The Allen Consulting Group

WACC Parameters Update

For the Purpose of Determining the Maximum Reserve Capacity Price

October 2009

Report to Independent Market Operator

The Allen Consulting Group

The Allen Consulting Group Pty Ltd

ACN 007 061 930, ABN 52 007 061 930

Melbourne

Level 9, 60 Collins St

Melbourne VIC 3000

Telephone: (61-3) 8650 6000

Facsimile: (61-3) 9654 6363

Sydney

Level 12, 210 George St

Sydney NSW 2000

Telephone: (61-2) 8272 5100

Facsimile: (61-2) 9247 2455

Canberra

Empire Chambers, Level 2, 1-13 University Ave

Canberra ACT 2600

GPO Box 418, Canberra ACT 2601

Telephone: (61-2) 6204 6500

Facsimile: (61-2) 6230 0149

Online

Email: info@allenconsult.com.au

Website: www.allenconsult.com.au

Contents

Executive summary

Introduction

Western Australia's Independent Market Operator (IMO) had previously engaged the Allen Consulting Group (ACG) for advice on the WACC that should reflect the efficient cost of capital required to support investment in an open cycle gas turbine (OCGT) peaking plant, where such plant is constructed following it successfully bid into a Reserve Capacity Auction.

In August 2009, the IMO engaged ACG to update previous recommendation on WACC parameters.

Main Summary Points

Table ES.1 provides a comparison of the recommended WACC values in 2007 and revised values in 2009.

Table ES.1

WACC PARAMETER ESTIMATIONS

CAPM Parameter	Notation	2007	2009
Nominal risk free rate of return (%)	$R_{nominal}$	6.21	**5.62**
Expected inflation	i	3.00	**3.00**
Real risk free rate of return (%)	R_{real}	3.12	**3.15**
Market risk premium (%)	MRP	6.00	**6.00**
Asset beta	β_a	0.50	**0.42**
Equity beta	β_e	0.83	**0.7**
Debt margin (%)	DM	1.60	**3.22**
Corporate tax rate (%)	T	30	**30**
Value of imputation credits	γ	0.50	**0.66**
Debt to total assets ratio (%)	D/A	40	**40**
Equity to total assets ratio (%)	E/A	60	**60**
Vanilla WACC (nominal) (%)		9.84	**9.43**
Pre-tax Officer WACC (nominal) (%)		11.02	**10.10**
Vanilla WACC (real) (%)		6.64	**6.24**
Pre-tax Officer WACC (real) (%)		7.79	**6.89**

Source: ACG analysis

The basis of our revised recommendations, in terms of the four major WACC components, are summarised below:

Beta

In our previous report, we recommended that the IMO adopt an equity beta value of 0.83 with 40 percent benchmark gearing. The underlying assumption was the hypothetical peaking plant is less risky than the power generation business in the National Electricity Market (NEM) but more risky than the regulated transmission and distribution business. We maintained the above headline assumption to estimate equity beta in this update.

We considered a number of comparators drawn from the electricity generation and energy transmission and distribution industry sectors. The search for comparable companies was limited to the following countries: Australia, New Zealand, US, Canada and Norway. We used Bloomberg's 'Historical Studies for Multiple Securities' (XSTD) file to calculate raw betas of comparable firms. The raw equity betas were de-levered then re-levered to equity betas for benchmark financial structures, using the Brealey & Myers formula.

From our list of comparators, we observed that Northland Power Income Fund exhibits the closest similarity to the OCGT power plant envisaged by the IMO. The Fund hedges its revenue volatility using long-term power purchase agreements (PPAs) and long-term contracts to assure the supply and price of natural gas. Therefore, the Fund has a relatively low asset beta of 0.26 and re-levered beta of 0.44 (40 percent gearing). Subjective judgement needs to be exercised to accommodate for the Fund's current diversified portfolio of generation assets and established risk management program.

Table ES.2 provides a summary of average beta values for each country group.

Table ES.2

AVERAGE BETA VALUES OF COMPARATORS

Comparator	Average (ND/V)	Asset Beta	D/V = 60%	D/V = 40%
Electricity Generation				
Canada	0.28	0.45	1.12	0.75
Norway	0.21	0.28	0.69	0.46
United States	0.55	0.60	1.49	1.00
Transmission & Distribution				
Australia	0.73	0.19	0.46	0.31
New Zealand	0.18	0.63	1.57	1.05
Canada	0.25	0.23	0.58	0.38
United States	0.43	0.24	0.60	0.40

Source: Bloomberg, ACG analysis

The current most relevant regulatory decision on beta for the purpose of this update would be AER's inaugural review of WACC parameters for electricity transmission and distribution network service providers in the NEM market. The AER's final decision on equity beta value is 0.8 at 60 percent gearing, which represents a 0.1 – 0.2 decrease from previously adopted beta values by various state regulators.

Based on the available evidence, ACG recommends the IMO to adopt an equity beta of 0.70, based on the benchmark gearing of 40 percent. The recommendation represents a 0.13 decrease in value.

Gearing

ACG observes no compelling evidence to shift from the previously adopted 40 percent gearing. On the contrary, available evidence supports the proportion that a 40 percent gearing should be maintained. The credit rating assumption of BBB+ should also be retained to match the capital structure of 40 percent gearing.

The optimal capital structure of a company is influenced by factors such as business risk and operating leverage inherent to the firms in an industry. Therefore, power generation business is expected to carry less debt than regulated transmission and distribution business as they have higher asset betas, which is a proxy for business risk. We plotted gearing levels against the asset betas of the companies in our comparator groups. Transmission and distribution businesses have an average gearing about 0.50 to 0.60 after removing the outliers. On the other hand, most power generation businesses have a gearing level that is less than 0.40.

Market Risk Premium

We reviewed recent developments in capital market evidence and post 2007 academic analysis of the Australian market risk premium (MRP) to address the issue whether a different MRP value needs to be adopted by the IMO. There are two key academic research papers on MRP that were used to inform recent regulatory reviews: Officer and Bishop (2008), and Handley (2009). Both papers indicate that there is no persuasive evidence leading to a decrease in 6 percent MRP but differ on the view whether MRP should be increased to incorporate imputation tax benefits. On the other hand, Bloomberg estimates of MRP show a huge variation in value that ranges from 4.5 percent to 9 percent for the past year leading to August 2009. In the light of available evidence, ACG recommends the IMO to retain the MRP at 6 percent.

Gamma

The generally accepted regulatory approach to define the value of imputation credits (gamma) has been in accordance with the Monkhouse definition, which defines gamma as the product of 'imputation credit payout' and 'utilisation rate'. However, Professor Handley recently argued that the decomposition of gamma to distribution rate and utilisation rate is unnecessary because for all valuation purposes, it is appropriate to assume 100 percent distribution of a firm's free cash flow and therefore a 100 percent distribution of imputation credit. This reduces the value of imputation credits to the same value as the utilisation rate. The AER agrees with Handley's reasoning and sets imputation credit payout to one in its inaugural review. ACG believes that Professor Handley's argument on imputation credit payout does hold water and recommends the IMO to follow AER's decision.

Academic studies on utilisation rates produce results that are dependent on the study period and approach taken. Given that the value of gamma must be reflective of current imputation tax regime, ACG recommends the IMO to adopt a value of 0.66 for gamma, which is the simple average of post-2000 utilisation rates as estimated by academic studies.

Chapter 1

Brief and Overview

1.1 The Brief

The Independent Market Operator (IMO) had previously engaged the Allen Consulting Group (ACG) for advice on the WACC that should reflect the efficient cost of capital required to support investment in an open cycle gas turbine (OCGT) peaking plant, where such plant is constructed following it successfully bid into a Reserve Capacity Auction.

In August 2009, the IMO engaged ACG to provide an update to previous recommendation on WACC parameters. Table 1.1 provides a comparison of the recommended WACC values in 2007 and 2009.

Table 1.1

WACC PARAMETER ESTIMATIONS

CAPM Parameter	Notation	2007	2009
Nominal risk free rate of return (%)	$R_{nominal}$	6.21	**5.62**
Expected inflation (%)	i	3.00	**3.00**
Real risk free rate of return (%)	R_{real}	3.12	**3.15**
Market risk premium (%)	MRP	6.00	**6.00**
Asset beta	β_a	0.5	**0.42**
Equity beta	β_e	0.83	**0.70**
Debt margin (%)	DM	1.60	**3.22**
Corporate tax rate (%)	T	30	**30**
Value of imputation credits	γ	0.5	**0.66**
Debt to total assets ratio (%)	D/A	40	**40**
Equity to total assets ratio (%)	E/A	60	**60**
Vanilla WACC (nominal) (%)		9.84	**9.43**
Pre-tax Officer WACC (nominal) (%)		11.02	**10.10**
Vanilla WACC (real) (%)		6.64	**6.24**
Pre-tax Officer WACC (real) (%)		7.79	**6.89**

Source: ACG analysis

1.2 Report Structure

The remainder of this report is structured as follows:

- In chapter 2 we analyse empirical evidence to inform our estimate of the asset beta and re-levered equity beta of the hypothetical peaking plant;
- In chapter 3 we assess the appropriate gearing and credit rating applicable to the power plant;
- In chapter 4 we review existing and new evidence on the Market Risk Premium and the valuation of imputation credits;
- In chapter 5, we review evidence relating to risk free rate, cost of debt and inflation.

Chapter 1

Beta – Systematic Risk

1.1 Introduction

In our previous advice to the IMO, we recommended that the IMO adopt an equity beta value of 0.83 with 40 percent benchmark gearing. The bases for our recommendation were that the hypothetical peaking plant is:

- Less risky than the power generation business in the National Electricity Market (NEM) due to the effects of a long term contract covering determining revenue for the first ten years and the effects of the administered capacity pricing regime thereafter;
- More risky than the regulated transmission and distribution business due to price risk after the expiry of long term contract and revenue is fixed for twice the length of the typical regulatory period

We propose to maintain the above approach to estimate equity beta in this update.

1.2 Methodology to estimate beta

We began our analysis by searching for power generation, energy transmission and distribution companies with market capitalisation of more than $200m AUD in Bloomberg[1]. Our search for comparable companies was limited to the following countries: Australia, New Zealand, US, Canada and Norway. We reviewed company descriptions and revenue breakdowns from our initial screening to discard inappropriate matches. Companies with less than 60 months of observations were also discarded. The remaining comparators were then sorted by country and profile (power generation vs. energy transmission and distribution).

We used the Bloomberg 'Historical Studies for Multiple Securities' (XSTD) excel file to calculate raw equity betas of comparable firms. Each company beta was estimated based on 60 months of monthly return observations (5 years) for the last 5 years to August 2009.

For each country examined, Bloomberg measures the rate of return (dividend plus capital gain) of the stock and regress this against the accumulation index of the relevant major market. Bloomberg allows the user to nominate the relevant market indices. We used the ASX Accumulation All Ordinaries Index, the NZX All Gross Index, the S&P 500 Total Return Index, S&P/TSX Total Return Index, and the OBX Index respectively for each of the countries listed above.

The estimated equity beta for a stock was de-levered based on the average market gearing level (book net debt / (book net debt plus market equity value)) observed for the stock over the same 60 months (5 year period) to obtain the asset beta. Proxy asset beta values derived were then re-levered to equity betas for benchmark financial structures.

[1] Bloomberg Industry Classification Standard (BCIS) was used to filter for comparable companies within an industry sector.

In undertaking this analysis, we used the Brealey & Myers formula to de-lever and re-lever of beta values:

$$\beta_a = \frac{E}{V} \times \beta_e$$

1.3 Capital market evidence

Electricity Generation

Table 1.2 shows the raw betas of listed power generation businesses and their corresponding asset betas. The table also includes re-levered equity betas to different capital structures for comparison. US companies appear to have a consistent asset beta of about 0.60 while their Canadian peers have a wide range of asset beta values, ranging from 0.25 to 0.74.

Table 1.3 compares the asset betas against the type of power generators and geographic location of these generators. We observed that companies with lower asset betas tend to derive a significant portion of its revenue from operating hydro power plants at their home country.

Amongst the various power generation companies analysed, Northland Power Income Fund exhibits the closest similarity to the OCGT power plant envisaged by the IMO. According to Bloomberg's description, the company was established in 1997 to acquire the Iroquois Falls Cogeneration Facility and all related and ancillary assets, contracts and rights. The cogeneration facility generates electricity and sells it exclusively to Ontario Hydro. The Fund hedges its revenue volatility using long-term power purchase agreements (PPAs) and long-term contracts to assure the supply and price of natural gas, which is the Fund's largest cost.

In essence, the OCGT peaking plant to be developed under the Reserve Capacity Mechanism shares a key common characteristic with Northland Power Income Fund. Both companies have long term power purchase power agreements with creditworthy customers to ensure revenue stability. Therefore, in our opinion, Northland Power is the best proxy available thus far. However, subjective judgement needs to be exercised to accommodate for the Fund's current diversified portfolio of generating assets and risk management program.

Box 1.1

NORTHLAND POWER INCOME FUND

Northland Power Income Fund is a Canadian open-ended income trust that indirectly owns equity interests in six power facilities: three combined-cycle cogeneration power plants that efficiently and cleanly produce electricity and steam and three wind power projects. Two cogeneration plants are located in Ontario: the 120 megawatt (MW) Iroquois Falls facility, which has been wholly owned by the Fund since its inception in 1997, and the 110 MW Kingston facility. Through its 19% equity interest in Panda Energy Corp. (PEC) and loan to a PEC subsidiary, the Fund owns an interest in the 230 MW Panda-Brandywine cogeneration facility located outside Washington, D.C. Electricity and steam sales from the cogeneration facilities are made under long-term power purchase agreements (PPAs) with creditworthy customers to ensure revenue stability, and long-term contracts assure the supply and price of natural gas, which is the Fund's largest cost. The 54 MW Mont Miller wind farm in Murdochville, Quebec, supplies power under a 21-year PPA, while the Eckolstädt and Kavelstorf wind farms in Germany, with a total installed capacity of 21.5 MW, supply energy to local utilities under long-term prices set by federal legislation.

Source: Northland Power Income Fund website[2]

[2] Northland Power Income Fund- Introduction http://www.npifund.com/index.taf?z=1&n=22&l=&_UserReference=B5AE113A239A426C4AA85440 accessed on 10 September 2009

Table 1.2

EQUITY BETA - ELECTRICITY GENERATING COMPANIES

Comparator	Raw Beta	Average (ND/V)	Asset Beta	D/V = 60%	D/V = 40%
Canada					
Brookfield Renewable Power Fund	0.49	0.40	0.29	0.74	0.49
EPCOR Power LP	0.37	0.32	0.25	0.63	0.42
Northland Power Income Fund	0.31	0.16	0.26	0.66	0.44
Macquarie Power & Infrastructure Fund	0.83	0.21	0.66	1.65	1.10
Innergex Power Income Fund	0.44	0.30	0.31	0.78	0.52
Algonquin Power Income Fund	1.18	0.38	0.74	1.85	1.23
Boralex Power Income Fund	0.56	0.19	0.45	1.14	0.76
Boralex Inc.	0.91	0.31	0.63	1.57	1.04
Average		**0.28**	**0.45**	**1.12**	**0.75**
Norway					
Arendals Fossekompani A/S	0.35	0.21	0.28	0.69	0.46
Average		**0.21**	**0.28**	**0.69**	**0.46**
US					
AES Corp	1.52	0.60	0.61	1.53	1.02
NRG Energy Inc.	1.03	0.45	0.57	1.42	0.95
Dynergy Inc.	1.51	0.59	0.62	1.54	1.03
Average		**0.55**	**0.60**	**1.49**	**1.00**
Total Average		**0.34**	**0.44**	**1.10**	**0.74**

Total Source: Bloomberg, ACG analysis

Table 1.3

GEOGRAPHIC SEGMENTATION OF REVENUE

Companies	Asset Beta	Geographic Segmentation	Generator Type
Brookfield Renewable Power Fund	0.29	Canada (100%)	Hydro Wind farm
EPCOR Power LP	0.25	United States (64%) Canada (36%)	Gas Small-scale hydro Bio-mass
Northland Power Income Fund	0.26	Canada (97.3%) Germany (2.7%)	Gas
Macquarie Power & Infrastructure Fund	0.66	Canada (100%)	Gas Wind Biomass Hydro
Innergex Power Income Fund	0.31	Canada (95.3%) United States (4.7%)	Hydro Wind power
Algonquin Power Income Fund	0.74	United States (60.2%) Canada (39.8%)	Hydro Gas
Boralex Power Income Fund	0.45	Canada (72.5%) United States (27.5%)	Hydro Thermal Gas
Boralex Inc.	0.63	United States (74.3%) France (25.1%) Canada (0.6%)	Thermal Wind power Gas Hydro
Arendals Fossekompani A/S	0.28	Norway (100%)	Hydro
AES Corp	0.61	Latin America (61.4%) North America (19.6%) International (19%)	Diverse fuel source
NRG Energy Inc.	0.57	United States (97.7%) International (2.3%)	Diverse fuel source
Dynegy Inc.	0.62	United States (100%)	Gas Thermal

Source: Bloomberg, company websites, ACG analysis

Energy Transmission and Distribution

The beta estimates for energy transmission and distribution companies are set out in Table 1.4. The average asset betas businesses in Australia, Canada and the United States are about 0.20. New Zealand is the only exception with a significantly higher beta; New Zealand's TrustPower has an estimated asset beta of 0.63. Our analysis indicates that TrustPower operates as a vertically integrated utility company. The company owns electricity generation networks, supplies and distributes electricity to customers, and also retails electricity throughout New Zealand. Consequently, the retail and power generation components of the business would have significantly bumped up TrustPower's asset beta. If TrustPower is excluded from the data sample, the total average asset beta would be reduced from 0.32 to 0.22. Therefore, to draw a conservative conclusion on available market evidence, transmission and distribution companies, on average, have an asset beta between 0.22 and 0.32, which corresponds to a re-levered equity beta (40 percent gearing) of 0.36 and 0.53.

Table 1.4

EQUITY BETA – ENERGY TRANSMISSION AND DISTRIBUTION COMPANIES

Comparator	Raw Beta	Average (ND/V)	Asset Beta	D/V = 60%	D/V = 40%
Australia					
Duet Group	0.66	0.75	0.17	0.41	0.28
Envestra Ltd.	0.72	0.71	0.21	0.51	0.34
Average		**0.73**	**0.19**	**0.46**	**0.31**
New Zealand					
TrustPower Limited	0.77	0.18	0.63	1.57	1.05
Average		**0.18**	**0.63**	**1.57**	**1.05**
Canada					
Canadian Utilities Limited	0.05	0.31	0.03	0.08	0.05
Gaz Metro Limited Partnership	0.39	0.41	0.23	0.57	0.38
Just Energy Income Fund	0.44	0.01	0.43	1.08	0.72
Average		**0.25**	**0.23**	**0.58**	**0.38**
US					
Sempra Energy	0.61	0.31	0.43	1.07	0.71
CentrePoint Energy Inc.	0.74	0.67	0.25	0.61	0.41
Nisource Inc.	0.78	0.56	0.34	0.85	0.57
AGL Resources Inc.	0.40	0.45	0.22	0.56	0.37
Atmos Energy Corporation	0.51	0.45	0.28	0.70	0.46
Southern Union Company	1.00	0.54	0.46	1.14	0.76
Piedmont Natural Gas Company	0.18	0.32	0.12	0.31	0.20
Nicor Inc.	0.34	0.34	0.23	0.57	0.38
New Jersey Resources Corporation	0.14	0.31	0.09	0.24	0.16
Northwest Natural Gas Company	0.26	0.38	0.16	0.40	0.27
Southeast Gas Corporation	0.69	0.54	0.32	0.79	0.53
South Jersey Industries Inc.	0.22	0.34	0.15	0.37	0.24
The Laclede Group Inc.	0.02	0.41	0.01	0.03	0.02
Chesapeake Utilities Corporation	0.45	0.34	0.30	0.74	0.49
Average		**0.43**	**0.24**	**0.60**	**0.40**
Total Average		**0.40**	**0.32**	**0.80**	**0.53**

Total Source: Bloomberg, ACG analysis

1.4 Regulatory Precedents

There are no regulatory precedents on price regulation for generation infrastructures in states other than Western Australia. Therefore, we have to fall back on regulatory precedents on energy network businesses for comparison.

The energy network industry has undergone significant reform in the last decade. Regulation of energy transmission and distribution businesses used to be within the purview of state and territory regulators. However, this role is now transitioning to the Australian Energy Regulator (AER) which will be the national economic regulator of energy networks except for Western Australia and Northern Territory. Consequently, there are no determinations on WACC values for energy networks by the jurisdictional regulators since 2007.

The current most relevant regulatory decision would be AER's inaugural review of WACC parameters for electricity transmission and distribution network service providers in the NEM market. The AER's final decision on equity beta value is 0.8 at 60 percent gearing, which represents a 0.1 – 0.2 decrease from previously adopted beta values by various state regulators[3]. The AER also notes that despite market data suggests a value lower than 0.8, the decision was made after given due consideration for a need to allow service providers with reasonable opportunity to recover efficient costs and incentives for investment, and to maintain regulatory stability.

1.5 Recommendation

Available capital market evidence reveals that beta values have decreased for both electricity generation companies and energy transmission and distribution companies since 2007. Therefore, ACG recommends that the IMO adopt an equity beta of 0.70, based on the benchmark gearing of 40 percent, for calculating the WACC to apply in setting the Maximum Reserve Capacity Price.

The bases for our recommendation are:

- Consistent with AER's decision to decrease the equity beta of transmission and distribution companies by 0.1 to 0.2;
- Lower than the average beta of power generating companies to reflect the effect of a long term contract covering revenue determination for the first ten years and the effects of administered capacity pricing regime thereafter;
- Higher than Northland Income Power Fund's re-levered beta to adjust for the Fund's diversified power generation assets
- More risky than energy transmission and distribution businesses, that is the equity beta should be higher than the observed value of 0.53.

[3] Australian Energy Regulators (May 2009), *Final Decision – Electricity transmission and distribution network service providers, Review of the weighted average cost of capital (WACC) parameters*, Table A.1 pg v.

Chapter 2

Gearing and Credit Rating

2.1 Introduction

In our previous advice to the IMO, we recommended a gearing level of 40 percent (debt to asset) would be sufficient for the OCGT power plant to maintain a BBB+ credit rating for its long term debt. In this chapter we review current market evidence on capital structure of comparable entities and their credit ratings. We will also provide recent regulatory decisions on gearing and credit ratings from other industries for comparison purposes.

2.2 Capital structure theory

The term 'capital structure' refers to the proportions of debt versus equity that are used to finance the firm's activities and investments. The idea of an optimal capital structure is one that maximises the enterprise value of the firm (i.e. the sum of debt and equity). Although the optimum capital structure is likely to be a range rather than a specific point, the calculation of a regulatory WACC requires a single number, which is the capital structure assumed by the regulator to be the best estimate of the optimal capital structure, taking account of the regulator's objective to promote economic efficiency.

Modigliani and Miller (M&M) concluded that capital structure does not change firm value in a 'perfect capital market'. A perfect capital market can be described as a frictionless market in which there are no taxes, no costs of bankruptcy, no information asymmetries and all market participants are price takers.[4] The raw conclusion of the original M&M paper is not generally accepted as a realistic proposition; rather, it is important in directing attention to the factors that are relevant in the determination of optimum capital structure.

There are two key considerations to determining the optimum capital structure: tax and bankruptcy costs. In the 'classical' taxation framework, debt is taxed at a lower rate than equity, which suggests that the value of a firm could be increased by increasing the debt component. The theoretical maximum increase in the market value of the firm (ignoring potential costs that are discussed further below) is given by:

$$\Delta V = t_c \Delta D$$

where the Greek 'delta' symbol (Δ) refers to 'change', V is enterprise value, t_c is the company tax rate and D is the amount of Debt.

However, the imputation tax system in Australia complicates the benefits of debt finance. In theory, if dividend imputation were fully effective, then any double taxation of equity would be removed and there would be no tax-related benefits from higher debt levels. This is a controversial issue. Empirical evidence estimates that the value of imputation credits ranges from zero, to virtually full value.

[4] Peirson, Brown, Easton and Howard (2003), *Pierson and Bird's Business Finance*, pg. 384

Despite the benefits of debt finance, a higher debt level increases the probability of bankruptcy, which raises a firm's bankruptcy costs. This implies that optimum capital structure occurs when any advantage derived from the tax benefits of increased debt is offset by increased bankruptcy costs.

Another reason why managers favour lower debt is to maintain financial flexibility, so that debt overhang can be avoided. A debt overhang problem emerges if a company has a new investment project with positive net present value (NPV), but cannot capture the investment opportunity due to an existing debt position.

To conclude, optimal capital structure is determined by such factors as the business risk inherent to the firms in an industry, taxation and incentive effects, and the expected losses if default occurs. Other things being equal, in industries where firms have higher business risk (i.e. more volatile operating cash flows), firms would be expected to carry less debt.

2.3 Current Market Evidence

Gearing

Table 2.1 and Table 2.2 provide the capital structures of electricity generation and energy transmission and distribution businesses. The average gearing of power generation businesses is only marginally higher than that in the transmission and distribution businesses. However, the variation in gearing levels between the two industries is apparent. Gearing levels for power generation businesses ranges from 0.19 to 0.63 while energy transmission and distribution businesses have gearing levels that ranges from 0.03 to 0.76.

Table 2.1

CAPITAL STRUCTURE – POWER GENERATION

Company	Gearing
Brookfield Renewable Power Fund	0.41
EPCOR Power LP	0.32
Northland Power Income Fund	0.18
Macquarie Power & Infrastructure Fund	0.24
Innergex Power Income Fund	0.31
Algonquin Power Income Fund	0.39
Boralex Power Income Fund	0.22
Boralex Inc.	0.36
Arendals Fossekompani A/S	0.19
AES Corp	0.63
NRG Energy Inc.	0.50
Dynegy Inc.	0.63
Average	**0.36**

Source: Bloomberg, ACG analysis

Table 2.2

CAPITAL STRUCTURE — TRANSMISSION AND DISTRIBUTION

Company	Gearing
Duet Group	0.76
Envestra Ltd.	0.72
TrustPower Limited	0.19
Canadian Utilities Limited	0.37
Gaz Metro Limited Partnership	0.41
Just Energy Income Fund	0.03
Sempra Energy	0.33
CentrePoint Energy Inc.	0.68
Nisource Inc.	0.57
AGL Resources Inc.	0.45
Atmos Energy Corporation	0.47
Southern Union Company	0.54
Piedmont Natural Gas Company	0.33
Nicor Inc.	0.36
New Jersey Resources Corporation	0.31
Northwest Natural Gas Company	0.38
Southeast Gas Corporation	0.55
South Jersey Industries Inc.	0.35
The Laclede Group Inc.	0.43
Chesapeake Utilities Corporation	0.35
Average	**0.43**

Source: Bloomberg, ACG analysis

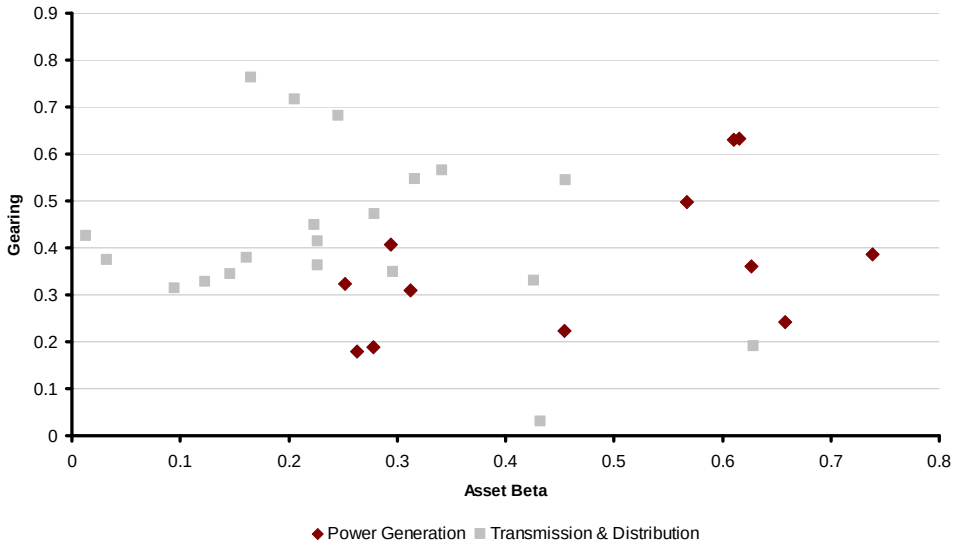
The above tables do not provide conclusive evidence that a structural difference exists between the gearing levels of power generation businesses and transmission and distribution businesses. As described earlier, the optimal capital structure of a company is influenced by factors such as the business risk and operating leverage inherent to the firms in an industry. Therefore, we expect power generation businesses to carry less debt as they have higher asset betas[5], which is a proxy for business risk.

Figure 2.1 plots the gearing levels against the asset betas of the companies in our comparator groups. Transmission and distribution businesses have a wide range of gearing levels but they concentrate about the lower end of asset betas. After removing the outliers in the chart, the average gearing would be about 0.5 to 0.6. Power generation companies, on the other hand, have a tighter range of gearing levels between 0.20 and 0.40 but more dispersed asset beta values. The scatter plot provides strong evidence that, in general, transmission and distribution businesses can take on higher debt levels than power generation businesses.

[5] Asset beta can be loosely defined as the linear sensitivity of the asset values to market returns

Figure 2.1

ASSET BETA VS CAPITAL STRUCTURE



Source: Bloomberg, ACG analysis

Credit Rating

Table 2.3 and Table 2.4 display the credit ratings of comparator firms as recorded by Bloomberg. Power generation company ratings range from B for Dynegy Inc. (with gearing of 63 percent) to BBB+ for EPCOR Power LP (with gearing of 32 percent). Transmission and distribution businesses, on the contrary, have higher credit rating for similar levels of gearing. These companies are awarded credit ratings in the regions of AA to BBB+ for 30 to 40 percent gearing. Duet Group maintained its BBB- rating despite having a gearing level of 76 percent. The distinction in gearing levels and credit ratings is obvious between the two industries.

Table 2.3

S&P CREDIT RATINGS - POWER GENERATION

Company	Credit Rating	Issue Date	Gearing Ratio
EPCOR Power LP	BBB+	5/7/2007	0.32
Algonquin Power Income Fund	BBB	3/9/2007	0.39
AES Corp/The	BB-	3/29/2006	0.63
NRG Energy Inc	BB-	7/22/2009	0.50
Dynegy Inc	B	7/22/2009	0.63

Source: Bloomberg, ACG analysis

Table 2.4

S&P CREDIT RATINGS – TRANSMISSION AND DISTRIBUTION

Company	Credit Rating	Issue Date	Gearing Ratio
DUET Group	BBB-	6/3/2003	0.76
Envestra Ltd	BBB-	7/31/2006	0.72
Canadian Utilities Ltd	A	1/7/2004	0.37
GAZ Metro LP	A-	4/18/2006	0.41
Sempra Energy	BBB+	10/7/2003	0.33
Centerpoint Energy Inc	BBB	3/4/2003	0.68
NiSource Inc	BBB-	12/18/2007	0.57
AGL Resources Inc	A-	12/8/2004	0.45
Atmos Energy Corp	BBB+	12/23/2008	0.47
Southern Union Co	BBB-	11/29/2006	0.54
Piedmont Natural Gas Co Inc	A	7/22/2003	0.33
Nicor Inc	AA	4/15/2003	0.36
Northwest Natural Gas Co	AA-	2/28/2006	0.38
Southwest Gas Corp	BBB	4/24/2009	0.55
The Laclede Group Inc	A	5/5/2003	0.43

Source: Bloomberg, ACG analysis

2.4 Regulatory precedents

Recent precedent on gearing assumptions for other regulated industries are shown in Table 2.5

Table 2.5

RECENT REGULATORY GEARING DECISIONS

State	Regulator	Year	Industry	Gearing (%)
Federal	AER	2009	Electricity	60
TAS	GPOC	2007	Water	50
NSW	IPART	2009	Water	60
ACT	ICRC	2008	Water	60
Federal	ACCC	2008	Rail	60
WA	ERA	2009	Rail	35

Source: Regulatory decisions

2.5 Recommendation

Our review of current available evidence and regulatory benchmark leads us to conclude that, with respect to the OCGT peaking plant, there is no compelling evidence to shift from the previously adopted 40 percent gearing. On the contrary, available evidence supports the proposition that a 40 percent gearing should be maintained. Having concluded on the appropriate gearing level, we also recommend that the credit rating assumption of BBB+ should also be retained to match the capital structure of 40 percent gearing.

Chapter 3

Market Risk Premium, Gamma and Tax Rates

3.1 Introduction

In this chapter, we review the market risk premium (MRP) and value of imputation credits i.e. gamma (γ) used in the pre-tax Officer WACC. These values are part of the market wide values that are independent of the asset or project in question.

3.2 Market Risk Premium

In 2007, we recommended that the IMO adopt a MRP value of 6.0%. Our recommendation on the forward looking MRP was based on a range of information sources, which comprises of capital market observations of historical returns to equity, studies on imputed expectation of the MRP and survey of opinions and assumptions of capital market participants.

Therefore, for the purpose of this review, we explore recent developments in capital market evidence and academic analysis on the Australian MRP since 2007 to address the issue whether a different MRP value needs to be adopted by the IMO.

Current market evidence

Officer and Bishop[6]

Officer and Bishop analysed historical risk premium for the period 1974 to December 2007. Historical MRP (prior to adjustment for tax imputation benefits) was estimated to be 7.4% for the period 1888 – 2007 and 6.7% for the period 1958 – 2007. If an imputation tax benefit of 0.5 is assumed, historical MRP increases to 7.6% and 7.1% respectively.

Their study concluded that there is no compelling evidence from the historical series that ignores the imputation tax benefits that would lead to a reduction in 6% MRP. However they argued that there is persuasive evidence for the MRP to be adjusted to 7%, incorporating the value of imputation tax benefits

Handley[7]

Associate Professor John Handley analysed historical market risk premium over the period 1883 to 2008 on behalf of the Australian Energy Regulators. His study was based on the seminal work by Brailsford, Handley and Maheswaran (BHM) in 2008. The sources and methodologies used were consistent with BHM. He found that historical MPR was 5.9% over the period 1888 – 2008 and 5.7% for the more recent period 1958 – 2008. Both values assume zero tax imputation benefits. If imputation tax benefits are included, assuming 50 percent usage of imputation credits, historical MRP will increase to 6.1% for both 1888 – 2008 and 1958 – 2008 periods.

[6] Officer B. and Bishop S.(August 2008) *Market Risk Premium – A Review Paper*, prepared for Energy Networks Association, Australia Pipeline Industry Association and Grid Australia

[7] Handley J (April 2009), *Further comments on the Historical Equity Risk Premium*, prepared for the Australian Energy Regulator

Bloomberg

Figure 3.1 compares historical estimates of the Australian MRP against the All Ordinaries Index. Bloomberg updates MRP data on a daily basis but does not maintain a historical MRP series that stretches beyond July 2008. The chart clearly indicates that at times of market uncertainty, the MRP is high. As the market recovers in the 2nd quarter of 2009, the inverse relationship between MRP and All Ordinaries Index becomes obvious.

Figure 3.1

MARKET RISK PREMIUM

Source: Bloomberg

Regulatory Precedent

Market risk premium of 6 percent is fairly entrenched in Australian regulatory decisions for regulated industries i.e. rail, water and energy. However, the AER recently revised its MRP estimate to 6.5 percent to factor in the uncertainty around market expectation due to the global financial crisis. The regulator opines that current market conditions for funds are likely to prevail until the next reset determinations[8]. Nonetheless, the AER also argued that 6 percent remains, in its view, the best estimate for a forward looking long term MRP.

Table 3.1 sets out recent regulatory decisions on MRP in Australia.

[8] Australian Energy Regulators (May 2009), *Final Decision – Electricity transmission and distribution network service providers, Review of the weighted average cost of capital (WACC) parameters*, Table A.1 pg v.

Table 3.1

REGULATORY DECISIONS ON MRP

Regulator (year)	State	MRP
Water		
GPOC(2007)	Tasmania	6.0%
IPART(2009)	New South Wales	5.5%-6.0%
ICRC(2008)	ACT	6.0%
Rail		
ERA(2009)	Western Australia	6.0%
ACCC(2008)	Federal	6.0%
Energy		
AER (2009)	Federal	6.5%

Source: Regulatory decisions

Conclusion

The AER took cautious approach to the interpretation of empirical evidence on historical MRP. The decision to increase MRP by 0.5 percent was due to AER's believe that current market condition will prevail until the next reset determination in 2014. The context to AER's decision to revise its MRP estimate is not applicable to the IMO because the OCGT peaking plant has a long term contract covering determining revenue for the first ten years. Therefore, the forward looking MRP also needs to be the forward looking for the next ten years.

In light of current evidence, we recommend that the IMO retain the MRP at 6 percent.

3.3 Gamma and taxation

The Economic Regulatory Authority advocates the use of the pre-tax Officer WACC as the preferred approach to adjust for imputation credits. This requires assumptions to be made about the effective rate of company income tax, and the value of imputation credits attached to distributions to shareholders.

In our previous advice, we recommended an effective company tax rate of 30 percent and a gamma of 0.5.

Recent developments

Taxation rate

In the pre-tax specification of the WACC, the effective tax rate is typically assumed to be the statutory tax rate of company income tax. The rate remains unchanged at 30 percent since our last advice to the IMO. Therefore, we see no persuasive evidence to depart from previously adopted value.

Gamma

The generally accepted regulatory approach to define the value of imputation credits has been in accordance with the Monkhouse definition. Under this approach, gamma is defined as the product of 'imputation credit payout' (F) and the 'utilisation rate' (θ).

$$\gamma = F \times \theta$$

The AER recently created intense debates due to its decision to steer away from the traditional 'Monkhouse' approach. The verdict to adopt the recommendation put forward by Handley, which assumes a payout ratio of 1.0, effectively reduces the value of imputation credits to the same value as the utilisation rate[9].

$$\gamma = F \times \theta = 1.0 \times \theta = \theta$$

Handley argued that the decomposition of gamma to distribution rate and utilisation rate is unnecessary because for all valuation purposes, it is appropriate to assume 100 percent distribution of a firm's free cash flow and therefore a 100 percent distribution of (associated) imputation credits. Handley also states[10]:

> This suggested alternative approach is then not only consistent with the standard WACC valuation framework (within a classical tax environment) due toe Miller and Modigliani (1961) … but is also consistent with the valuation framework which underlies Officer's (1994) set of WACC definitions appropriate to the Australian imputation tax system.

Despite AER's decision to adopt a payout ratio of 1.0, the AER agrees that a reasonable estimate of the annual payout ratio is the market average of 0.71 provided by Hathaway and Officer in 2004.

The most recent study to examine the utilisation of imputation credits was undertaken by Handley and Maheswaran (2008), who employed Australian Taxation Office (ATO) data.[11] The results, which break down the findings by category of investor, resident individuals, resident funds and on-residents, are displayed in Table 4.2.

Table 3.2

AVERAGE UTILISATION RATE (THETA)

Investor type	Average utilisation rate (theta)		
	1990-2000	2001-2004	1990-2004
Resident individuals	0.92	1.00	0.94
Resident funds	0.64	1.00	0.74
Non-residents	0.05	0.07	0.05
Total	0.67	0.81	0.71

Source: Handley and Maheswaran (2008)

[9] AER (2009), pg 420.

[10] Handley J (November 2008), *A note on the valuation of imputation credits*, report prepared for the energy regulators, pg. 5

[11] Handley, J. and K. Maheswaran (March, 2008), 'A measure of the efficacy of the Australian imputation tax system', *The Economic Record*, Vol. 84, No. 264, p.90.

Utilisation rates differ significantly for different type of investors and study window. However, the average utilisation rate of resident individuals remains fairly constant at levels that approximate one.

Table 3.3 tabulates the estimated utilisation rate estimated by various academics. The numbers are very erratic and depend on the study period and approach undertaken. The AER used information similar to the table below and decided on a value of 0.65 for gamma.

Table 3.3

RECENT ESTIMATES OF UTILISATION RATE

Study	Study Period	Theta
Hathaway & Officer (2004)	1986 – 2004	0.5
	Post 2000	0.6
Beggs & Skeels (2006)	1986 – 2004	0.57 (2001 – 2004)
Handley and Maheswaran (2008)	1988 – 2004	0.81 (2001 – 2004) 0.71 (1990 – 2004)

Source: AER (2009), Review of WACC parameters, pg. 199

Recommendation

The theoretical WACC required by the IMO has to reflect the efficient cost of capital required to support investment in an open cycle gas turbine (OCGT) peaking plant. This requirement is in line with Handley's proposal to equate the value of imputation credits to utilisation rate because for valuation purposes, it is often assumed that the firm's free cash flow will be distributed 100 percent.

Therefore, ACG recommends that the IMO follows AER's decision to define gamma as the value of utilisation rate i.e. $\gamma = \theta$.

ACG also notes that the value of gamma must be reflective of current imputation tax regime. Therefore, we recommend that IMO adopt a value of 0.66 for gamma, which is based on the simple average of post-2000 thetas (θ) as estimated by the respective studies in Table 3.3.[12]

[12] (0.6 + 0.57 + 0.81) / 3 = 0.66

Chapter 4

Risk free rate, inflation and cost of debt

4.1 Introduction

In this chapter we review current market evidence relating to the Australian bond market to assess the appropriate debt margin required to finance the OCGT power plant's operations under the assumed benchmark gearing and credit rating assumptions. That is, we examine evidence on current debt margins to assess the likely cost of debt for adopting a 40 percent benchmark gearing level, and a benchmark credit rating of BBB+.

4.2 Risk free rates

The market typically derives values of nominal and real risk free rates from capital market observations on yields on government coupon bonds and government inflation indexed bonds. As there are no Commonwealth Government securities (CGS) with precisely 10 years to maturity, approximate yields had to be obtained through linear interpolation. First, we obtained yield data on CGS coupon bonds closest to 10 year maturity from the Reserve Bank of Australia (RBA). Second, we interpolated the data to 10-year yield for the 20 trading days up to 31 August 2009, and then calculated the average equivalent annualised yield, which amounted to 5.62 percent. We repeated the above methodology to obtain the 20-days average real interest rate, which amounted to 3.15 percent.

4.3 Inflation

We highlighted the controversies surrounding the use of breakeven inflation rates in our 2007 paper. In essence, the implied inflation rates derived from the Fisher equation using government coupon bonds and inflation indexed bonds are likely to overstate the market's actual views on long-term inflation due to shortage of indexed bonds. Despite the controversies, the approach still provides relatively valuable insights on inflation forecast.

Based on the average real and nominal risk free rates, we derived an inflation forecast of 2.4 percent using the Fisher equation. The forecast is well within RBA's inflation target band of 2 and 3 percent per annum. On the other hand, RBA's survey of inflationary expectations contained in the August Statement on Monetary policy indicated an underlying inflation of 3.75 percent over the year to the June quarter[13], which is above the target inflation band. Given the dichotomy in available evidence, there is no persuasive evidence to adopt a value that differs from our previous recommendation of 3 percent.

4.4 Estimating the debt risk premium

The *Market Procedure for Determination of the Maximum Reserve Capacity Price version 1.1* (2008) clause 1.13.8 states:

[13] Reserve Bank of Australia (August 2009), *Statement on Monetary Policy*, pg. 3

(h) The debt risk premium, DRP, for a Capacity Year is the premium determined for that Capacity Year by the IMO as the margin between the observed annualised Australian benchmark corporate bond rate for corporate bonds which have a BBB+ (or equivalent) credit rating from Standard and Poors and a maturity of 10 years and the nominal risk free rate:

- using the predicted yields for corporate bonds published by Bloomberg; and the nominal risk free rate calculated as directed above; and
- the nominal risk free rate and Bloomberg yields averaged over

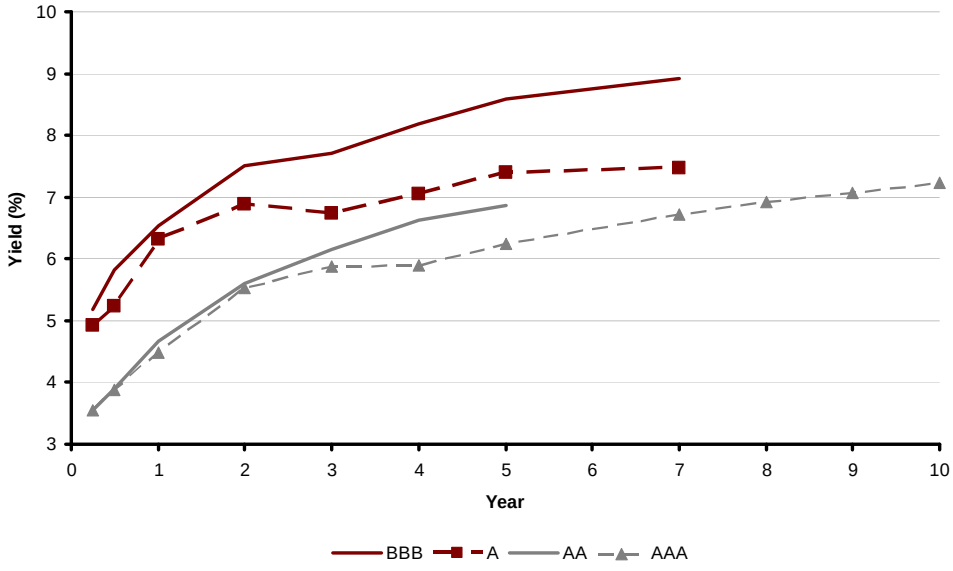
the same 20-trading day period.

(i) If there are no bonds with a maturity of 10 years on any day in the period referred to in Steps 1.13.8(g) and 1.13.8(h), the IMO must determine the nominal risk free rate and the DRP by interpolating on a straight line basis from the two bonds closest to the 10 year term and which also straddle the 10 year expiry date.

In our memo to the IMO in December 2008, we advised that it is not possible to calculate the debt risk premium in accordance to the requirements of the *Market Procedure*. Currently, the longest dated estimate of fair value yield for BBB bonds in the Bloomberg database is 7 years. In fact, Bloomberg has stopped providing yield estimates beyond 7 years for non AAA rated corporate bonds since mid August. Hence, interpolation is not possible, and the only way to estimate the 10 year fair value yield for a BBB bond is extrapolate.

Figure 4.1

BLOOMBERG FAIR VALUE CURVE ON 31 AUG 2009



Source: Bloomberg

4.5 Cost of Debt

Methodology

There are several ways that such extrapolation can be undertaken and the result varies for each of them. For the purpose of this update, we explored four different approaches to provide the best estimate:

Method 1: assume 7Y spread equals 10Y spread

Estimated 10Y BBB+ yield = 10Y AAA BBG FV

+ 7Y BBB BBG FV yield

- 7Y AAA BBG FV yield

Method 2: extrapolate from available BBB+ yields

Estimated 10Y BBB+ yield = 7Y BBB BBG FV yield

$$+\frac{3}{2}\times(7\text{Y} - 5\text{Y BBB} + \text{BBG FV yield})$$

Method 3: apply 10Y spread from CBASpectrum to Bloomberg data

Estimated 10Y BBB+ yield = 10Y AAA BBG FV

+ 10Y BBB+ CBASpectrum yield

- 10Y AAA CBASpectrum yield

Method 4: use CBASpectrum estimated yield

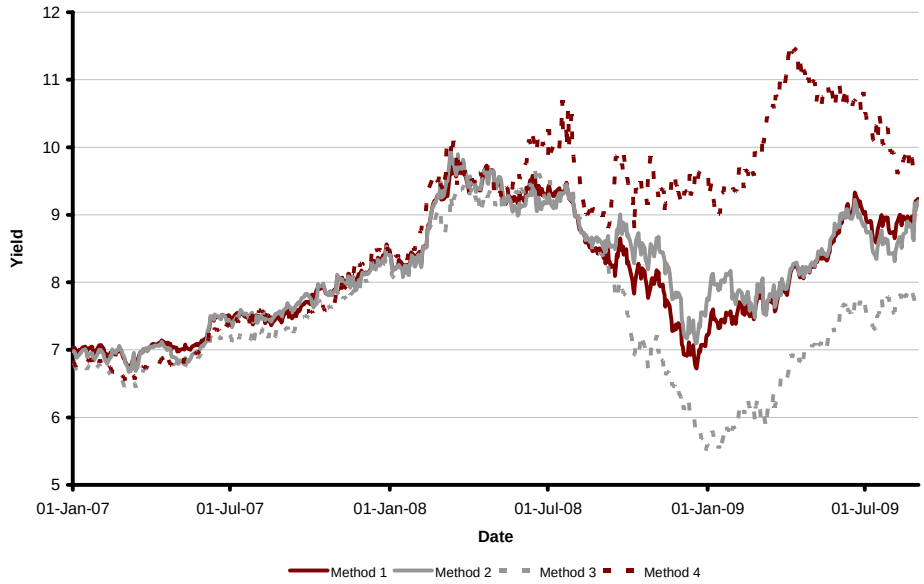
Estimated 10Y BBB+ yield = 10Y BBB+ CBASpectrum yield

Comparison of results

The estimated 10Y BBB+ bond rates can be substantially different depending on the approach used. Figure 4.2 below shows the movements in the estimated BBB+ bond rate using different approach over the period 2007 to August 2009. The four estimates tracked each other closely until mid 2008. Estimates from method 3 and method 4 began to diverge, creating an upper bound and lower bound for the estimates. It is interesting to note that the divergence seems to have turned around in the recent months, showing signs of convergence towards the estimates from method 1 and 2. The figure also appears to suggest that method 3 and 4 could have underestimated and overestimated the BBB+ 10 year bond rates respectively during extreme market uncertainties.

Figure 4.2

ESTIMATED BBB+ 10Y BOND YIELDS



Source: Bloomberg, CBASpectrum, ACG analysis

Table 4.1 shows the estimated debt risk premiums for the four different methods discussed above.

Table 4.1

DEBT RISK PREMIUM ESTIMATES (PERCENT)

	Method 1	Method 2	Method 3	Method 4
20D Avg. Yield	8.94	8.74	7.76	9.75
Risk free rate	5.62	5.62	5.62	5.62
Debt Risk Premium	3.32	3.12	2.14	4.13

Source: ACG analysis

4.6 Recommendation

Considering the evidence above, we recommend that the IMO use an average of 20-day yields from method 1 and method 2 to estimate the 10Y BBB+ bond rates. Notwithstanding the difference in results, the first two methods may be closest to the envisaged intent of clause 1.13.8(i) of *Market Procedure for Determination of the Maximum Reserve Capacity Price.* Therefore, debt risk premium applicable as at 31 August 2009 would be 3.22 percent and the corresponding nominal risk free rate is 5.62 percent.

Appendix A

A.1 Electricity Generation

Table A.1

DESCRIPTION AND PRODUCT SEGMENTATION

Code Company	Description
CANADA	
BRC-U CN Brookfield Renewable Power Fund	Brookfield Renewable Power Fund produces electricity exclusively from environmentally friendly hydroelectric resources. The Fund owns, operates and manages hydroelectric generating stations and a wind farm in geographic regions across North America: Quebec, Ontario, British Columbia and New England.
EP-U CN EPCOR Power LP	EPCOR Power L.P is a limited partnership that owns a portfolio of power generation assets in Canada and the United States, with a total generating capacity of 744 megawatts. The generation plants include natural gas, small-scale hydro and bio-mass facilities.
NPI-U CN Northland Power Income Fund	Northland Power Income Fund is an open-ended trust that was established to acquire the Iroquois Falls Cogeneration Facility and all related and ancillary assets, contracts, and rights. The facility generates electricity and sells it exclusively to Ontario Hydro.
MPT-U CN Macquarie Power & Infrastructure Income Fund	Macquarie Power & Infrastructure Income Fund is an unincorporated, open-ended, limited purpose trust created to acquire indirectly a gas-fired power plant in Ontario, Canada.
IEF-U CN Innergex Power Income Fund	Innergex Power Income Fund is an unincorporated open-ended trust established to indirectly acquire and own interests in several hydroelectric power generating facilities. The facilities are in Quebec and Ontario, both located in Canada.
APF-U CN Algonquin Power Income Fund	Algonquin Power Income Fund is an unincorporated open ended trust. The Fund has been created to acquire a direct or indirect equity interest in hydroelectric generating facilities located in Ontario and Quebec, Canada and New York and New Hampshire, United States.
BPT-U CN Boralex Power Income Fund	Boralex Power Income Fund is an unincorporated open-ended trust that indirectly owns and operates several power generating stations located in Quebec, Canada. The Company's stations produce energy from different sources, including wood-residue or natural gas-fired thermal and cogenerating facilities, as well as hydroelectric power stations.
BLX CN Boralex Inc.	Boralex Inc. produces hydroelectric and thermal power. The Company owns hydroelectric power stations in Quebec, Canada, a natural gas-fired cogeneration plant located in Kingsey Falls, Canada, and a wood waste cogeneration plant located in Dolbeau, Canada. Boralex also owns a hydroelectric power station in Palmer, Massachusetts and a wood waste cogeneration plant in Stratton, Maine.
NORWAY	

Code Company	Description
AFK NO Arendals Fossekompani A/S	Aktieselskapet Arendals Fossekompani operates two hydropower plants located at the Boylefoss and Flatenfoss waterfalls in the lower part of the Arendals water course. The Company is also a power contract broker.
UNITED STATES	
AES US AES Corp	The AES Corporation acquires, develops, owns, and operates generation plants and distribution businesses in several countries. The Company sells electricity under long term contracts and serves customers under its regulated utility businesses. AES also also mines coal, turns seawater into drinking water, and develops alternative sources of energy.
NRG US NRG Energy Inc.	NRG Energy, Inc. owns and operates a diverse portfolio of power-generating facilities, primarily in the United States. The Company's operations include energy production and cogeneration facilities, thermal energy production, and energy resource recovery facilities.
DYN US Dynegy Inc.	Dynegy Inc. provides electricity to markets and customers throughout the United States. The Company's sell electric energy, capacity and ancillary services on a wholesale basis from its power generation facilities.

Source: Bloomberg

A.2 Energy Transmission and Distribution

Table A.2

DESCRIPTION AND PRODUCT SEGMENTATION

Code Company	Description
AUSTRALIA	
DUE AU Duet Group	DUET Group invests in energy utility assets located in Australia and New Zealand. The Group's investment assets include gas pipelines and electricity distribution networks.
ENV AU Envestra Ltd	Envestra Limited operates natural gas distribution networks and transmission pipelines in South Australia, Queensland and the Northern Territory. The Company's networks distribute gas to households and businesses in Adelaide, Brisbane (north of Brisbane River), Alice Springs and various regional centers in South Australia and Queensland.
CANADA	
CU CN Canadian Utilities Limited	Canadian Utilities Limited conducts operations in electrical utility services, independent power production, and retail gas and electricity marketing. The Company also distributes, transmits, gathers, processes, and stores natural gas. In addition, Canadian Utilities provides technical logistical services and billing and call center services.
GZM-U CN Gaz Metro Limited Partnership	Gaz Metro Limited Partnership is a Quebec energy company and a Canadian natural gas distributor serving customers in Quebec and the northeastern United States. The Company also has interests in natural gas transportation enterprises, sells goods and services through various companies in the energy and fiber optic fields, and provides rehabilitation services for waste water infrastructures.
JE-U CN Just Energy Income Fund	Just Energy Income Fund sells natural gas and/or electricity to residential and commercial customers under long-term fixed-price and price-protected contracts. The Company also offers its customers the option to receive all or part of their electricity from renewable sources.
NEW ZEALAND	
TPW NZ TrustPower Limited	TrustPower Limited is a regional New Zealand power company which operates electricity generation networks and also supplies and distributes electricity and other related services to customers. TrustPower also has operations in retailing electricity throughout New Zealand.
UNITED STATES	
SRE US Sempra Energy	Sempra Energy is an energy services holding company with operations throughout the United States, Mexico, and other countries in South America. The Company, through its subsidiaries, generates electricity, delivers natural gas, operates natural gas pipelines and storage facilities, and operates a wind power generation project.
CNP US	CenterPoint Energy, Inc. is a public utility holding company. The Company, through its subsidiaries, conducts activities in electricity

Code Company	Description
CentrePoint Energy Inc.	transmission and distribution, natural gas distribution and sales, interstate pipeline and gathering operations, and power generation.
NI US Nisource Inc.	NiSource Inc. is an energy holding company. The Company's subsidiaries provide natural gas, electricity and other products and services to customers located within a corridor that runs from the Gulf Coast through the Midwest to New England.
AGL US AGL Resources Inc.	AGL Resources Inc. primarily sells and distributes natural gas to customers in Georgia and southeastern Tennessee. The Company also holds interests in other energy-related businesses, including natural gas and electricity marketing, wholesale and retail propane sales, gas supply services, and consumer products.
ATO US Atmos Energy Corporation	Atmos Energy Corporation distributes natural gas to utility customers in several states. The Company's non-utility operations span various states and provide natural gas marketing and procurement services to large customers. Atmos Energy also manages company-owned natural gas storage and pipeline assets, including an intrastate natural gas pipeline in Texas.
SUG US Southern Union Company	Southern Union Company, through subsidiaries, gathers, processes, stores, transports, and distributes natural gas. The Company transports natural gas by pipeline from gas producing areas to customers primarily in the southeast, midwest, and Great Lakes region. Southern Union also operates a liquefied natural gas import terminal.
PNY US Piedmont Natural Gas Company	Piedmont Natural Gas Company, Inc. is an energy and services company that primarily transports, distributes, and sells natural gas. The Company serves residential, commercial, and industrial customers in North Carolina, South Carolina, and Tennessee. Piedmont also, through subsidiaries, markets natural gas to customers in Georgia, and distributes propane in various states.
GAS US Nicor Inc.	Nicor Inc. is holding company. The Company, through its subsidiaries, provides gas distribution services in Illinois as well as containerized freight transportation services the Bahamas and the Caribbean region. Nicor also provides energy-related products and services to retail markets and markets natural gas on a wholesale basis.
NJR US New Jersey Resources Corporation	New Jersey Resources Corporation provides retail and wholesale energy services to customers in New Jersey and in states from the Gulf Coast to New England, and Canada. The Company's principal subsidiary, New Jersey Natural Gas Co., is a local distribution company serving customers in central and northern New Jersey.
NWN US Northwest Natural Gas Company	Northwest Natural Gas Company distributes natural gas to customers in western Oregon, as well as portions of Washington. The Company services residential, commercial, and industrial customers. Northwest Natural supplies many of its non-core customers through gas transportation service, delivering gas purchased by these customers directly from suppliers.
SWX US Southeast Gas Corporation	Southwest Gas Corporation purchases, transports, and distributes natural gas to Residential, commercial, and industrial customers in portions of Arizona, Nevada, and California. The Company also provides construction services to utility companies, including trenching and installation, replacement, and maintenance services for energy distribution systems.
SJI US South Jersey Industries, Inc.	South Jersey Industries, Inc. is an energy services holding company. TheCompany provides regulated, natural gas service to residential, commercial, and industrial customers in southern New Jersey. South Jersey also markets total energy management services, including natural gas, electricity, demand-side management, and consulting services throughout the eastern United States.
LG US The Laclede Group, Inc.	The Laclede Group, Inc. is the parent company for Laclede Gas Company, a public utility involved in the retail distribution of natural gas. The Company serves an area in eastern Missouri, including the city of St. Louis, St. Louis County, and parts of several other counties.

Code Company	Description
	Laclede also operates underground natural gas storage fields and transports and stores liquid propane.
CPK US Chesapeake Utilities Corporation	Chesapeake Utilities Corporation is a utility company that provides natural gas transmission and distribution, propane distribution, and information technology services. The Company distributes natural gas to residential, commercial, and industrial customers in Delaware, Maryland, and Florida. Chesapeake Utilities' propane is distributed to customers in Delaware, Maryland, and Virginia.

Source: Bloomberg

Appendix B

References – Regulatory Decisions

Australian Competition and Consumer Commission (ACCC) (2008), *Australian Rail Track Corporation: Access Undertaking - Interstate Rail Network*, Commonwealth of Australia

Australian Energy Regulator (2009), *Electricity transmission and distribution network service providers: Review of the weighted average cost of capital (WACC)*, Commonwealth of Australia

Economic Regulation Authority (ERA) (2009) *The Pilbura Infrastructure (TPI): Final Determination on the 2009 Weighted Average Cost of Capital for TPI's Railway Network*, Western Australia

Government Prices Oversight Commission (GPOC) (2007), *Investigation into the Pricing Policies of Hobart Regional Water Authority, Esk Water Authority, Cradle Coast Water-Final Report*, Tasmania

Independent Competition and Regulatory Commission (ICRC) (2008), *Water and Wastewater Price Review, Final Report and Price Determination, Report 1 of 2008*, ACT

Independent Market Operator (IMO) (2008), *Market Procedure for Determination of the Maximum Reserve Capacity Price*, Western Australia

Independent Pricing and Regulatory Tribunal (IPART) (2009), *Gosford City Council, Wyong Shire Council: Prices for water, sewerage and stormwater drainage services from 1 July 2009 to 30 June 2013, Water - Determinations and Final Report*, New South Wales