 4.61 | 1.20 | 1.32 | 0.30 |
| **2019f** | 1.37 | 3.79 | 5.05 | 0.32 | 2.36 | 4.42 | 1.05 | 1.43 | 0.63 |
| **2020f** | 1.37 | 3.79 | 5.05 | 0.32 | 2.36 | 4.42 | 1.05 | 1.43 | 0.63 |
| **2021f** | 1.37 | 3.79 | 5.05 | 0.32 | 2.36 | 4.42 | 1.05 | 1.43 | 0.63 |
| **2022f** | 1.37 | 3.79 | 5.05 | 0.32 | 2.36 | 4.42 | 1.05 | 1.43 | 0.63 |
| **2020a** | 2.29 | 3.82 | 5.63 | 0.92 | 2.33 | 4.80 | 1.36 | 1.49 | 0.83 |
| **2021a** | 1.95 | 3.77 | 5.48 | 0.69 | 2.29 | 4.65 | 1.26 | 1.48 | 0.83 |
| **2022a** | 1.70 | 3.78 | 5.34 | 0.57 | 2.35 | 4.55 | 1.15 | 1.44 | 0.79 |
| **2020 Regions** | | **3.91** | | | **2.69** | | | **1.23** | |
| **2021 Regions** | | **3.73** | | | **2.54** | | | **1.19** | |
| **2022 Regions** | | **3.61** | | | **2.49** | | | **1.12** | |

*Note: 2020a denotes Average (11 - 20f), 2021a denotes Average (12 - 21f) and 2022a denotes Average (13 - 22f).*

### Non-interest fees

The ACM method allows transaction costs are allowed on top of the interest rate surcharge. The ACM uses 15 basis points.

## 6.1 Conclusion

The cost of debt estimates are based on indices for utility companies based in Europe, USA and Chile. The estimate for the regulatory years 2020, 2021 and 2022 are 3.91, 3.73 and 3.61 respectively. Considering the non-interest fees allowed in the ACM method, the final Cost of Debt estimates are **4.06 per cent** for 2020, **3.88 per cent** for 2021 and **3.76 per cent**.

# 7 WACC final results

This section shows the results of our calculations for the different regulated companies in the Dutch Caribbean Netherlands. "Water- en Elektriciteitsbedrijf Bonaire" (WEB), "Contour Global" (CG), "Statia Utility Company" (STUCO), and "Saba Electricity Company" (SEC).

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

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

The WACC calculations for 2020, 2021 and 2022 can be found in Table 7.1, Table 7.2 and Table 7.3, respectively.

**Table 7.1: WACC calculations for the different regulated companies. 2020.**

| | SEC [Saba] | CG [Bonaire] | STUCO [Saint Eustatius] | WEB [Bonaire] | WEB2 [Bonaire] |
|---|---|---|---|---|---|
| **Activity group** | **1** | **2** | **3** | **3** | **4** |
| **Risk-free Rate (Equity)** | 2.37% | 2.37% | 2.37% | 2.37% | 2.37% |
| **ERP** | 6.92% | 6.92% | 6.92% | 6.92% | 6.92% |
| **Asset betas** | 0.44 | 0.46 | 0.45 | 0.45 | 0.45 |
| **Equity betas** | 0.72 | 0.74 | 0.69 | 0.69 | 0.69 |
| **Cost of equity** | 7.36% | 7.50% | 7.16% | 7.16% | 7.16% |
| **Tax Rate** | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| **Pre-tax cost of equity** | **7.36%** | **7.50%** | **7.16%** | **7.16%** | **7.16%** |
| **Risk-free Rate (Debt)** | 2.69% | 2.69% | 2.69% | 2.69% | 2.69% |
| **Debt Premium** | 1.23% | 1.23% | 1.23% | 1.23% | 1.23% |
| **Non-interest fees** | 0.15% | 0.15% | 0.15% | 0.15% | 0.15% |
| **Cost of debt** | **4.06%** | **4.06%** | **4.06%** | **4.06%** | **4.06%** |
| **Gearing** | 39.0% | 38.0% | 35.0% | 35.0% | 35.0% |
| **Vanilla WACC** | **6.08%** | **6.20%** | **6.08%** | **6.08%** | **6.08%** |
| **Pre-tax WACC** | **6.08%** | **6.20%** | **6.08%** | **6.08%** | **6.08%** |

Note: activity groups refer to.
Group 1: "Electricity production and distribution".
Group 2: "Electricity production".
Group 3: "Combined electricity and water".
Group 4: "Water supply and distribution, and electricity distribution" (scenario to allow for possibility of WEB discontinuing energy production in the near future.

## Table 7.2: WACC calculations for the different regulated companies. 2021.

| | SEC [Saba] | CG [Bonaire] | STUCO [Saint Eustatius] | WEB [Bonaire] | WEB2 [Bonaire] |
|---|---|---|---|---|---|
| **Activity group** | **1** | **2** | **3** | **3** | **4** |
| **Risk-free Rate (Equity)** | 2.37% | 2.37% | 2.37% | 2.37% | 2.37% |
| **ERP** | 6.92% | 6.92% | 6.92% | 6.92% | 6.92% |
| **Asset betas** | 0.44 | 0.46 | 0.45 | 0.45 | 0.45 |
| **Equity betas** | 0.72 | 0.74 | 0.69 | 0.69 | 0.69 |
| **Cost of equity** | 7.36% | 7.50% | 7.16% | 7.16% | 7.16% |
| **Tax Rate** | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| **Pre-tax cost of equity** | **7.36%** | **7.50%** | **7.16%** | **7.16%** | **7.16%** |
| **Risk-free Rate (Debt)** | 2.54% | 2.54% | 2.54% | 2.54% | 2.54% |
| **Debt Premium** | 1.19% | 1.19% | 1.19% | 1.19% | 1.19% |
| **Non-interest fees** | 0.15% | 0.15% | 0.15% | 0.15% | 0.15% |
| **Cost of debt** | **3.88%** | **3.88%** | **3.88%** | **3.88%** | **3.88%** |
| **Gearing** | 39.0% | 38.0% | 35.0% | 35.0% | 35.0% |
| **Vanilla WACC** | **6.00%** | **6.13%** | **6.01%** | **6.01%** | **6.01%** |
| **Pre-tax WACC** | **6.00%** | **6.13%** | **6.01%** | **6.01%** | **6.01%** |

Note: activity groups refer to.
Group 1: "Electricity production and distribution".
Group 2: "Electricity production".
Group 3: "Combined electricity and water".
Group 4: "Water supply and distribution, and electricity distribution" (scenario to allow for possibility of WEB discontinuing energy production in the near future.

## Table 7.3: WACC calculations for the different regulated companies. 2022.

| | SEC [Saba] | CG [Bonaire] | STUCO [Saint Eustatius] | WEB [Bonaire] | WEB2 [Bonaire] |
|---|---|---|---|---|---|
| **Activity group** | **1** | **2** | **3** | **3** | **4** |
| **Risk-free Rate (Equity)** | 2.37% | 2.37% | 2.37% | 2.37% | 2.37% |
| **ERP** | 6.92% | 6.92% | 6.92% | 6.92% | 6.92% |
| **Asset betas** | 0.44 | 0.46 | 0.45 | 0.45 | 0.45 |
| **Equity betas** | 0.72 | 0.74 | 0.69 | 0.69 | 0.69 |
| **Cost of equity** | **7.36%** | **7.50%** | **7.16%** | **7.16%** | **7.16%** |
| **Tax Rate** | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| **Pre-tax cost of equity** | 7.36% | 7.50% | 7.16% | 7.16% | 7.16% |
| **Risk-free Rate (Debt)** | 2.49% | 2.49% | 2.49% | 2.49% | 2.49% |
| **Debt Premium** | 1.12% | 1.12% | 1.12% | 1.12% | 1.12% |
| **Non-interest fees** | 0.15% | 0.15% | 0.15% | 0.15% | 0.15% |
| **Cost of debt** | **3.76%** | **3.76%** | **3.76%** | **3.76%** | **3.76%** |
| **Gearing** | 39.0% | 38.0% | 35.0% | 35.0% | 35.0% |
| **Vanilla WACC** | **5.96%** | **6.08%** | **5.97%** | **5.97%** | **5.97%** |
| **Pre-tax WACC** | **5.96%** | **6.08%** | **5.97%** | **5.97%** | **5.97%** |

Note: activity groups refer to.
Group 1: "Electricity production and distribution".
Group 2: "Electricity production".
Group 3: "Combined electricity and water".
Group 4: "Water supply and distribution, and electricity distribution" (scenario to allow for possibility of WEB discontinuing energy production in the near future.

# Annex 1: Detailed descriptions

## The regulated companies

**ContourGlobal Bonaire B.V. (CG)**
Since 2013, the 24 MW integrated wind and diesel power plant in Bonaire is part of the ContourGlobal plc, a multinational UK-based company set up for acquiring and developing wholesale power generation with long-term contracts diversified across fuel types and geographies.

The power plant is a baseload facility for the island's distribution company, WEB and is the sole supplier of electricity to the island's 16,500 inhabitants (although, since 2015, there is a Solar Pilot on Barcadera that generates energy for around 60 households). Utilizing wind, batteries and diesel is a major advantage, as the two fuel types complement each other to provide consistent access to reliable energy and the batteries ensure reliability in meeting the energy load during the transitions between wind and diesel.

- The diesel plant consists of five 2.85 MW MAN diesel engines each capable of operating with both heavy and light fuel oil.
- The wind farm consists of twelve Enercon turbines of 900kW each and an additional 330kW turbine.
- The battery storage technology consist of three sets of batteries that can sustain up to 3MW for 2 minutes allowing to smoothly switch from diesel and wind and vice versa without causing disturbances on the island grid.

**Saba Electric Company N.V. (SEC)**
The Saba Electric Company (SEC) was established in 1959 as the sole supplier of electricity on the Island Saba, providing electricity to approximately 1,200 customers. It operates a power plant and the transmission and distribution network across the island. SEC believes in providing affordable and sustainable electricity in an environmentally-conscious manner for its customers.

As a responsible energy company, Saba Electric Company is committed to providing its customers with reliable and cost-effective electricity to homes and businesses, which is affordable and sustainable, in an environmentally-conscious manner for its customers. Thanks to SEC's underground transmission and distribution network, the future of Saba looks much brighter, especially during hurricane season when power outages are common. Saba Electric Company continues to strive for excellence in the field of electricity production in order to provide its valued customers with a quality product and service.

**Statia Utility Company N.V. (STUCO)**
The official webpage of Statia Utility Company provides little information about the company activities and history. For this reason, we used other sources in order to provide a brief but complete introduction.

From January 1st 2014 STUCO NV is the sole utility company for the island of St. Eustatius after the split up of the previous energy company, GEBE (Common Energy Company of the Windward Islands). Therefore, STUCO is the party responsible for production, distribution and supply of electricity and drinking water to end-users.

- **Electricity Production:** The energy source of St. Eustatius consists of diesel generators and solar plants. As of 2016, the diesel generators produced 3.3 MW, while the operating solar panel, financed by the Ministry of Economic Affairs, produced 1.9 MW. In 2017 another 2 MW solar park was launched, helping reducing even more the Company's operating costs[20]. The total amount of electricity produced by STUCO

[20] Public entity St. Eustatius (2017) "The Budget 2018"
https://www.statiagovernment.com/documents/St.%20Eustatius%20Budget%202018%20-%20FINAL.pdf

is about 14GWh per year[21]. Moreover NuStar (private electricity production facility) and STUCO have interconnected grids and, according to STUCO, NuStar can be requested at all time to supply 500kW, and excess power of another 500 kW is available[22].

- **Distribution:** STUCO pays special attention to the network and the distribution of energy. In order to reduce network's vulnerability, the island was allocated €2.4 million under the 11th European Development Fund (EDF) for the period 2014-2020[23].
- **Water:** Water supply for the St. Eustatius Island is characterised by limited capacity and limited number of customers.

**Water- en Energiebedrijf Bonaire N.V. (WEB)**

Water- en Energiebedrijf Bonaire N.V. (WEB), is a multi-utility company controlled by the Public Entity of Bonaire (Openbaar Lichaam Bonaire). Founded in 1963, it is responsible for the electricity grid and the supply of electricity and drinking water to over 17,000 households, companies and organisations in Bonaire. Since March 2013 the company also provides collection and treatment of wastewater services, managing the Waste Water Treatment Plant (WWTP), and distribution of irrigation water. Together with partners from the US and The Netherlands[24], WEB is working towards sustainable, reliable and affordable energy for inhabitants and visitors to the island.

- **Electricity production**: While CG is the primary electricity producer on Bonaire, WEB is responsible for a portion of the total electricity consumed. The energy mix of Bonaire consists of a diesel power station at Karpata, a peak shaver / backup diesel power station at Barcadera, the test set-up with solar panels at Barcadera (792 solar panels that now generate energy for around 60 households), the wind farm at Morotin (12 wind turbines of 900 kW each) and a windmill at Sorobon (a wind turbine of 330 kW). Wind energy provides about 33 percent of the annual energy demand on Bonaire.
- **Distribution:** WEB is investing in a modern, robust and reliable network, suitable for new developments. These improvements, which would allow WEB to meet the energy needs of the entire island, ranges from the natural instability of renewable sources (i.e. wind and solar energy) to the requirements set out in the Electricity and Drinking Water BES (2016) Act.
- **Drinking water:** Nowadays, WEB extracts drinking water from seawater, although for centuries rainwater and well water were the only sources of drinking water of the whole island (suffering from water scarcity during the 60s of the last century).
- **Wastewater:** Thanks to the collection and purification of wastewater which came from septic tanks, cesspools and the sewage system, the company is able to protect the groundwater and the sea (the island belongs to the top 10 best dive sites in the world and yearly attracts large flows of tourists). Moreover, WEB reutilises the treated wastewater for irrigation purposes.

[21] Ferd Schelleman MSc., Bart van Weijsten MSc. (2016) "Renewable energy future for the Dutch Caribbean islands Bonaire, St. Eustatius and Saba" https://zoek.officielebekendmakingen.nl/blg-776649.pdf

[22] Ferd Schelleman MSc., Bart van Weijsten MSc. (2016) "Renewable energy future for the Dutch Caribbean islands Bonaire, St. Eustatius and Saba"

[23] Public entity St. Eustatius (2017) "The Budget 2018"

[24] The American company Contour Global manages the power plant at Karpata and the wind park at Morotin. The solar test setup at Barcadera is installed by the Dutch company Oskomera Solar Power Solutions. WEB works closely with the Dutch grid operator Stedin, who makes his knowledge and expertise available for the optimization of the energy supply on Bonaire.

## Description of the geographical areas

The island of Bonaire is located 50 miles off the coast of Venezuela, alongside the islands of Aruba and Curacao, making up what is known as the "A-B-C" islands.[25] The 113 square mile island's main industry is tourism, promoted by Tourism Bonaire due to its location as one of the few islands in the Caribbean outside of the hurricane belt, and the official currency being the US dollar.[26] A major draw of Bonaire is the recreational diving and snorkelling available for tourists, pristine beaches, and an international airport making the island easy to access. The island is officially part of the Netherlands as a "special municipality," and the 19,500 residents have the same rights as Dutch citizens in Europe. [27] There are also protected Marine and State parks on the island with many rare bird species.[28]

The island of Saba is the smallest Dutch "special municipality,"[29] now overseen by the Dutch government in Europe. The official website, Saba Tourism, describes the island as a "thrilling 12 minute flight from neighbouring island St. Maarten," southwest of Puerto Rico and the Virgin Islands.[30] The island is just 5 square miles and has a population of 2,000 people. The majority of it is occupied by the potentially most active volcano in the Caribbean, although there is still space on the island for the Saba University Medical School. Due to the island's volcanic origins, the island is a hotspot for divers to explore the dramatic corals and animals that are located off of Saba's shores.[31]

The island of Saint Eustatius, known as Statia, is located like its close neighbour Saba in the northern Leeward Islands, 504 miles southwest of the Dominican Republic. The 8.1 square mile island has just 3,300 residents and is proud of its pristine, off the beaten track reputation.[32] Statia was discovered by Christopher Columbus in 1493, and promotes tourism with both its history during the colonial era as a major trade centre, and its protected dive sites, from the marine park to over 200 shipwrecks near the coasts.[33] Now a Dutch "special municipality," the island has an extinct volcano that attracts hikers with its perfectly shaped cone and crater.

| | Bonaire | Saba | Saint Eustatis |
|---|---|---|---|
| **Population** | 19,500 | 2,000 | 3,300 |
| **Size (square miles)** | 113 | 5 | 8.1 |
| **Distance to continent (mi)** | 50 | 1,242 | 1,258 |
| **Major Tourism Draw** | Diving, Beaches | Diving, Beaches | Diving, Hiking, Beaches |

[25] Tourism Bonaire https://www.tourismbonaire.com
[26]Tourism Bonaire https://www.tourismbonaire.com
[27] Government of the Netherlands, Caribbean Parts of the Kingdom https://www.government.nl/topics/caribbean-parts-of-the-kingdom/bonaire-st-eustatius-and-saba
[28] Tourism Bonaire https://www.tourismbonaire.com
[29]Government of the Netherlands, Caribbean Parts of the Kingdom https://www.government.nl/topics/caribbean-parts-of-the-kingdom/bonaire-st-eustatius-and-saba
[30]Saba Tourism http://www.sabatourism.com/
[31] Saba Tourism https://www.tourismbonaire.com
[32] Statia Government http://www.statiagovernment.com/tourism.html
[33] Statia Government http://www.statiagovernment.com/tourism.html


San Francisco de Macoris
Santiago
San Pedro de Macoris
San Juan
Higüey
Santo Domingo
La Romana
PUERTO RICO (U.S.)
BRITISH VIRGIN ISLANDS (U.K.)
Saba
Saint Eustatius
Plymouth
FRENCH-GUADELOUPE (FR.)
DOMINICA
Roseau
FRENCH-MARTINIQUE (FR.)
ST LUCIA
ST VINCENT AND THE GRENADINES
BARBADOS
GRENADA
Oranjestad
Bonaire
Coro
Maracaibo
Cabimas
San Felipe
Barquisimeto
Maracay
Caracas
Valencia
Cumana
Barcelona
Maturin
TRINIDAD AND TOBAGO

# Annex 2: Identification of risks

The determination of the cost of capital is a crucial element in the regulatory process. When setting price limits for services or products supplied by regulated firms, regulators need to decide what would constitute a "fair" rate of return on the capital employed in the production of the regulated services. To do this, regulators assess the return that investors in these firms expect to earn.

In addition to the multiple types of costs incurred (such as assets depreciating), the "fair" rate of return needs to recognise the opportunity costs implied of such investments (the loss of potential profit had investors invested in alternative assets). The WACC calculations therefore, help inform what the potential return for investors should be when investing in the Caribbean Netherlands water and energy companies and not elsewhere.

One important issue when determining the cost of capital is risk, and the allowed return should reward for it (bearing in mind that the higher the risk the higher the allowed return should be). In the CAPM framework, there are recognised two types of risks: specific and systematic.

- **Specific risks** (also known as non- or un-systematic risks). These are risks inherent in every investment. As such, the risk can be eliminated largely through adequate diversification within a specific asset class (mixing a wide variety of investments within a portfolio smooths out unsystematic risk: the positive performance of some investments neutralizes the negative performance of others). As such, they are not envisaged in a company's cost of capital.
- **Systematic risk** (also known as market or non-diversifiable risk). This is a risk that is characteristic of an entire market, and reflects the effects of recession, wars, or political decisions. As they cannot be avoided through diversification, the systematic risk affects a company's cost of capital.

It is because of the presence of systematic risks, that investors need to be compensated for their investments. The compensation (or required return on the investment) reflects the systematic risk over a diversified portfolio of investments (i.e. the market index). It is calculated using the "betas", a measure comparing the volatility of returns of a company's stock against those of the broader market (betas allow investors to gauge how sensitive a security might be to other macro and market risks).

The common practice to estimate betas for publicly-listed companies is to use direct market data. When companies are not listed, betas must be inferred from a set of relevant comparators, all with similar systematic risk to the regulated firms.

## Systematic risk

Systematic risk is typically understood as reflecting risks from revenues, operating leverage, financial leverage and other factors (typically this includes other aspects such as bad debt). The previous study focused on the demand fluctuations (termed as "cyclicality of revenues" in that report), and the operational leverage as the main determinants of risk.[34] Our methodology to identifying risks builds on and develops further the previous approach.

[34] The report also looks at financial leverage, also referred to as gearing (proportion of debt to equity). However, as the analysis is focussed on asset betas (which correct for any effect financial leverage has on the risk profile of a company) this determinant is not discussed as part of systematic risk.

**Demand fluctuations**

Companies' revenues are derived from changes in demand. Either in the form of changes in the number of consumers, quantities demanded, quality (reliability of the service) or connections (and length of the network), the demand for services affects ultimately the sales of companies. Hence, it is not surprising that developments in the business cycle have an impact on companies' revenues. Sudden changes in demand, supply or simply the economic climate (including the "optimism" or "pessimism" of consumers or suppliers) affect the revenues and profits of companies.

All enterprises are sensitive to the business cycle in one form or another. However, the sensitivity considerably differs among firms and this also affects firms' non-diversifiable risk: the higher their sensitivity, the larger their non-diversifiable risk. To disentangle the effects of the business cycle on revenues, the previous report sought to see these as the interaction of quantity and prices, which in turn are influenced by: the type of products/services, the type of customers/clients, the type and rate of competition, the type of regulatory framework and the type of economies/countries.

It is interesting to review such factors as some of these can make companies more resilient to the business cycle. As it will be seen, the factors will also be useful to characterise the systematic risk of companies and help in the selection of the peer group.

- **Services, and their characteristics**. The influence of the business cycle will be smaller in cases where a product or service fulfils the basic needs of a customer, or when this is provided with fewer alternatives. Hence, the selection of comparators should choose among companies whose products have similar responsiveness to changes in prices of the service.
- **Consumers, and their characteristics**. Revenues will also be driven by the capacity of consumers to select among a range of alternatives. It will also depend on consumer's change in demand as a response to changes in their income (as a result of the evolution of the business cycle or shocks in the growth path which could increase consumption or encourage more consumers in the form of new connections). The analysis should also consider the consumer base as a criterion when selecting the list of comparators.
- **Competition**. The market structure will also have an influence on firm's revenues. More concentrated markets will tend to take longer to adapt to unexpected changes and have less impact on the profitability of the company (either in response to a change in the cost of inputs or as a result of the business cycle).
- **Regulatory framework**. Differences in regulatory frameworks can also have an impact on the systematic risk of a company (in particular, the envisaged controls can affect the rewards of regulated companies).
- **Country.** Companies exposure also depends on the degree of openness of their countries (businesses in closed economies are less affected by international developments).

**Operational Leverage**

Operational leverage is the ratio between fixed and variable costs within the cost structure of a company. A high proportion of fixed to variable costs increases the sensitivity of a company to the business cycle (variable costs can be reduced quickly in response to a change in demand, whereas fix costs cannot). Because it might be difficult to identify the fixed and variable costs of companies, the company's business model is usually taken as a proxy for companies' cost structure (and hence operational leverage).

## Selecting a well-suited peer group

To select an adequate peer group, we have followed the methodological approach of the previous study. These identified the different risk drives according to the following criteria: [1] Services, [2] Consumers, [3] Competition, [4] Regulatory framework, [5] Country, and [6] Cost structure/business model.

In the previous study it was concluded that:

- [1] Services was the most important criterion, and that this would typically correlate with other criteria such as [2] Customers, [3] Competition, and [6] Cost structure/business model.
- The second most important criterion was [5] Country, which would also lead to similarities in [2] Customers, [3] Competition and [4] Regulatory framework.
- Finally, it was also concluded that some other criteria such as [6] Cost structure/business model, and [3] competition are more difficult to test, as they cannot always be derived from publicly available information.

Our criteria for selection of comparators has therefore looked into those three main criteria, which we refer to as: relevant activities, geographic scope and business model identified.

**Relevant activities**

The relevant activities were taken from the activities the different regulated companies provide. We hence selected companies within the following sectors: "energy production", "energy production and distribution" and "energy and water companies" (undertaking both production and distribution activities).[35] This follows the practice used previously.[36]

**Geographic scope**

The geographic scope was delimited by taking into account the specific characteristics of the Dutch Caribbean region, and the fact that these can be described in terms of: (a) small islands, (b) situated in the Caribbean ocean and (c) part of a Western European country/economy. The geographical scope is therefore determined by the following geographical areas: Caribbean, Comparable islands and/or islands groups (Hawaii, Canary Islands, Mauritius, Channel Islands, France Polynesia, Açores, and the Falkland Islands), Europe, the United States of America and Latin America.

**Business model**

We undertook a detail review of the description of the activities of all the companies in the list.

- Because the main power-generation activities of the regulated companies can be related to the use of diesel plant (CG, SEC, STUCO, WEB), solar (SEC, STUCO, WEB), and wind turbines (CG, WEB), our selection of additional comparators was done mainly from sectors with included such activities (of relevance is the fact that the regulated companies are moving or have plans to more towards renewable energy technologies, something that it is expected to grow in the near future). On the basis of the business model criterion, we excluded additional companies which description included activities related to nuclear power generation or use of traditional inputs as main sources of energy production, and also those involved in the production and distribution of gas, steam or heat.
- The transmission activities undertaken by the three regulated companies (SEC, STUCO, WEB) involve small and independent networks (due to the insularity conditions in which they operate). For this reason, companies' descriptions which identified themselves as being active in large transmission networks were excluded from the group, as well as comparators for which distribution was undertaken in parallel with the production of energy using sources of inputs other than solar and wind.

[35] We looked at the possibility to include in the analysis "mixed" players, this is companies supplying more than one utility service. The Thomson Reuters classification provides a classification that accounts for this: "Other Multiline Utilities" consists of companies involved in at least two activities (electric, natural gas, and water utilities), none of them being dominant. However, we found that this classification included many companies that included many activities not relevant for the study (including many gas companies and other activities related to NICS sectors of "Steam and Air-Conditioning Supply", "Heating Equipment (except Warm Air Furnaces) Manufacturing", "Solid Waste Landfill" or "Ice Cream and Frozen Dessert Manufacturing"). Because of the potential errors in the inclusion of companies with unrelated activities we included only "pure players": establishments primarily engaged in the generation and distribution of electric power, and water services. This is consistent with the approach taken previously.

[36] In BCCF (2016) it was considered "pure players" in: (i) energy companies active in production and distribution, (ii) energy companies only active in production and (iii) water companies active in production and distribution. This constitutes our initial long-list of comparators.

- The comparators envisaged for the production and distribution of water segments of STUCO and WEB used companies active in the production and distribution of water and treatment of wastewaters.