

ENERGY MARKET AUTHORITY

# REVIEW OF VESTING CONTRACT FINANCIAL PARAMETERS

for the period of 1 January 2021 to 31 December 2022

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## EXECUTIVE SUMMARY

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As part of the Energy Market Authority's review of financial parameters for setting the Vesting Contract price for the period 1<sup>st</sup> January 2021 to 31<sup>st</sup> December 2022, WSP Consultancy Pte Ltd has engaged KPMG Services Pte Ltd as a financial advisor to assist EMA in their determination of the financial parameters.

KPMG's scope of work as the financial advisor includes the review of the following financial parameters that are necessary to arrive at the weighted average cost of capital (WACC):

- Risk-free rate;
- Debt premium;
- Cost of debt;
- Market risk premium;
- Equity beta;
- Cost of equity; and
- Proportion of debt to assets (or gearing).

As part of our review of the above parameters, we have also updated other parameters, such as relevant exchange rates and the MAS Core Inflation Index as and when necessary.

The draft post-tax nominal WACC, calculated following review of the above parameters, is **7.36%**.

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## ABBREVIATIONS & ACRONYMS

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CPI	Consumer Price Index
EMA	Energy Market Authority
EUR	Currency of Eurozone
LRMC	Long Run Marginal Cost
MAS	Monetary Authority of Singapore
MRP	Market Risk Premium
NEMS	National Electricity Market of Singapore
SGD	Currency of Singapore
SRMC	Short Run Marginal Cost
USD	Currency of USA
WACC	Weighted Average Cost of Capital
YoY	Year on year

# 1 INTRODUCTION

## 1.1 TERMS OF REFERENCE

The Energy Market of Authority (EMA) of Singapore introduced Vesting Contracts in January 2004 as a tool to mitigate the exercise of market power by commercial generation companies (Gencos) in the National Electricity Market of Singapore (NEMS). To achieve this, Gencos are required under their Vesting Contracts to sell a specified amount of electricity at a set price, thus removing an incentive for generation capacity to be withheld from the NEMS. The set price is estimated as the marginal Long Run Marginal Cost (LRMC) of a theoretical new power generation entrant to the Singapore market that utilises the most economic generation technology in operation that contributes to more than 25% of total demand.

This Draft Report presents KPMG's analysis and recommendations for the financial parameters and is aligned to EMA's procedures for calculating the components of the vesting contracts, as well as past practices adopted for prior reviews of parameters for the Vesting Contracts.

A summary of the financial parameters is presented in Table 1.1 below. For this Draft Report, these figures have been calculated with a Base Month of March 2020.

**Table 1.1 Summary of Financial Parameters**

<b>Financial Parameter</b>	<b>Unit</b>	<b>2021-2022</b>	<b>Report Reference</b>
Base Month	Month	March 2020	<b>2.1</b>
Exchange Rate	USD/SGD	1.39	<b>2.2</b>
	EUR/SGD	1.53	<b>2.2</b>
	EUR/USD	1.10	<b>2.2</b>
Corporate Tax Rate	%	17.00	<b>2.3</b>
MAS Core Inflation	%	0.03	<b>2.4</b>
Risk-free rate	%	1.89	<b>2.5</b>
Debt premium	%	1.80	<b>2.6</b>
Market Risk Premium	%	6.70	<b>2.7</b>
Equity beta	Number	1.14	<b>2.9</b>
Gearing	%	33.54	<b>2.10</b>
<b>Post-tax nominal WACC</b>	<b>%</b>	<b>7.36</b>	<b>2.11</b>

## 2 DETERMINATION OF FINANCIAL PARAMETERS

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### 2.1 BASE MONTH

A three-month averaging period has been adopted for the estimation of financial parameters in order to adjust for potential volatility that may occur in the financial markets. This is consistent with *EMA's procedures for calculating the components of the vesting contracts*. For this Draft Report, the Base Month is March 2020, thus data will be considered between 1 January 2020 and 31 March 2020.

The choice of Base Month influences the following financial parameters:

- Exchange rate;
- MAS Core Inflation;
- Risk-free rate; and
- Debt premium.

The COVID-19 global pandemic has introduced further volatility to the market during the averaging period. EMA has requested that KPMG consider two additional scenarios for this Draft Report for the financial parameters that form the cost of debt (i.e. the risk-free rate and debt premium only).

Two additional three-month time periods, between 1 December 2019 to 28 February 2020 (Alternative 1), and 1 October 2019 to 31 December 2019 (Alternative 2) were considered (Timing Scenarios). These dates were selected to analyse potential volatility while also keeping the timing of the financial data relatively consistent with the remaining parameters.

### 2.2 EXCHANGE RATES

Exchange rates used in the calculation of Vesting Contract components have been sourced from Bloomberg. The exchange rates are the average of the bid and ask rates for the three-month averaging period up-to and including the Base Month.

The calculated exchange rates are as follows:

- USD/SGD: 1.3854
- EUR/SGD: 1.5277
- EUR/USD: 1.1032

Daily exchange rate data can be found in Appendix A - Exchange Rates.

### 2.3 CORPORATE TAX RATE

The current Corporate Tax Rate for Singapore is **17.00%**, as noted by the Inland Revenue Authority of Singapore<sup>1</sup>.

### 2.4 MAS CORE INFLATION INDEX

The Monetary Authority of Singapore (MAS) Core Inflation Index is utilised in the computation of the post-tax real WACC. In line with *EMA's procedures for calculating the components of the vesting contracts*, a three-month average of MAS Core Inflation monthly index data has been calculated with March as the Base Month. The results are presented in Table 2.1 below.

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<sup>1</sup> Corporate Tax Rates, Inland Revenue Authority of Singapore, <https://www.iras.gov.sg/irashome/Businesses/Companies/Learning-the-basics-of-Corporate-Income-Tax/Overview-of-Corporate-Income-Tax/>.

**Table 2.1 MAS Core Inflation for averaging period**

Period	MAS Core Inflation Index value	Year-on-year growth (%)
January 2020	100.276	0.32%
February 2020	100.142	- 0.07%
March 2020	99.865	- 0.16%
<b>Three-month average</b>		<b>0.03%</b>

Source: Monetary Authority of Singapore, <http://www.mas.gov.sg/statistics/other-statistics.aspx>

The average inflation figure from January 2020 to March 2020 is lower than the preceding months due to the impact of COVID-19. For comparison, the average inflation between December 2019 to February 2020 was 0.28%, and the average inflation between October to December 2019 was 0.54%. Given the negative growth and the COVID-19 situation in Singapore as at the date of this report, this factor will need to be monitored for the Final Report.

## 2.5 RISK-FREE RATE

The risk-free rate represents the return that an investor would expect on a riskless asset. Typically, the yield of a government bond in a country with a strong credit rating is utilised to estimate a suitable risk-free rate. For the calculation of the WACC, the risk-free rate influences both the cost of debt and cost of equity.

Two important factors in considering a suitable treasury bond to use as the risk-free rate for the calculation of WACC in the Vesting Contracts are:

- **Relevance:** the government bond should be aligned to the Singapore market and reflect the risk conditions of this country; and
- **Tenure:** The tenure of the selected government bond should be aligned to the useful life of the asset that the WACC relates to. The useful life for the theoretical power plant is **25 years**, pursuant to WSP's review of technical parameters. Thus, a treasury bond should be chosen with a maturity that is closest to this.

Based on these factors, the government bond selected is NA16100H. It is a 30-year Singapore Government Security (SGS) issued on 1st March 2016 that will mature on 1st March 2046. With a remaining maturity of approximately 26 years, this bond most closely aligns to the 25-year useful life noted above.

The risk-free rate is **1.89%**, based upon a three-month average of closing yields for NA16100H up-to and including the Base Month.

Considering the alternative time periods due to the COVID-19 situation, the risk-free rate between December 2019 to February 2020 is 2.04%, and between October 2019 to December 2019 was 2.07%.

## 2.6 DEBT PREMIUM

The debt premium is the margin that a financier requires in excess of the risk-free rate in order to lend funds. Entity financial health, sector of operation, and corporate credit rating are among many factors that can influence the debt premium for an entity.

Analysing the debt premium of entities in a similar sector and of a similar risk rating is a suitable method to estimate a debt premium for a theoretical power plant entrant. Consistent with prior determinations of the Vesting Contract parameters, we have selected the Moody's Baa Utility Bond Index as a suitable



proxy for the cost of debt of a theoretical power plant entrant in Singapore. The Daily Treasury Yield Curve Rates of 30-year securities from the United States Department of Treasury was adopted as the risk-free rate to arrive at the debt premium.

The calculated debt premium is **1.80%**, based upon a three-month average up-to and including the Base Month. The daily data utilised in calculating the debt premium can be found in Appendix C - Debt Premium.

Considering the alternative time periods due to the COVID-19 situation, the debt premium between December 2019 to February 2020 is 1.42%, and between October 2019 to December 2019 was 1.48%. The calculated debt premium for the Base Month is higher than the alternative time periods due to a sharp increase in the Moody's Baa Utility Index from mid-March coupled with a decline in the US 30-year securities daily yield.

To understand this timing impact on the cost of debt, we have provided these in Table 2.2 for each of the Timing Scenarios. To avoid changing approach, KPMG recommends for this Draft Report that the Base Month is retained as per the standard approach for review of the vesting contract parameters.

**Table 2.2 Impact of timing on pre-tax cost of debt**

Timing Scenario	Risk-free rate	Debt premium	Pre-tax cost of debt
Base Month (Jan 2020 – Mar 2020)	1.89%	1.80%	<b>3.69%</b>
Alternative 1 (Dec 2019 – Feb 2020)	2.04%	1.42%	<b>3.46%</b>
Alternative 2 (Oct 2019 – Dec 2019)	2.07%	1.48%	<b>3.55%</b>

KPMG will revisit this factor for the Final Report to understand any changes in financial markets in subsequent months.

## 2.7 MARKET RISK PREMIUM

The market risk premium (MRP) represents the rate of return in excess of a risk-free rate that an investor expects to receive from a risky investment<sup>2</sup>. While there are numerous methods for estimating the MRP, we have utilised the following three in determining the MRP based on feedback from EMA:

- Implied MRP
- Overseas benchmarks and
- Dividend growth model

The calculated MRP is **6.70%**, representing the mean of the range of MRP estimates considered. These values are summarised in Table 2.3 and are discussed further below.

**Table 2.3 Calculation of MRP**

Method	MRP (%)
Implied MRP	6.01%
Overseas benchmarks	6.73%
Dividend growth model	7.35%
<b>Mean</b>	<b>6.70%</b>

<sup>2</sup> In this context, a risky investment is simply one that is not risk-free

### 2.7.1 IMPLIED MARKET RISK PREMIUM

In his annual series on the equity risk premium<sup>3</sup>, Damodaran puts forward several alternative methods for estimating the equity risk premium. Among these is an implied equity risk premium using a dividend discount model. This uses current market data, expected dividends and an expected growth rate to solve for a required return on equity. The implied equity risk premium can then be arrived at per the below formula:

$$\text{Implied equity risk premium} = \text{Required return on equity} - \text{risk free rate}$$

Damodaran utilises the S&P 500 in the United States as the reference index for calculating the implied equity risk premium. To calculate an implied equity risk premium for different countries, he also includes a country risk adjustment based on sovereign risk and local market volatility<sup>4</sup>. For Singapore, there is no country risk adjustment to the baseline implied equity risk premium due to its Aaa sovereign risk rating.

The implied MRP is **6.01%**, as computed by Damodaran as of 1st April 2020<sup>5</sup>. Damodaran notes these values have been revisited due to 'unprecedented volatility' in market data.

### 2.7.2 OVERSEAS BENCHMARKS

Several regulators in overseas markets calculate a WACC when determining an allowed rate of return for regulated entities. These include entities operating in a range of sectors such as electricity, gas, water, and rail. From this, the MRP can be extracted given it is a component of the cost of equity.

In selecting appropriate overseas benchmarks, we have opted for determinations governing regulated electricity assets in developed economies with a similar risk profile to Singapore. We have then selected the most recent determination or decision released by the relevant regulator to extract the MRP. The mean of these values was then taken to provide the MRP based on overseas benchmarks.

The MRP based on overseas benchmarks is **6.73%**, as shown in Table 2.4 below.

**Table 2.4 MRP based on overseas benchmarks**

Year	Regulator	Sector	MRP
2019	Ofgem (UK) <sup>6</sup>	Electricity	7.39% <sup>7</sup>
2019	Australian Energy Regulator (AU) <sup>8</sup>	Electricity	6.10%
2019	Commerce Commission New Zealand (NZ) <sup>9</sup>	Electricity	6.69% <sup>10</sup>
<b>Mean</b>			<b>6.73%</b>

### 2.7.3 DIVIDEND GROWTH MODEL

Bloomberg provides estimates of an MRP for each country (titled a Country Risk Premium) that is calculated as the difference between an estimated market return and the risk-free rate for the given

<sup>3</sup> Equity Risk Premiums (ERP): Determinants, Estimation and Implications – The 2020 Edition, Aswath Damodaran, March 2020.

<sup>4</sup> Country Default Spreads and Risk Premiums, Aswath Damodaran, [http://pages.stern.nyu.edu/~adamodar/New\\_Home\\_Page/datafile/ctryprem.html](http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/ctryprem.html)

<sup>5</sup> Ibid.

<sup>6</sup> RIIO-2 Sector Specific Methodology Decision – Finance, Ofgem, May 2019

<sup>7</sup> Calculated as the difference between Total Market Returns (TMR) and the risk-free rate stated by Ofgem, adjusted from CFIH real terms to nominal terms.

<sup>8</sup> Rate of return Annual Update, Australian Energy Regulator, December 2019

<sup>9</sup> Cost of capital determination for electricity distribution businesses' 2020-2025 default price-quality paths and Transpower New Zealand Limited's 2020-2025 individual price-quality path, Commerce Commission New Zealand, 2019

<sup>10</sup> Market risk premium is derived based on the tax-adjusted market risk premium of 7.00%, a risk-free rate of 1.12%, and an average corporate tax rate of 28%.

country. For clarity, the risk-free rate assumed by Bloomberg is a generic 10-year treasury security (for Singapore this is the MAS 10-year Benchmark Government Bond Yield).

The MRP based on the dividend growth model is **7.35%**, as of 31<sup>st</sup> March 2020.

## 2.8 COMPARATOR COMPANIES

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### 2.8.1 METHODOLOGY

To calculate the equity beta and gearing of a theoretical power plant entrant to Singapore, market data of appropriate companies can be utilised to calculate proxy values. Utilising the data of multiple companies can assist in addressing outliers or volatility.

Consistent with prior reviews of the Vesting Contract parameters, we have constructed a set of comparator companies from with reference to the five screening criteria described below. An entity that fails any one of the criteria is excluded from the comparator set.

#### **Availability of information**

An entity must be publicly listed and have at least five years of financial data available.

Our screening exercise only included companies that are publicly listed. KPMG has reviewed Annual Reports to confirm that at least five years of financial data has been published.

#### **Financial health**

An entity must not have had a major, adverse financial event in the last five years. This includes events such as insolvency or restructuring.

To review this factor, we analysed Annual Reports and corporate disclosures from companies that discussed such events that had occurred. Where such an event has occurred, the entity fails this criterion. We have also reviewed the 5-year probability of default based on Bloomberg's Default Risk Model and excluded an entity if the figure is greater than 10%.

#### **Geographical location of revenues**

An entity must source a majority (i.e. 50% or more) of its total revenue from countries with a similar sovereign risk rating to Singapore.

To assess this criterion, we considered the following:

- **Similar sovereign risk rating:** Singapore sovereign risk rating is assessed by Moody's as Aaa. Consistent with prior reviews, our Capital IQ company search screened companies to only consider those listed in countries with a sovereign risk rating between Aaa - Aa2. Appendix B – Comparator Company Data outlines the countries that fall within this range.
- **Geographical location of revenues:** Annual Reports and company disclosures were reviewed to confirm where an entity sources its revenues. To meet the criteria, 50% or more of the entity's total revenues must be sourced from countries noted in Appendix B – Comparator Company Data.

#### **Source of revenues**

Only companies that earned the majority of their revenues through wholesale electricity generation and/or retailing in merchant markets were considered.

As part of our initial company screening, our Capital IQ company search included companies classified in the following industries:

- Electric Power Generation by Fossil Fuels;
- Independent Power and Renewable Electricity Producers; and

- Multi-utilities.

Company disclosures and publicly available information were then reviewed (particularly segment financial data) to determine the split of an entity's revenues and whether it passes this criterion. In evaluating this split, we note the following:

- Revenues from activities such as wholesale power generation and the retailing of electricity in merchant markets were included. Where relevant, portfolio optimisation revenues were also included as these relate to risk management activities undertaken by electricity businesses engaged in merchant markets.
- Revenues from rate-regulated electricity retailing (such as many United States utilities), regulated electricity networks, long-term bilateral electricity contracts and gas/other utility businesses were all excluded.

### **Generation portfolio**

An entity's power generation portfolio must comprise a majority (i.e. 50% or more) of thermal generation assets.

This criterion was evaluated based on the installed capacity of an entity's power generation assets, sourced from Annual Reports or other company disclosure documents. Our definition of thermal generation assets excluded nuclear power plants as these face different financial and operational constraints to coal- and gas-fired generators. Furthermore, Singapore has no installed nuclear power plants nor publicly announced plans to construct same, so it does not reflect a theoretical power plant entrant to this market.

## **2.8.2 SELECTED COMPARATOR COMPANIES**

Based on the above criteria, the screening resulted in the following four comparator companies:

- AGL Energy Limited (ASX: AGL)
- Origin Energy Limited (ASX: ORG)
- Genesis Energy Limited (NZSE: GNE) and
- SSE plc (LSE: SSE)

Please refer to Appendix B – Comparator Company Data for the profiles of the four comparator companies. We have also documented our evaluation of shortlisted companies that did not pass all criteria to be included in the comparator set. For the avoidance of doubt, our shortlist included the three entities that were included in the comparator set for the immediately preceding review of the Vesting Contract parameters. However, as detailed in Appendix B – Comparator Company Data, two of these three entities failed our assessment of the evaluation criteria for this review of the Vesting Contract parameters.

## **2.9 EQUITY BETA**

Equity beta reflects a selected security or portfolio's volatility in comparison to its market. An equity beta greater than 1 indicates the security or portfolio is more volatile than its market, while an equity beta less than 1 indicates the inverse. The equity beta includes the impact of capital structure of the selected security or portfolio whereas an asset beta excludes leverage in its calculation.

We have considered an equity beta for the theoretical power plant entrant with reference to our comparator set. The methodology to calculate the equity beta is as follows:

1. Obtain the 5-year levered (equity) beta based on weekly returns for each of the comparator companies;

2. De-lever levered beta based on the applicable 5-year average gearing and tax rate for each of the comparator companies to obtain the asset beta;
3. Calculate the R<sup>2</sup> weighted average asset beta of comparator companies; and
4. Re-lever beta based on gearing as determined in Section 2.10 below and the Singapore corporate tax rate of 17% as specified in Section 2.3.

The relationship between unlevered beta and levered beta follows the following equation:

$$\text{Levered beta} = \text{Asset beta} \times \left( 1 + (1 - t) \times \frac{D}{E} \right)$$

Based on this approach, the equity beta is **1.14**. The calculations for equity beta based on the comparator set are detailed in Appendix D - Beta Calculations.

## 2.10 GEARING

An entity's gearing level reflects its financing mix of debt and equity. A higher level of gearing indicates a higher level of leverage, that is, a company is financed by a greater ratio of debt than equity. Gearing influences, the calculation of the WACC as it is used to weight the cost of equity and cost of debt. To provide a proxy gearing level of the theoretical power plant entrant, we have analysed the mean gearing levels for each entity within the comparator set over a trailing 5-year period, commencing from the end of the Base Month.

The gearing is **34%**. A breakdown of the data used to calculate this can be found in Appendix E - Comparator Company Gearing Data.

## 2.11 WEIGHTED AVERAGE COST OF CAPITAL

The formula to calculate WACC is expressed as follows:

$$\text{WACC} = \left( (r_f + DP) \times (1 - t) \right) \times g + \left( r_f + \beta(r_m - r_f) \right) \times (1 - g)$$

With reference to this formula, and the financial parameters calculated for this Draft Report, the relevant WACC values are as follows:

- Post-tax nominal WACC : 7.36%
- Post-tax real WACC : 7.33%
- Pre-tax real WACC : 8.84%

The calculation of the post-tax nominal WACC is shown in Table 2.5 for this Draft Report, as well as the values determined for the prior two Vesting Contract reviews.

**Table 2.5 Calculation of the post-tax nominal WACC**

Parameter	2017-18	2019-20	2021-22
Risk-free rate $r_f$	2.54%	2.86%	1.89%
Debt premium $DP$	2.61%	2.64%	1.80%
Gearing $g$	0.46	0.47	0.34
Equity beta $\beta$	1.00	1.00	1.14
Market risk premium $r_m - r_f$	6.12%	6.53%	6.70%
Tax rate $t$	17.00%	17.00%	17.00%
Cost of equity	8.66%	9.39%	9.53%
Pre-tax cost of debt	5.15%	5.50%	3.69%
Post-tax nominal WACC	6.65%	7.13%	7.36%

## APPENDIX A - EXCHANGE RATES

### EXCHANGE RATES [USD/SGD]

Daily USD/SGD Exchange Rate								
Date	Bid	Ask	Date	Bid	Ask	Date	Bid	Ask
1/1/2020	1.3445	1.3454	3/2/2020	1.3680	1.3692	2/3/2020	1.3899	1.3910
2/1/2020	1.3465	1.3477	4/2/2020	1.3699	1.3710	3/3/2020	1.3876	1.3890
3/1/2020	1.3468	1.3518	5/2/2020	1.3806	1.3821	4/3/2020	1.3838	1.3854
6/1/2020	1.3491	1.3495	6/2/2020	1.3854	1.3860	5/3/2020	1.3825	1.3836
7/1/2020	1.3484	1.3511	7/2/2020	1.3887	1.3902	6/3/2020	1.3769	1.3800
8/1/2020	1.3503	1.3519	10/2/2020	1.3891	1.3899	9/3/2020	1.3839	1.3853
9/1/2020	1.3510	1.3523	11/2/2020	1.3860	1.3868	10/3/2020	1.3910	1.3920
10/1/2020	1.3469	1.3499	12/2/2020	1.3861	1.3869	11/3/2020	1.3948	1.3954
13/1/2020	1.3463	1.3468	13/2/2020	1.3887	1.3900	12/3/2020	1.4070	1.4119
14/1/2020	1.3464	1.3471	14/2/2020	1.3902	1.3944	13/3/2020	1.4135	1.4164
15/1/2020	1.3459	1.3462	17/2/2020	1.3890	1.3897	16/3/2020	1.4204	1.4214
16/1/2020	1.3469	1.3475	18/2/2020	1.3923	1.3930	17/3/2020	1.4280	1.4304
17/1/2020	1.3464	1.3482	19/2/2020	1.3943	1.3949	18/3/2020	1.4422	1.4468
20/1/2020	1.3465	1.3469	20/2/2020	1.4005	1.4016	19/3/2020	1.4486	1.4531
21/1/2020	1.3495	1.3503	21/2/2020	1.3957	1.3998	20/3/2020	1.4483	1.4529
22/1/2020	1.3486	1.3491	24/2/2020	1.3992	1.4004	23/3/2020	1.4590	1.4629
23/1/2020	1.3507	1.3517	25/2/2020	1.3983	1.3993	24/3/2020	1.4459	1.4466
24/1/2020	1.3495	1.3524	26/2/2020	1.3972	1.3982	25/3/2020	1.4469	1.4479
27/1/2020	1.3573	1.3581	27/2/2020	1.3949	1.3954	26/3/2020	1.4305	1.4318
28/1/2020	1.3575	1.3580	28/2/2020	1.3920	1.3945	27/3/2020	1.4236	1.4300
29/1/2020	1.3597	1.3615				30/3/2020	1.4236	1.4260
30/1/2020	1.3615	1.3632				31/3/2020	1.4209	1.4231
31/1/2020	1.3638	1.3658						
<b>3-month average of mid-price</b>					<b>1.3854</b>			

## EXCHANGE RATES [EUR/SGD]

Daily EUR/SGD Exchange Rate								
Date	Bid	Ask	Date	Bid	Ask	Date	Bid	Ask
1/1/2020	1.5072	1.5096	3/2/2020	1.5127	1.5147	2/3/2020	1.5472	1.5488
2/1/2020	1.5042	1.5059	4/2/2020	1.5129	1.5140	3/3/2020	1.5497	1.5525
3/1/2020	1.5034	1.5094	5/2/2020	1.5184	1.5202	4/3/2020	1.5404	1.5435
6/1/2020	1.5104	1.5113	6/2/2020	1.5213	1.5227	5/3/2020	1.5530	1.5556
7/1/2020	1.5037	1.5070	7/2/2020	1.5199	1.5220	6/3/2020	1.5537	1.5571
8/1/2020	1.4992	1.5015	10/2/2020	1.5155	1.5168	9/3/2020	1.5828	1.5874
9/1/2020	1.5002	1.5022	11/2/2020	1.5128	1.5140	10/3/2020	1.5687	1.5708
10/1/2020	1.4981	1.5015	12/2/2020	1.5068	1.5085	11/3/2020	1.5714	1.5731
13/1/2020	1.4988	1.4999	13/2/2020	1.5051	1.5073	12/3/2020	1.5738	1.5802
14/1/2020	1.4981	1.4995	14/2/2020	1.5059	1.5094	13/3/2020	1.5696	1.5740
15/1/2020	1.5005	1.5012	17/2/2020	1.5047	1.5062	16/3/2020	1.5872	1.5907
16/1/2020	1.4996	1.5009	18/2/2020	1.5020	1.5035	17/3/2020	1.5700	1.5738
17/1/2020	1.4931	1.4956	19/2/2020	1.5062	1.5078	18/3/2020	1.5731	1.5798
20/1/2020	1.4936	1.4945	20/2/2020	1.5101	1.5121	19/3/2020	1.5481	1.5543
21/1/2020	1.4953	1.4969	21/2/2020	1.5146	1.5179	20/3/2020	1.5433	1.5556
22/1/2020	1.4956	1.4967	24/2/2020	1.5184	1.5200	23/3/2020	1.5639	1.5704
23/1/2020	1.4927	1.4948	25/2/2020	1.5213	1.5229	24/3/2020	1.5596	1.5610
24/1/2020	1.4876	1.4915	26/2/2020	1.5201	1.5221	25/3/2020	1.5741	1.5761
27/1/2020	1.4954	1.4965	27/2/2020	1.5341	1.5354	26/3/2020	1.5774	1.5801
28/1/2020	1.4962	1.4971	28/2/2020	1.5348	1.5376	27/3/2020	1.5874	1.5937
29/1/2020	1.4968	1.4994				30/3/2020	1.5710	1.5763
30/1/2020	1.5015	1.5042				31/3/2020	1.5664	1.5710
31/1/2020	1.5129	1.5150						
<b>3-month average of mid-price</b>					<b>1.5277</b>			

## EXCHANGE RATES [EUR/USD]

Daily EUR/USD Exchange Rate								
Date	Bid	Ask	Date	Bid	Ask	Date	Bid	Ask
1/1/2020	1.1209	1.1217	3/2/2020	1.1065	1.1065	2/3/2020	1.1085	1.1085
2/1/2020	1.1198	1.1199	4/2/2020	1.1055	1.1056	3/3/2020	1.1112	1.1113
3/1/2020	1.115	1.1171	5/2/2020	1.1019	1.1019	4/3/2020	1.1136	1.1137
6/1/2020	1.1196	1.1197	6/2/2020	1.1001	1.1002	5/3/2020	1.1170	1.1170
7/1/2020	1.1176	1.1177	7/2/2020	1.0943	1.0949	6/3/2020	1.1279	1.1289
8/1/2020	1.1127	1.1128	10/2/2020	1.0949	1.0950	9/3/2020	1.1424	1.1425
9/1/2020	1.1110	1.1110	11/2/2020	1.0918	1.0919	10/3/2020	1.1353	1.1354
10/1/2020	1.1111	1.1132	12/2/2020	1.0918	1.0919	11/3/2020	1.1327	1.1327
13/1/2020	1.1117	1.1117	13/2/2020	1.0874	1.0874	12/3/2020	1.1233	1.1234
14/1/2020	1.1134	1.1134	14/2/2020	1.0826	1.0836	13/3/2020	1.1093	1.1122
15/1/2020	1.1139	1.1139	17/2/2020	1.0847	1.0847	16/3/2020	1.1165	1.1166
16/1/2020	1.1157	1.1158	18/2/2020	1.0827	1.0827	17/3/2020	1.1028	1.1029
17/1/2020	1.1086	1.1098	19/2/2020	1.0800	1.0801	18/3/2020	1.1000	1.1001
20/1/2020	1.1084	1.1084	20/2/2020	1.0792	1.0793	19/3/2020	1.0782	1.0784
21/1/2020	1.1104	1.1104	21/2/2020	1.0843	1.0850	20/3/2020	1.0660	1.0717
22/1/2020	1.1086	1.1086	24/2/2020	1.0816	1.0816	23/3/2020	1.0691	1.0692
23/1/2020	1.1091	1.1092	25/2/2020	1.0838	1.0838	24/3/2020	1.0881	1.0882
24/1/2020	1.1020	1.103	26/2/2020	1.0886	1.0887	25/3/2020	1.0806	1.0807
27/1/2020	1.1028	1.1028	27/2/2020	1.0940	1.0940	26/3/2020	1.0953	1.0954
28/1/2020	1.1019	1.1019	28/2/2020	1.1022	1.1031	27/3/2020	1.1134	1.1149
29/1/2020	1.1001	1.1002				30/3/2020	1.1067	1.1068
30/1/2020	1.1014	1.1015				31/3/2020	1.0947	1.0949
31/1/2020	1.1088	1.1098						
<b>3-month average of mid-price</b>				1.1032				

Source: Bloomberg (Ticker: EURUSD BGN Currency)



## APPENDIX B – COMPARATOR COMPANY DATA

### SOVEREIGN RISK RATINGS OF SIMILAR COUNTRIES

Country	Moody's ratings
Abu Dhabi	Aa2
Australia	Aaa
Austria	Aa1
Canada	Aaa
Denmark	Aaa
Finland	Aa1
France	Aa2
Germany	Aaa
Hong Kong	Aa3
Isle of Man	Aa2
Kuwait	Aa2
Liechtenstein	Aaa
Luxembourg	Aaa
Netherlands	Aaa
New Zealand	Aaa
Norway	Aaa
Singapore	Aaa
South Korea	Aa2
Sweden	Aaa
Switzerland	Aaa
United Arab Emirates	Aa2
United Kingdom	Aa2
United States	Aaa

Source: *Country Default Spreads and Risk Premiums*, Aswath Damodaran,

[http://pages.stern.nyu.edu/~adamodar/New\\_Home\\_Page/datafile/ctryprem.html](http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/ctryprem.html)

## COMPARATOR COMPANY PROFILES

Company	Description
AGL Energy Limited (ASX:AGL)	AGL Energy Limited provides energy to residential, small and large business, and wholesale customers in Australia. It operates in four segments: Wholesale Markets, Customer Markets, Group Operations, and Investments. The company engages in generating electricity through thermal, hydro, wind, and solar power generation plants; gas storage activities; and the retail sale of electricity, gas, solar, and energy products and services. The company operates electricity generation portfolio of 10,413 megawatts; the Newcastle gas storage facility in New South Wales; the Silver Springs underground gas storage facility in Queensland; natural gas production assets at Camden in New South Wales; and the North Queensland gas assets. It serves 3.7 million customer accounts. AGL Energy Limited was founded in 1837 and is based in Sydney, Australia.
Origin Energy Limited (ASX: ORG)	Origin Energy Limited, an integrated energy company, engages in the exploration and production of natural gas, electricity generation, wholesale and retail sale of electricity and gas, and sale of liquefied natural gas in Australia and internationally. The company operates in Energy Markets and Integrated Gas segments. Its exploration and production portfolio includes the Bowen and Surat basins in Queensland; the Browse basin in Western Australia; and the Beetaloo Basin in the Northern Territory. The company also generates electricity from coal, wind, pumped water storage, solar, and cogeneration plants; sells electricity, natural gas, and LPG; provides GreenPower and green gas products; and supplies LPG to homes and businesses. In addition, it offers electric and gas hot water systems, as well as hot water systems repair and replacement services; split system air conditioners; ducted heating solutions; and ducted evaporative cooling systems. The company serves approximately 4.2 million electricity customers. Origin Energy Limited was founded in 1946 and is based in Barangaroo, Australia.
Genesis Energy Limited (NZSE: GNE)	Genesis Energy Limited generates, trades in, and sells electricity to residential and business customers in New Zealand. The company generates electricity from thermal, hydro, and wind sources. Its Retail segment supplies energy, including electricity, gas, and LPG to end-users, as well as provides related services. The company's Wholesale segment engages in the supply of electricity to the wholesale electricity market; supply of gas and LPG to wholesale customers and retail segment; and purchase and sale of derivatives to fix the price of electricity. Its Kupe segment is involved in the exploration, development, and production of gas and petroleum products; and supply of gas and LPG to the wholesale segment, and light oil. The company's generation asset portfolio includes the Huntly power station with a generation capacity of 953 MW; Tongariro Power Scheme that comprises three power stations with a generation capacity of 361.8MW; Waikaremoana Power Scheme, which include three power stations with a generation capacity of 138 MW; and Tekapo Power Scheme with a generation capacity of 179 MW; and Hau Nui wind farm with 15 wind turbines. It sells electricity, natural gas, and LPG to approximately 500,000 customers under the Genesis Energy and Energy Online brands. Genesis Energy Limited also offers solar power products and bottled LPG; and property rental services. The company was formerly known as Genesis Power Limited and changed its name to Genesis Energy Limited in September 2013. Genesis Energy Limited was incorporated in 1998 and is headquartered in Auckland, New Zealand.
SSE plc (LSE:SSE)	SSE plc engages in the generation, transmission, distribution, and supply of electricity. The company operates through three segments: Wholesale, Networks, and Retail. It generates electricity from water, water, gas, coal, oil, and multi fuel. The company distributes electricity to approximately 3.8 million homes and businesses across the north of the central belt of Scotland and also central southern England; and owns and operates 132 kilovolts (KV), 275kV, and 400kV electricity transmission network using high voltage overhead lines, and underground and subsea cables. It also produces, stores, distributes, and supplies gas. In addition, it engages in electricity and utility contracting, telecommunications, energy trading, insurance, and property holding businesses, as well as provision of corporate and maintenance services. The company was formerly known as Scottish and Southern Energy plc and changed its name to SSE plc in September 2011. SSE plc was incorporated in 1989 and is based in Perth, the United Kingdom.

Source: Capital IQ

## SHORTLISTED COMPANIES AND ASSESSMENTS CRITERIA

### COMPANIES ADDED TO COMPARATOR PANEL

Criteria	AGL Energy Limited	Origin Energy Limited	Genesis Energy Limited	SSE plc
<i>Availability of information</i>	PASS - publicly listed information available for last 5 years	PASS - publicly listed information available for last 5 years	PASS - publicly listed information available for last 5 years	PASS - publicly listed information available for last 5 years
<i>Financial health</i>	PASS - no adverse financial impact in last five years	PASS - no adverse financial impact in last five years	PASS - no adverse financial impact in last five years	PASS - no adverse financial impact in last five years
<i>Geographical location of revenues</i>	PASS - Australia	PASS - Australia	PASS - New Zealand	PASS - United Kingdom
<i>Revenue from electricity generation and sales in merchant markets</i>	PASS - 34% of the Company's revenues are from generation sales to pool, and 46% is from sales of electricity.	PASS - 14% of Company's revenues are from generation sales to pool, and 58% is from sales of electricity.	PASS - 82% of the Company's revenues are from wholesale (47%) and retail (35%) sales of electricity.	PASS - majority of Company's revenues for 2019 come from electricity generation (7%), energy portfolio management (20%) and the retailing of energy (57%).
<i>Generation portfolio is predominately thermal</i>	PASS - the majority of the Company's 10,413MW generation fleet is thermal (either coal- or gas-fired)	PASS - 81% of the Company's generation fleet of 7,476MW is thermal (either coal- or gas-fired).	PASS - 58% of the Company's total generation fleet of 1,652MW is gas-fired generation.	PASS - 64% of the Company's total installed capacity comprises thermal generation.
<i>Added to comparator list?</i>	✓	✓	✓	✓
<i>Selected in prior (last 3) determinations?</i>				2019/20 2017/18 2015/16

### SHORTLISTED COMPANIES EXCLUDED FROM COMPARATOR SET

Criteria	EVN AG	Drax Group plc	NRG Energy Inc	Vistra Energy Corp
<i>Availability of information</i>	PASS - publicly listed information available for last 5 years	PASS - publicly listed information available for last 5 years	PASS - publicly listed information available for last 5 years	PASS - publicly listed information available for last 5 years
<i>Financial health</i>	PASS - no adverse financial impact in last five years	PASS - no adverse financial impact in last five years	FAIL - in June 2017, the GenOn Entities (subsidiaries of the Company) filed for Chapter 11 bankruptcy and the Company deconsolidated the	FAIL - the current entity is the successor entity to TCEH Corp that emerged from Chapter 11

Criteria	EVN AG	Drax Group plc	NRG Energy Inc	Vistra Energy Corp
			relevant entities from the financial statements and recorded a USD\$206 million loss. Overall, a USD\$2,337 million loss was reported in 2017.	bankruptcy in October 2016.
Geographical location of revenues	PASS - Austria (54%), Germany (3%)	PASS - United Kingdom, United States	PASS - Canada, United States	PASS - United States
Revenue from electricity generation and sales in merchant markets	FAIL - the energy and generation segments only accounted for 35% of the Company's 2019/20 revenues. While the South East Europe segment (the Company's largest by revenue) is involved in the generation and sale of electricity, it also operates electricity network assets and the Company does not provide a breakdown of revenues that would allow us to reliably evaluate this criterion.	FAIL - While 52% of the Company's revenues in 2019 were external sales of electricity generation and 48% was from the retailing of energy, majority of actual generation output is by biomass.  Drax Group plc currently receives subsidies (in the form of contracts for difference) whereby it receives compensation on top of market prices for its coal-fired units that have been converted to biomass. This is not indicative of the Singapore market nor does it represent pure sales in merchant markets.	PASS - the majority of the Company's revenues are from sales of generation or retailing of energy. 19% of revenues were derived from energy or capacity revenue, and 78% of revenues were from retailing (per 2019 Annual Report). Per this Report, the Company states the majority of its business is in Texas, where it participates in the deregulated ERCOT market and is not subject to rate-regulation (thus it derives revenues from a merchant market).	PASS - For 2019, 27% of revenues were derived from wholesale generation revenue and 42% came from retail electricity in the ERCOT market (deregulated energy-only market in Texas).
Generation portfolio is predominately thermal	FAIL - March 2020 company presentation notes that only 42% of installed capacity is thermal generation (719MW of a total 1,704MW)	PASS - per 2019 Annual Report, 51% of the Company's 6,500MW generation capacity is either gas- or coal-fired. For the avoidance of doubt, this 51% <b>excludes</b> the capacity at Drax Power Station that was converted to biomass.	PASS - 93% of the Company's generation assets are from thermal sources (either coal, gas or oil)	PASS - 93% of the Company's generation portfolio of 38,448MW comprises coal- or gas-fired generation.

Criteria	EVN AG	Drax Group plc	NRG Energy Inc	Vistra Energy Corp
Added to comparator list?	x	x	x	x
Selected in prior (last 3) determinations?		2017/18	2017/18	

#### SHORTLISTED COMPANIES EXCLUDED FROM COMPARATOR SET (CONT.)

Criteria	Capital Power Corporation	TransAlta Corp	RWE AG
Availability of information	PASS - publicly listed information available for last 5 years	PASS - publicly listed information available for last 5 years	PASS - publicly listed information available for last 5 years
Financial health	PASS - no adverse financial impact in last five years	PASS - no adverse financial impact in last five years	FAIL - RWE's business has undergone major changes in the last 5 years. In 2016, RWE's renewable, retail and power grid operations were spun off to Innogy SE. In 2019, E.ON agreed to an asset swap that provided a significant portion of renewable generation to RWE. In 2020, the renewable assets transferred out in 2016 will be returned to RWE.
Geographical location of revenues	PASS - Canada, United States	PASS - Australia, Canada, United States	PASS - Germany (36%), UK (38%)
Revenue from electricity generation and sales in merchant markets	FAIL - Only 37% of the Company's total revenues were from merchant sources (the Alberta Commercial segment).	FAIL - for 2019, the "Revenue from other" line item (which includes merchant revenues) only comprised 35% of total revenues. 52% of total revenues were derived from contracts with customers or leases relating to PPAs/long-term contracts.	PASS - For 2019, 78% of revenue from electricity, of which 80% is from supply and trading.
Generation portfolio is predominately thermal	PASS - Capital Power Corporation's generation portfolio is 82% thermal generation.	PASS - 72% of the Company's generation portfolio comprise thermal assets (either coal- or gas-fired)	PASS - 65% of the Group's generation capacity of 42,863 MW comprise thermal assets (either coal- or gas-fired)
Added to comparator list?	x	x	x
Selected in prior (last 3) determinations?	2019/20 2017/18	2019/20 2015/16	

## APPENDIX C - DEBT PREMIUM

Date	Moody's Bond Utility Baa Index	30-year US Treasury Bonds	Debt Premium
2/1/2020	3.72	2.33	1.39
3/1/2020	3.64	2.26	1.38
6/1/2020	3.68	2.28	1.4
7/1/2020	3.71	2.31	1.4
8/1/2020	3.77	2.35	1.42
9/1/2020	3.73	2.38	1.35
10/1/2020	3.67	2.28	1.39
13/1/2020	3.69	2.3	1.39
14/1/2020	3.66	2.27	1.39
15/1/2020	3.62	2.23	1.39
16/1/2020	3.63	2.26	1.37
17/1/2020	3.65	2.29	1.36
21/1/2020	3.58	2.23	1.35
22/1/2020	3.57	2.22	1.35
23/1/2020	3.54	2.18	1.36
24/1/2020	3.49	2.14	1.35
27/1/2020	3.45	2.05	1.4
28/1/2020	3.49	2.1	1.39
29/1/2020	3.46	2.05	1.41
30/1/2020	3.45	2.04	1.41
31/1/2020	3.44	1.99	1.45
3/2/2020	3.44	2.01	1.43
4/2/2020	3.51	2.08	1.43
5/2/2020	3.55	2.14	1.41
6/2/2020	3.52	2.11	1.41
7/2/2020	3.45	2.05	1.4
10/2/2020	3.44	2.03	1.41
11/2/2020	3.46	2.05	1.41
12/2/2020	3.51	2.09	1.42
13/2/2020	3.49	2.07	1.42
14/2/2020	3.45	2.04	1.41
18/2/2020	3.42	2	1.42
19/2/2020	3.43	2.01	1.42
20/2/2020	3.39	1.97	1.42

Date	Moody's Bond Utility Baa Index	30-year US Treasury Bonds	Debt Premium
21/2/2020	3.37	1.9	1.47
24/2/2020	3.31	1.84	1.47
25/2/2020	3.31	1.8	1.51
26/2/2020	3.32	1.81	1.51
27/2/2020	3.34	1.79	1.55
28/2/2020	3.27	1.65	1.62
2/3/2020	3.28	1.66	1.62
3/3/2020	3.24	1.64	1.6
4/3/2020	3.25	1.67	1.58
5/3/2020	3.18	1.56	1.62
6/3/2020	3.01	1.25	1.76
9/3/2020	3.06	0.99	2.07
10/3/2020	3.31	1.28	2.03
11/3/2020	3.47	1.3	2.17
12/3/2020	3.73	1.49	2.24
13/3/2020	3.9	1.56	2.34
16/3/2020	3.72	1.34	2.38
17/3/2020	4.18	1.63	2.55
18/3/2020	4.61	1.77	2.84
19/3/2020	4.74	1.78	2.96
20/3/2020	4.69	1.55	3.14
23/3/2020	4.62	1.33	3.29
24/3/2020	4.61	1.39	3.22
25/3/2020	4.73	1.45	3.28
26/3/2020	4.63	1.42	3.21
27/3/2020	4.45	1.29	3.16
30/3/2020	4.36	1.31	3.05
31/3/2020	4.39	1.35	3.04
<b>3-month average</b>	<b>3.67</b>	<b>1.87</b>	<b>1.80</b>

Source: Bloomberg (Ticker: MOODUBAA Index), US Department of the Treasury – Daily Treasury Yield Curve Rates

## APPENDIX D - BETA CALCULATIONS

Comparator company	5-year average D/E	5-year raw levered beta	Tax rate	Unlevered beta	R <sup>2</sup>
AGL Energy Limited (ASX:AGL)	0.24	0.64	30%	0.55	0.21
Origin Energy Limited (ASX:ORG)	0.77	1.71	30%	1.11	0.46
Genesis Energy Limited (NZSE:GNE)	0.48	1.03	28%	0.76	0.34
SSE plc (LSE:SSE)	0.63	0.81	19%	0.54	0.33
<b>Sum of R<sup>2</sup></b>	<b>1.34</b>				
<b>R<sup>2</sup> weighted average unlevered beta</b>	<b>0.79</b>				
<b>Singapore corporate tax rate</b>	<b>17%</b>				
<b>Recommended D/E ratio (mean)</b>	<b>0.53</b>				
<b>Relevered R-squared weighted beta based on mean D/E</b>	<b>1.14</b>				



## APPENDIX E - COMPARATOR COMPANY GEARING DATA

Comparator company	Market value of equity (USD millions)				
	31/03/2016	31/03/2017	31/03/2018	31/03/2019	31/03/2020
AGL Energy Limited (ASX:AGL)	9,541	13,399	10,933	10,136	6,645
Origin Energy Limited (ASX: ORG)	6,858	9,451	11,764	9,000	4,732
Genesis Energy Limited (NZSE:GNE)	1,421	1,455	1,718	2,228	1,549
SSE plc (LSE:SSE)	21,501	18,720	18,128	16,011	16,693

Source: Capital IQ

Comparator company	Total debt (USD millions)				
	31/03/2016	31/03/2017	31/03/2018	31/03/2019	31/03/2020
AGL Energy Limited (ASX:AGL)	2,279	2,674	2,304	2,145	2,228
Origin Energy Limited (ASX:ORG)	6,923	6,820	6,684	4,796	4,851
Genesis Energy Limited (NZSE:GNE)	644	755	873	821	881
SSE plc (LSE:SSE)	10,087	10,270	11,447	12,376	12,332

Source: Capital IQ

Comparator company	Gearing					5-year average gearing ratio <sup>11</sup>
	31/03/2016	31/03/2017	31/03/2018	31/03/2019	31/03/2020	
AGL Energy Limited (ASX:AGL)	0.19	0.17	0.17	0.17	0.25	0.19
Origin Energy Limited (ASX: ORG)	0.50	0.42	0.36	0.35	0.51	0.44
Genesis Energy Limited (NZSE:GNE)	0.31	0.34	0.34	0.27	0.36	0.33
SSE plc (LSE:SSE)	0.32	0.35	0.39	0.44	0.42	0.39
<b>Mean gearing ratio</b>						<b>0.34</b>

<sup>11</sup> Please note that the 5-year average gearing ratio is calculated by using the 5-year average debt-to-equity ratio in the gearing formula, and is not the average of individual yearly gearings.

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