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**VIA E-MAIL**

February 28, 2012

**BRITISH COLUMBIA UTILITIES COMMISSION**
**GENERIC COST OF CAPITAL PROCEEDING EXHIBIT A2-2**

To: All Regulated Entities

Re: British Columbia Utilities Commission
Commission Order G-20-12
Generic Cost of Capital Proceeding

Commission staff submits the following document for the record in this proceeding:

The Terasen Utilities (December 8, 2010) – Automatic Adjustment Mechanism Review.

Yours truly,

Alanna Gillis

DC/dg
Enclosure

**Scott A. Thomson**
Executive Vice President,
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December 8, 2010

British Columbia Utilities Commission
Sixth Floor, 900 Howe Street
Vancouver, B.C. V6Z 2N3

Attention: Ms. Erica M. Hamilton, Commission Secretary

Dear Ms. Hamilton:

**Re: Terasen Gas Inc. ("TGI"), Terasen Gas (Vancouver Island) Inc. ("TGVI") and Terasen Gas (Whistler) Inc. ("TGW"), collectively the "Terasen Utilities"**

**Automatic Adjustment Mechanism Review - British Columbia Utilities Commission ("BCUC" or the "Commission") Order No. G-158-09 Compliance Filing**

On May 15, 2009, the Terasen Utilities filed their Return on Equity ("ROE") and Capital Structure Application ("Application"), requesting an increase in ROE, elimination of the Automatic Adjustment Mechanism ("AAM"), the setting of the TGI's ROE as the benchmark ROE, and an increase to the common equity component of TGI's capital structure.

In its decision accompanying Order No. G-158-09 ("Decision"), dated December 16, 2009, the Commission directed that the AAM that had been used to determine the ROE of the Terasen Utilities on an annual basis be eliminated. The Commission also directed TGI to complete a study of alternative formulae and report to the BCUC by December 31, 2010:

> *A key consideration in the determination of whether to retain, amend or eliminate the AAM is whether the ROE produced by application of the formula for 2010 is reasonably comparable to the ROE determined by the Commission Panel from the evidence before it. The Commission's calculation of the ROE for 2010, as derived from the adjustment mechanism, is 8.43 percent, compared to the Commission Panel's determination that the appropriate ROE for TGI in 2010 is 9.50 percent. The Commission Panel determines that, in its present configuration, the AAM will not provide an ROE for TGI for 2010 that meets the fair return standard.*
>
> *The Commission Panel agrees that a single variable is unlikely to capture the many causes of changes in ROE and that in particular the recent flight to quality has driven down the yield on long-term Canada bonds, while the cost of risk has been priced upwards.*
>
> *In the Commission Panel's opinion, reliance on CAPM by Canadian regulatory agencies has also contributed to the divergence between Canadian and US allowed ROEs. In light of the limited weight given by the Commission Panel to CAPM in determining the ROE for TGI for 2010, it would seem inconsistent to retain the adjustment mechanism.*
>
> ***Accordingly the Commission Panel directs that the AAM be eliminated. TGI is directed to complete its study of alternative formulae and report to the Commission by December 31, 2010.***

As a result of the Decision, the Terasen Utilities retained Concentric Energy Advisors to conduct a full study of AAMs used in North America. This letter and attached report of

Concentric Energy Advisors have been prepared to comply with the directive in BCUC Order No. G-158-09.

**Background to Automatic Adjustment Mechanisms**

Until recently, the mechanism to adjust ROEs on an annual basis was through the use of an AAM, which came into effect in the mid-1990s and was adopted by many regulators across jurisdictions in Canada. In 1994, the BCUC was the first regulator in Canada to establish an AAM for calculating the allowed ROE on an annual basis, based on long-term Canada bond yields; and the BCUC determined BC Gas Utility Ltd. (now Terasen Gas Inc.) to be the benchmark low-risk utility. The allowed ROEs for other investor-owned utilities regulated by the BCUC (such as TGVI and TGW and FortisBC) were to be determined by adding to the benchmark ROE a company specific risk premium.

The use of a formula approach to ROE provided value to both utilities and customers in that it produced efficiency in regulatory process and therefore reduced costs. Over the last several years, however, the AAM has been increasingly under scrutiny in many jurisdictions for failure to meet the fair return standard. The validity of the AAM was examined closely in various regulatory jurisdictions across Canada during 2008 and 2009, with growing concerns about reliance on a single variable, the Government of Canada bond yield, and about the AAM overestimating the sensitivity of the utility ROE to changes in the Government of Canada bond yield. These concerns were highlighted during the 2008 and 2009 financial crisis when the changing capital markets (and particularly government bond yields) resulted in low ROEs and unfair rates of return.

The table below summarizes the history of AAM and the result of the recent AAM reviews by regulatory bodies in Canada.

| Regulator | AAM Adopted | Recent Decision | Decision/Order Number | Release Date |
|---|---|---|---|---|
| **British Columbia Utilities Commission (BCUC)** | 1994 | Eliminated | G-158-09 | December 16, 2009 |
| **National Energy Board (NEB)** | 1995 | Terminated | N/A | October 8, 2009 |
| **Public Utilities Board of Manitoba (PUBM)*** | 1995 | - | - | - |
| **Ontario Energy Board (OEB)** | 1997 | Modified | EB-2009-0084 | December 11, 2009 |
| **Newfoundland and Labrador Board of Commissioners of Public Utilities (NL PUB)** | 1998 | Maintained | P.U.43 (2009) | December 24, 2009 |
| **Québec Régie de l'énergie (Régie)** | 1999 | Maintained | D-2009-156 | December 7, 2009 |
| **Alberta Utilities Commission (AUC)** | 2004 | Suspended | 2009-216 | November 12, 2009 |

*Note: PUBM has not have a formal review, but has abandoned using an AAM in recent years

In addition to BCUC's Decision, the AAM was recently abandoned by the National Energy Board ("NEB"), suspended by the Alberta Utilities Commission ("AUC"), and modified by the Ontario Energy Board ("OEB").

The NEB, on October 8, 2009, decided that the 1994 multi-pipeline ROE Formula was no longer in effect due to the considerable changes in financial and economic circumstances.

Similarly, the AUC's 2009 Generic Cost of Capital Decision resulted in suspension of the application of the ROE AAM. Some of the reasons that led to these changes, requiring a fair return on equity for Alberta utilities, were, as indicated in the decision, increased economic globalization, performance of the financial markets, financial performance of utilities, anticipated infrastructure expansion in Alberta, the financial crisis that began in 2007, and the growing differential between corporate bond yields and government bonds. The AUC has initiated a proceeding to consider whether to implement an annual ROE AAM in 2011.

On December 11, 2009, the OEB reset and refined its AAM, changing the allowed ROE by 50% of the change in forecast long-term Canada bond yields and 50% of the change in observed A rated utility bond index over the 30-year Canada Bond yield. This decision came about to address the relatively low ROE level, and the adjustment parameters were refined to reduce the sensitivity to changes in government bond yields.

An AAM was maintained but modified by the Québec Régie de l'énergie ("Régie") in its decision (D-2009-156), dated December 7, 2009, and similarly in Newfoundland and Labrador Board of Commissioners of Public Utilities ("NL PUB") decision (Order No. P.U. 43 (2009) dated December 24, 2009). The Public Utilities Board of Manitoba ("PUBM") has not yet initiated a formal review process to assess the continued use of the AAM; however, it has abandoned the use of AAM in recent years and only "uses the formula as an upper bound reasonableness check for return determinations for Centra Gas"[1].

**The Terasen Utilities' Position and Recommendation**

The use of AAM is only appropriate when it results in returns that meet the fair return standard. This means that the starting point or benchmark rate of return needs to be set at a level that meets the fair return standard before it can be adjusted to produce fair and reasonable returns. In the U.S., the use of AAM is less common, and in instances where such a mechanism is used, it is only applied to a starting point ROE that is fair. The Terasen Utilities have not found a formula in Canada or the U.S. that ensures fair and reasonable returns over time, and that meets the fair return standard, although a couple of those identified in the Concentric report came somewhat close to the BCUC's 2009 Decision in a backcast analysis.

In their Application, the Terasen Utilities requested an allowed ROE for TGI, the Benchmark ROE, to be set at 11%. In the same Application, the Terasen Utilities maintained that an AAM should*:*

1. be relatively simple to understand and apply;

1 Please refer to Concentric Energy Advisors report

2. be based on changes in one or more reasonably available and verifiable variables;
3. exclude changes in variables due to abnormal market events;
4. incorporate variables which vary in a quantifiable way with the utility cost of equity; and
5. incorporate variables which are not vulnerable to changes caused by company-specific circumstances which may not impact on the cost of equity for the utilities to which the formula applies.

The Terasen Utilities believe that the same criteria would be necessary to underpin an AAM if an AAM formula were to be introduced in the future. Further, should an AAM be implemented it is critical that the starting point be set at a level that meets the fair return standard. Given this requirement, the recency of the Decision in late 2009 and the gradual economic recovery, the Terasen Utilities are not proposing that the Commission adopt a formulaic AAM at this time.

On November 15, 2010, the OEB released its determination of the benchmark ROE for Ontario utilities subject to its formula for 2011 as 9.66%, a change of only 9 basis points from 2010. The Terasen Utilities submit that this suggests there would be little benefit derived from re-examining cost of capital at this time or introducing a new AAM in British Columbia.

In the event the Commission considers adopting an AAM in the future, the Terasen Utilities believe that such an AAM should be based on the principles outlined in the attached report prepared by Concentric Energy Advisors, and believe that the current 9.5% ROE benchmark and the related economic parameters from the Fall of 2009 should be used as the starting point until a new comprehensive review of the cost of capital for a benchmark utility is completed. Additionally, the Terasen Utilities submit that if a new AAM were to be considered, that the ROE for TGVI and TGW should continue to be set with reference to the benchmark ROE established for TGI by adding a utility specific risk premium, which has been a successful approach in BC.

Sincerely,

**TERASEN GAS INC.**
**TERASEN GAS (VANCOUVER ISLAND) INC. and**
**TERASEN GAS (WHISTLER) INC.**

***Original signed by:***

Scott A. Thomson
Executive Vice President, Finance, Regulatory & Energy Supply

Attachment

# Terasen Gas Inc.
# Terasen Gas (Vancouver Island) Inc. and
# Terasen Gas (Whistler) Inc.
# (Collectively the "Terasen Utilities")

# A Review of Automatic Adjustment Mechanisms for Cost of Capital

November 29, 2010

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## INTRODUCTION

Concentric understands that pursuant to the British Columbia Utilities Commission's ("BCUC" or "Commission") Return on Equity ("ROE") and Capital Structure Order No. G-158-09, dated December 16, 2009, for Terasen Gas Inc. ("TGI" or "Terasen"), Terasen Gas (Vancouver Island) Inc. ("TGVI"), and Terasen Gas (Whistler) Inc. ("TGW") (collectively referred to as the "Terasen Utilities"), the Commission eliminated the formulaic ROE adjustment mechanism determining that the returns it produced were "insufficient to meet the fair return standard."[1]

The automatic adjustment mechanism ("AAM") was originally established in 1994 to adjust the 1995 rate of return on common equity for BC Gas Utility Ltd. (now TGI), Pacific Northern Gas Ltd., and West Kootenay Power Ltd. (now FortisBC Inc.). As a precursor to that Decision, the Commission had convened an evidentiary proceeding to evaluate processes or mechanisms that might be employed to improve the determination of ROE and capital structures, particularly in terms of process.[2] Ultimately, in its decision, after considering stakeholder evidence, the Commission established a process whereby the benchmark ROE for a low risk, high grade utility would be determined in a generic cost of capital proceeding and would be adjusted annually using an AAM based on long term bond yields. For purposes of determining the utility specific ROE and capital structure, the Commission would consider the utility's relative risk versus the benchmark utility and would adjust ROE and/or capital structure to account for differences in risk between the utility and the generic benchmark.

The years that followed produced a steady decline in interest rates and consistently lower ROE results. In 2008 and 2009, government bond yields, which served as the basis of the BCUC AAM, continued their decline to unprecedented low levels while corporate risk premiums and corporate capital costs spiked. Over the period since implementation of the AAM, Canadian utilities that were once receiving ROEs in parity with U.S., were receiving ROE awards 200 basis points lower than their U.S. counterparts. These factors illuminated the inherent flaws in the AAM that the Commission noted in its recent Order. Ultimately, the Commission determined that "a single variable is unlikely to capture the many causes of changes in ROE"[3] and as such, discontinued the AAM. Specifically, the Commission found:

> *A key consideration in the determination of whether to retain, amend or eliminate the AAM is whether the ROE produced by application of the formula for 2010 is reasonably comparable to the ROE determined by the Commission Panel from the evidence before it. The Commission's calculation of the ROE for 2010, as derived from the adjustment mechanism, is 8.43 percent, compared to the Commission Panel's determination that the appropriate ROE for TGI in 2010 is 9.50 percent. The Commission Panel determines that, in its present configuration, the AAM will not provide an ROE for TGI for 2010 that meets the fair return standard.*

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1 In the Matter of Terasen Gas Inc., Terasen Gas (Vancouver Island) Inc., Terasen Gas (Whistler) Inc. and Return on Equity and Capital Structure Decision, G-158-09, December 16, 2009 at 72.

2 In the Matter of Return on Equity, BC Gas Utility Ltd., Pacific Northern Gas Ltd., West Kootenay Power Ltd. Decision G-35-94, June 10, 1994, at 2.

3 In the Matter of Terasen Gas Inc., Terasen Gas (Vancouver Island) Inc., Terasen Gas (Whistler) Inc. and Return on Equity and Capital Structure Decision, G-158-09, December 16, 2009 at 73.

*The Commission Panel agrees that a single variable is unlikely to capture the many causes of changes in ROE and that in particular the recent flight to quality has driven down the yield on long term Canada bonds, while the cost of risk has been priced upwards.*

*In the Commission Panel's opinion, reliance on CAPM by Canadian regulatory agencies has also contributed to the divergence between Canadian and US allowed ROEs. In light of the limited weight given by the Commission Panel to CAPM in determining the ROE for TGI for 2010, it would seem inconsistent to retain the adjustment mechanism.*

*Accordingly the Commission Panel directs that the AAM be eliminated. TGI is directed to complete its study of alternative formulae and report to the Commission by December 31, 2010.*[4]

To that end, the Terasen Utilities have retained Concentric Energy Advisors ("Concentric") to assist them with the development of a responsive filing to the Commission. Concentric has conducted extensive research and analysis regarding the Canadian ROE formula and the returns it has historically produced, in addition to analyzing the relative comparability of Canadian and U.S. utilities. Concentric had also developed a formulaic recommendation in Alberta and Ontario, which recognized the importance of litigated North American authorized returns for ROE determinations in Canada, and the integration of capital markets and similarity of regulatory models and corresponding risks for utilities in the two countries. Our discussion in this Report is underpinned by the considerable research we have conducted on these topics in connection with the following studies:

- A Comparative Analysis of Return on Equity of Natural Gas Utilities, prepared for the Ontario Energy Board by Concentric Energy Advisors, June 14, 2007;
- A Comparative Analysis of Return on Equity for Electric Utilities, prepared for the Coalition of Large Distributors ("CLD") and Hydro One Networks Inc. by Concentric Energy Advisors, June 2008;
- Concentric's Testimony before the AUC in its 2009 Generic Cost of Capital Proceeding, Application No. 1578571 / Proceeding ID. 85, on behalf of the ATCO Utilities, November 20, 2008; and most recently
- Concentric's Testimony and Presentation before the OEB in its 2009 Consultative Process on Cost of Capital, EB-2009-0084, on behalf of each Enbridge Gas Distribution, Inc. and Hydro One and the Coalition of Large Electric Distributors[5], individually, September 2009.

In order to assist the Terasen Utilities with their filing to the Commission, Concentric has examined the use of ROE formulas in other jurisdictions, contrasted these approaches with alternatives, considered the relative merits of these approaches and prepared this report summarizing our findings. Concentric is not recommending that a formula be adopted, but has reviewed and summarized the formulas in existence or that have been proposed in other jurisdictions. Additionally, Concentric has identified attributes that should be considered in the construction of an AAM in the event that one is adopted in the future.

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4 In the Matter of Terasen Gas Inc., Terasen Gas (Vancouver Island) Inc., Terasen Gas (Whistler) Inc. and Return on Equity and Capital Structure Decision, G-158-09, December 16, 2009 at 72.

5 The Coalition of Large Distributors consists of the following members: Enersource Hydro Mississauga Inc., Horizon Utilities Corporation, Hydro Ottawa Limited, Powerstream Inc., Toronto Hydro-Electric Systems Limited, and Veridian Connections Inc.

The remainder of this report is organized according to the following topics: Section 1 provides an overview of formulaic approaches to cost of capital in Canada and the U.S., and a brief overview of cost of capital practices overseas. Section 2 identifies desirable formula attributes. Section 3 provides an evaluation of alternative formulaic approaches, either in practice or proposed in other jurisdictions. Section 4 describes five alternatives for consideration by the Commission, and Section 5 summarizes our conclusions.

## 1. Cost of Capital Formulas

Regulators in both Canada and the U.S. consider three primary factors when establishing a just and reasonable allowed return. These factors are: 1) capital attraction; 2) financial integrity; and 3) comparable returns. That is, the authorized return must allow the regulated utility to attract capital on reasonable terms under a variety of different market conditions, to maintain its financial integrity and borrowing capacity, and to offer investors the opportunity to earn a return comparable to other businesses with commensurate risks. Canadian regulators are guided by the benchmark ROE decision *Northwestern Utilities v. City of Edmonton* (1929)[6], U.S. regulators are guided by court decisions including *Federal Power Commission v. Hope Natural Gas* (1944)[7] and *Bluefield Water Works and Improvement Company v. PSC of W. Va.* (1923)[8], and these decisions are also cited extensively in Canada.

The use over the past two decades of formulas or AAMs applied to the utility cost of capital had, until recently, evolved to be the 'norm' in Canada, but remains an exception among U.S. regulators. The formulaic methodology provides an approach to approximating the results of periodic rate hearings, without having to expend time and resources for a full evidentiary rate hearing on cost of capital. At the center of the Canadian movement towards a formulaic methodology has been a desire for improved regulatory efficiency through a generic approach to an often contentious issue in the context of a litigated rate proceeding or settlement process. In Canada, we have seen a re-evaluation of the use of AAMs over the past two years. The following sections highlight the use of formulaic approaches and prevailing cost of capital practices in Canada, the U.S., and selectively overseas.

### a. Canada

In Canada, the adoption of a formulaic approach to setting regulated authorized equity returns was first established by the British Columbia Utilities Commission in 1994. According to a regulatory history compiled by Major and Priddle[9], through the mid-1990s Canadian utilities typically filed rate applications every one or two years, with ROEs set using one or more of four approaches: Comparable Earnings (CE), Discounted Cash Flow (DCF),

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6 http://csc.lexum.umontreal.ca/en/1961/1961scr0-392/1961scr0-392.html
7 http://supreme.justia.com/us/320/591/case.html
8 http://supreme.justia.com/us/262/679/case.html
9 'The Fair Return Standard for Return on Investment by Canadian Gas Utilities: Meaning, Application, Results Implications", Hon. John C. Major, Former Justice, Supreme Court of Canada and Roland Priddle, Former Chair of the National Energy Board, March 2008.

Capital Asset Pricing Model (CAPM), or Equity Risk Premium (ERP). The adoption of a generic approach to ROE was ushered in by the following factors:

> *The context for the search by Canadian regulators for a generic approach to ROE was characterized by: frequent rate applications; repetitive evidence, often provided by the same expert witnesses, on the three principal tests; growing disenchantment with the CE and DCF tests; and increasing reliance on the ERP approach. That search was led by the BC Commission which "…was the first regulatory agency in Canada to examine the applicability of a generic, formula-based approach to setting natural gas or electric ROE as a means of improving the efficiency or effectiveness of the regulatory process.*"[10]

Following the precedent set by the BC Utilities Commission in 1994, several other regulatory bodies in Canada followed suit: the National Energy Board ("NEB") (1995), Manitoba (1995), Ontario (1997), Newfoundland and Labrador (1998), Quebec (1999), and Alberta (2004).[11] Concentric has identified 6 Canadian provinces in addition to the NEB that implemented a formulaic approach to adjusting ROE, although the majority of these (NEB, BC, Manitoba and Alberta) are either terminated, under review or suspension,[12] and the Newfoundland and Labrador Board invited Newfoundland Power to propose changes to the formula in its most recent decision.[13]

In the case of the BC formula, the coefficient was initially set at 1.0[14] at the time the formula was established in 1994 and was subsequently changed to 0.80[15] and then to 0.75[16]. Withstanding current developments around the formula in Ontario, Alberta, Manitoba and the NEB, the formula that has been prevalent in the majority of Canadian provinces had settled on the following equation:

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10 Ibid., p.14.

11 Ibid, pp.15-16.

12 The NEB terminated the formula in October 2009, See NEB Reasons for Decision Multi-Client RH-R-2-94, (October 2009), part 1.2, *"Whatever the reason, given the vast experience the industry has gained in reaching negotiated settlements over the past 15 years, the Board is of the view that it is neither necessary nor appropriate to replace the RH-2-94 Decision with another multi-pipeline cost of capital decision at this time. Accordingly, the RH-2-94 Decision will not continue to be in effect."* Similarly, the BC Commission terminated the formula in December 2009, See Commission Order G-158-09, (December 2009), part 5, at 73, "*The Commission has accordingly directed that the automatic adjustment mechanism be eliminated.*" The Manitoba Commission no longer uses the formula to make ROE determinations, but rather sets return based upon targeted debt/equity ratios of 75/25. The Board still uses the formula as an upper bound reasonableness check for return determinations for Centra Gas. *See* Manitoba Board Orders 103/05 and 115/05, (October 2005), part 1.(a), at 3 *"regulatory approach alternatives – the Board confirms its intention to use both the Rate Base Rate of Return and Cost of Service methodologies, with Rate Base Rate of Return to be a test of the maximum allowable return to MH".* The Alberta Commission has suspended the formula and will consider whether to reinstate the formula in the next generic proceeding. See AUC Decision 2009-216 (November 12, 2009), part 79 & 81. *"The Commission has decided to suspend the application of the existing, or any, ROE adjustment formula. The Commission has set a generic ROE for 2009 and 2010 of 9.0 percent. The same ROE will be employed for 2011 on an interim basis….In 2011, the Commission will initiate a proceeding to consider the final ROE for 2011 and to consider whether to implement an annual ROE adjustment formula".*

13 Newfoundland and Labrador Board of Commissioners of Public Utilities, Reason for Decision: Order No. P.U. 43 (2009), p. 30.

14 BCUC Decision No. G-35-94, June 10, 1994.

15 BCUC Decision No. G-49-97, April 24, 1997.

16 BCUC Decision No. G-14-06, March 2, 2006.

$$ROE_t = ROE_{t-1} + 0.75 \times (LCBF_t - LCBF_{t-1})$$

Where $ROE_t$ is the ROE for the upcoming period and $ROE_{t-1}$ is the ROE for the previous period. The $LCBF_t$ is equal to the Long Canada Bond Forecast, made up of the average of the 10 year bond forecast 3 months out and 12 months out, plus the one month average historical spread between the 30-year and 10-year bond yield; and for any period t may be expressed as:

$$LCBF_t = \left[\frac{10\_CBF_{3,t} + 10\_CBF_{12,t}}{2}\right] + \sum_i \frac{30\_CB_{i,1} - 10\_CB_{i,1}}{i_t}$$

A brief overview of formulas currently in use in other Canadian provinces is provided in Figure 1 and Part 3 of this report.

**b. United States**

In the U.S., formulaic approaches to determining ROE have been adopted by relatively few regulatory jurisdictions, as litigated ROE proceedings remain the prevalent means for setting ROE. Typically, a formulaic ROE approach coincides with a broader alternative regulation or performance-based rate plan that includes formulaic adjustments to rate components in addition to performance measures and incentives. Though, there are a number of U.S. jurisdictions that operate under "formula rate plans"[17] very few utilize automatic formulaic mechanisms to adjust ROE.

Of those jurisdictions that have adopted the use of formulaic adjustments to ROE, prevailing practices lie on both ends of the spectrum of complexity, with very little in between. For example, at one end of the spectrum, is the "prescriptive approach" which lays the ground rules for conducting a comprehensive ROE Study using standard methodologies and removing areas of contention by prescribing data inputs and proxy group selection criteria. This approach has been employed by Mississippi and has been considered by New York[18] and most recently Connecticut.[19]

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17 "Formula Rate Plans", "Performance-based Rate Plans" or "Alternative Regulation Plans" are all commonly used terminology in the U.S. (and may be used interchangeably) to describe a comprehensive alternative incentive rate structure.

18 The New York commission also entertained the "uniform/prescriptive approach" in 1982 when it initiated a Generic Financing Proceeding primarily focused on maintaining the financial integrity of utilities through financial standards designed to maintain A credit ratings. This proceeding evolved to a 1991 re-examination of the adequacy of these standards in the face of increased industry competition for the telecommunications, electric, gas, and water industries. Following a two-year period involving separate working groups of utilities and other interested parties, each industry group recommended the adoption of a generic cost of equity formula. The electric/gas group formula equally weighted three methods: DCF (two-stage), CAPM (average of 4 results), and Comparable Earnings, and a twice-per-year determination to be applied to subsequent rate periods. The Commission never rendered a final decision in this proceeding. However, it has utilized the recommendations from this proceeding to guide allowed returns for utility companies in New York.

19 The state of Connecticut initiated an investigative inquiry in October 2009 "*to explore the need, desirability and feasibility of establishing a uniform methodology for determining return on equity (ROE) for public service companies during rates cases conducted pursuant to § 16-19 of the General Statutes of Connecticut (Conn. Gen. Stat.).*" Comments in that proceeding were filed earlier in the year and it appears that the DPUC is considering the "prescriptive approach" where standardized DCF and CAPM analyses are completed for a specified proxy group of companies. A final decision is anticipated in February 2011.

The second, more common approach to formulaic ROE adjustment mechanisms, is that which can be described as a simple formula, such as has been prevalent in Canada, requiring no interim ROE analyses at all. Vermont and California use simple formulas tied to bond yields, similar to the Canadian formula described above. How those formulas differ from the formula described earlier, is detailed in Part 3 of this Report.

Lastly, there are a handful of U.S. jurisdictions that fix ROE at a specified rate and do not make adjustments, but rather share overages and shortfalls with ratepayers. Alabama and Louisiana fall into this category.[20] And, there are several jurisdictions and the FERC[21] that use a formula to set parameters for the range of reasonable ROE determinations, but do not adjust ROE using a formula.[22] A brief overview of the AAMs in Canada and the U.S. is provided in Figure 1, and a more complete discussion of U.S. automatic adjustment mechanisms currently in practice and their inputs may be found in Part 3.

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[20] The Alabama Commission adopted a rate stabilization approach to the cost of equity when it set an ROE range for Alabama Power equal to 13 to 14.5%, subject to an annual rate increase cap of 5%. For rate increases above the cap, the company was at risk, and rate increases below the cap are allowed up to the 14.5% limit. Similar mechanisms were established for Alabama Gas (1983) and Mobile Gas (2002), and remain in effect today. This type of program was motivated by concerns for controlling rate increases, and evolved during a period of relatively high inflation. Similarly, in Louisiana, Entergy Gulf States has been subject to an electric formula rate plan since 2004. The current plan incorporates a 150 basis point dead-band, i.e. 75 basis points above or below a benchmark ROE of 10.65%. If EGS' earned ROE falls below the lower end of the dead-band (that is 9.9%), the company is permitted to recover 60% of the shortfall up to the lower end of the dead-band from ratepayers. If EGS' earned ROE exceeds the upper end of the dead-band (that is 11.4%), the company must refund 60% of the excess to customers. The other electric and gas utilities in Louisiana operate under similar rate stabilization plans. However, only Louisiana Gas Service has a cap on the amount by which O&M expenses are allowed to increase each year (i.e., $39.9 million per year adjusted for inflation and customer levels).

[21] While not completely formulaic, the FERC has applied a prescriptive approach to measuring ROE for regulated transmission utilities under its jurisdiction. For natural gas pipelines, the FERC specifies proxy group selection criteria, employs a two-stage DCF methodology, prescribes sources for analyst growth rates, prescribes appropriate weightings of growth rates to be used in the analysis, and prescribes a methodology for arriving at a reasonable range of ROE results from which the midpoint is selected. This method has evolved through case precedent (as has the methodology for electric transmission ROE determinations, which differ slightly from those of gas transmission ROE determinations). For relevant FERC proceedings that established the natural gas prescriptive approach to ROE, please refer to 84 FERC ¶61,081, Williston Basis Interstate Pipeline Company, Order on Initial Decision, Issued July 29, 1998; Opinion No. 414-A, 84 FERC ¶61,084, Issued July 29, 1998; and Opinion No. 414-B, 85 FERC ¶61,323.

[22] In Virginia, Title 56, Chapter 23 of the Code of Virginia prescribed a formula to be used by the Virginia State Corporation Commission ("SCC") to set a ceiling and floor for authorized ROEs. The statute states: "*In such proceedings the Commission shall determine fair rates of return on common equity applicable to the generation and distribution services of the utility. In so doing, the Commission may use any methodology to determine such return it finds consistent with the public interest, but such return shall not be set lower than the average of the returns on common equity reported to the Securities and Exchange Commission for the three most recent annual periods for which such data are available by not less than a majority, selected by the Commission as specified in subdivision 2 b, of other investor-owned electric utilities in the peer group of the utility, nor shall the Commission set such return more than 300 basis points higher than such average.*" Similarly, in Florida, the PSC uses a leverage formula to set bounds around a range of returns based on a low-end equity ratio of 40% and a high-end ratio of 100% for its water utilities. The base ROE is determined through DCF and CAPM analyses using natural gas utilities as a proxy for water utilities. See Notice of Proposed Agency Action Order Establishing Authorized Range of Returns on Common Equity for Wastewater Utilities, Docket No. 090006-WS, Order No. PSC-09-0430-PAA-WS (June 19, 2009) "*Section 367.081(4)(f), Florida Statutes (F.S.), authorizes us to establish, not less than once each year, a leverage formula to calculate a reasonable range of returns on equity (ROE) for water and wastewater (W A W) utilities...Although Subsection 367.081 (4)(f), F.S., authorizes us to establish a range of returns for setting the authorized ROE for W A W utilities, we retain the discretion to set an ROE for W A W utilities based on record evidence in any proceeding.*"

### c. ROE Practices Overseas

Looking abroad to the U.K., Netherlands and Australia, we find a reliance on price cap regulation and rates that are adjusted annually based upon inflation and productivity by the utilities. These countries (the U.K., Netherlands and Australia) each rely predominantly on a market based asset return or (WACC) methodology to set the initial base rates for a fixed period (3 to 5 years). None of these countries employ an AAM to set ROE. ROEs are set in regulatory proceedings.

All of the prevailing formulaic approaches that we have identified and their associated inputs are summarized in Figure 1.

**Figure 1: North American Formulaic ROE Adjustment Mechanisms Currently in Effect**

| Formula Inputs | Jurisdiction: Ontario (new formula) | Quebec (former BC, Ontario and NEB) formula | Newfoundland and Labrador formula | Vermont formula | California formula | Mississippi formula |
|---|---|---|---|---|---|---|
| Forecast 10-year Government Bond Yield (Average of 3 months out and 12 months out forecast) | ✓ | ✓ | ✓ | | | |
| 20 trading day average of 10-year U.S. Treasury yield | | | | ✓ | | |
| 12 month average yield Moody's Baa or A utility bond yield | | | | | ✓ | |
| Spread between 10 and 30-year Government Bond Yield (daily differences for select prior month) | ✓ | ✓ | ✓ | | | |
| Spread between Long Canada Government Bond Yield and the Blooomberg Fair Value Canada 30-Year A-rated Utility Bond index | ✓ | | | | | |
| Inversely Applies Coefficient of 20% Δ in bond yield to Equity Risk Premium (same as 80% Δ in bond yield) | | | ✓ | | | |
| Coefficient of 75% Δ in bond yield | | ✓ | | | | |
| Coefficient of 50% Δ in bond yield | ✓ | | | ✓ | ✓ | |
| Equal weighting of DCF, Risk Premium and CAPM + 12.5 bps for flotation costs | | | | | | ✓ |
| Incentives | | | | ✓ | | ✓ |
| Deadband | | | | ✓ | ✓ | ✓ |
| Formula Applied Annually | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Specified Review Period | ✓ | | | | ✓ | |

Upon examining the formulas adopted in Canada and the U.S., there are some common themes in terms of inputs and overall design elements. Generally, most formulas are tied to government or utility bond yields (only the Mississippi prescriptive ROE methodology does not utilize a bond yield directly for its adjustment mechanism). Of those formulae that rely on bond yields, a 30-year bond yield is the tenure of bonds more commonly adopted. The Canadian formulas tend to use a forecast 10-year bond yield plus the recent spread between 10 and 30-year bonds. The Vermont formula uses a historical average of the 10-year bond yield. The California formula and the newly adopted Ontario formula utilize a measure of the corporate long-term utility bond yield. In addition, in Ontario a portion of the long-term utility bond yield is forecast (the formula adds 0.50 of the change in the Long Canada Bond Forecast to 0.50 of the change in the yield spread between the A-rated Utility Bond and the Long Canada Bond from the base year.) In Canada, adjustment coefficients applied to changes in bond yields had generally been in the 0.75 range, but as is the case in Ontario above, there is movement towards a range of 0.50 as seen with U.S. formulas. In addition, several of the formulas are coupled with incentive mechanisms, deadbands, specified review periods, and all of the formulas are adjusted annually (subject to their deadbands).

## 2. Desirable Formula Attributes

Two perceived benefits of a formulaic adjustment mechanism are regulatory expediency and greater certainty for both the utility and regulator. As noted above, formulas generally update annually, without special proceedings or contentious battles between stakeholders. However, the tendency to set and forget the formula is also a primary drawback to the formulaic approach. When equity returns are generated on autopilot, there is a tendency to ignore or discount changing market conditions that may render the formulaic result unfair. There must be a balance that recognizes the need to periodically benchmark against traditional measures of required returns for regulated utilities. A functional ROE formula must be able to approximate the results that would have been produced in a rate-setting hearing process.

Establishing the starting point of the formula is the first step in the process. Great care must be exercised in establishing the initial ROE as the effects of any understatements or overstatements will be felt with each succeeding application of the formula. Concentric is of the view that the initial ROE should be set in accordance with traditional ROE setting methodologies, utilizing multiple approaches, based on a proxy group of companies with similar risk profiles, in a process where the regulatory Board hears evidence from the company and its stakeholders. Most jurisdictions go through this process each time ROE is set. A fully litigated regulatory process where stakeholder evidence is presented and heard by the commission generally provides a sound basis for a fair determination of ROE. As noted earlier, several jurisdictions have turned to the use of formulas to provide interim adjustments to ROE for estimated movements in equity markets between rate proceedings. The same regulatory objectives could be met without a formula by scheduling regular cost of capital proceedings within reasonable time frames. Periodic rate hearings encompass most of the desired attributes we consider in establishing a formulaic methodology. When utilizing an AAM, it is also important that the parameters of the formula are carefully selected. Otherwise, errors will have a compounding influence on the formulaic result as they accumulate over time.

If a formula is adopted, Concentric is of the opinion that any formulaic approach selected should give adequate consideration to the following criteria:

1. Tracks required utility equity returns
2. Ease of administration
3. Based on commercially accessible inputs
4. Promotes regulatory transparency
5. Forward-looking
6. Stability
7. Insulated from the effects of anomalous and transitory market conditions
8. Specified timetable for periodic review and/or rebasing of the formula
9. Reflects the capital market conditions faced by the utility.

Tracks Required Utility Equity Returns

The formulaic approach must accurately reflect investor-required equity returns amid varied economic and financial market conditions. A formula that relies exclusively on government bond yields, for example, may lose sight of influences in the bond market that do not affect the equities market and vice-versa. Bond yields and equity returns do not always move in tandem. For example, the sustained decline in interest rates in Canada over the last decade as a result of the monetary policy from the Federal Reserve Board and the Bank of Canada has resulted in increasingly lower formula-produced returns on equity, while litigated evidentiary proceedings in Canada and the U.S. were producing higher equity returns than those produced by the formula. Indeed, in the recent financial crisis and economic recession, credit spreads widened significantly and equity market volatility rose to unprecedented levels, ultimately causing government bond yields and corporate capital costs to move opposite to one another despite a historical positive relationship. Neither bond yield (government or corporate) provides a complete picture of required equity returns. Incorporating factors that estimate required utility equity returns or incorporating returns allowed in other jurisdictions into the formulaic adjustment mechanism might alleviate this problem. Such factors might include:

- An index of North American allowed equity returns for utilities
- DCF Calculation
- Equity Risk Premium or CAPM[23] Calculation
- Investor analyst sector or utility specific projections for ROE.

Ease of Administration

Regulators seeking to adopt formulas are generally looking for an ROE adjustment mechanism that can be updated annually without the need for a hearing process or supporting expert testimony. The process of hiring experts to provide opinions and supporting evidence on ROE issues is costly and time consuming. It is important that if an

[23] The CAPM methodology is an extension of the basic equity risk premium model. It is a theoretical model based on the investor objective of optimizing portfolio returns by minimizing systematic market risk. The CAPM model is often criticized for the subjectivity and controversy around its input parameters such as beta, the means to adjust beta, the appropriate risk free rate and the appropriate risk premium.

automatic adjustment mechanism is reintroduced, it should be readily administered by regulatory staff without the assistance of outside experts.

Based on Commercially Accessible Inputs

Formulas should utilize data that is commercially available and populated for both U.S. and Canadian companies. Often, subscription charges apply to data services (e.g., Bloomberg, DEX Universe Bond Indices), but these costs may be more than offset by the value of the data to the process.

Promotes Regulatory Transparency

Regulatory transparency refers to the openness of the process and predictability of outcomes by all stakeholders, i.e. the utility, creditors, investors, and ratepayers. A formulaic ROE that can be readily estimated by stakeholders promotes regulatory transparency, enabling investors to make forward projections based on widely understood data inputs. A formula with inputs that are not available to the stakeholders or that requires regulatory discretion in its application would not satisfy the objective of regulatory transparency as there is still uncertainty around the ultimate regulatory decision.

Forward-Looking

A formulaic ROE should provide an informed estimate of what investors will require in returns over the course of the applicable rate-setting period. For this reason, the use of yield projections and share price data are beneficial in providing a forward looking view of what is to come on the investment horizon. Both projected yield data and stock value per share data provide meaningful information as to what investors see for the future of a given credit issue or company valuation at the present time. Near-term historical data may be a reasonable proxy for projected data unless significant growth or anomalous market activity render recent history an inappropriate indicator for the projection period.

Stability

The formula should be responsive to changing market conditions but not overly sensitive to normal market volatility. It should have the stability to moderate the effects of temporary market movements so that regulators and utilities alike are not constantly making nominal changes to rates that would otherwise reverse themselves in the next period. Deadbands are used in several jurisdictions to avoid the recalculation of ROE and rates for minor changes in market conditions. If used, deadbands should strike a reasonable balance between triggering too often and not triggering often enough. A formula that is too sensitive to market volatility introduces unnecessary volatility to utility revenues and rates and results in inefficient rate revisions.

Insulated from the Effects of Anomalous and Transitory Market Conditions

Some formulaic approaches employ ceilings and floors to limit the movement of ROE from starting levels and/or trigger a review. The recent market collapse and recession of 2008 illustrated that a formula may produce inappropriate results under certain market conditions. Monitoring and setting limits based upon established thresholds such as: returns in other jurisdictions, credit spreads, changes in bond yields, changes in earnings growth, changes in stock prices, or substantial changes in ROE results may all provide valuable information to assist in the determination that the formula should be tested for appropriate results. Once such a condition is indentified, there must be an assessment and resolution process where

the regulator and stakeholders arrive at an equitable solution for ensuring the fair return on equity for the upcoming period.

Specified Timetable for Periodic Review and/or Rebasing of the Formula
Any formulaic methodology should be accompanied by defined conditions that would trigger a review. A formula that remains on autopilot too long may yield inappropriate results. It is therefore necessary to routinely benchmark the formulaic result to other measures of ROE. We have observed that conditions may arise that would warrant a review, but without an established process the decision to re-evaluate the formula could be delayed by stakeholder deliberations on whether the formula is providing reasonable results. For that reason, Concentric recommends an established framework for rebasing the formula, i.e. every 3 to 5 years, unless there is substantial agreement among stakeholders that the formula is providing reasonable results. The periodic review, at a minimum, should incorporate tests beyond those upon which the formula is based. There is also value in allowing parties to petition for a review of the formula when and if they believe it is providing unreasonable results.

Reflects the Capital Market Conditions Faced by the Utility
When setting the ROE for a regulated utility, it is ideal to obtain data inputs reflecting capital market conditions faced by the utility. The integration of North American capital markets and the similarity of the legislative and regulatory processes have created a more homogenous market for utility capital. Formulas should strive to choose proxies carefully, so that risks borne by the proxy companies are representative of those to which the utility under consideration is subjected. Though no proxy is perfect, risk adjustments may be made for marked differences in risk profiles between the utility and its set of proxy companies.

## 3. Alternative Formulaic Approaches

### a. A Study of Formulaic Inputs

The components of a cost of capital or ROE adjustment formula can be broken down into two fundamental functions. First, the inputs to approximate the movement of equity returns based upon an estimated relationship between the formula input factor and the returns utility equity investors require. Through our research, we have identified the following inputs and coefficients that are present in ROE automatic adjustment mechanisms:

- Forecast Government Bond Yield
- Historical Government Bond Yield
- Corporate Bond Yield
- Utility Bond Yield
- DCF, Risk Premium and CAPM Inputs
- Formula Coefficient.

Second, some formulas incorporate protective mechanisms that mitigate the impact of the formula under certain conditions. Examples of these are trigger mechanisms that prompt a review if a predetermined threshold is met, and predetermined periods for rebasing ROE. Some formulas employ ceilings and floors that are either fixed or tied to a variable, which

provide a figurative rail to keep the formula returns on track. Other mechanisms may specify a materiality threshold for adjustment and employ a deadband in which no adjustment is made. Below is a list of measures that we have identified that moderate or rebase the results of the formula in certain conditions:

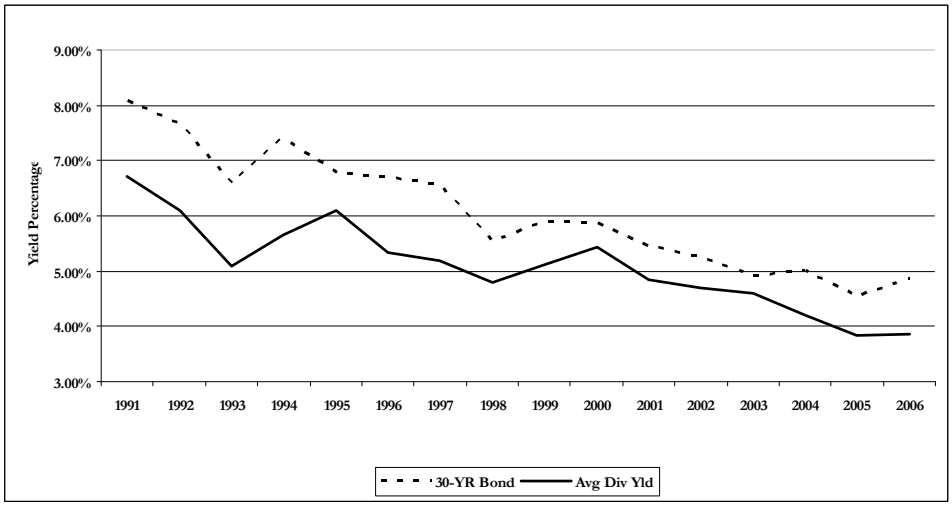
- Deadband
- Ceilings and Floors
- Trigger Mechanisms
- Review Period.

### i. Inputs that Approximate the Movement of Equity Returns

As we detailed in our Report for the OEB in 2007, there is a strong historical relationship between utility dividend yields and bond yields. In that report, we stated:

> *There is significant academic research that establishes that utility stock prices are inversely related to the level of interest rates, and likewise that dividend yields and the level of interest rates are positively correlated. [Figure 2] depicts the strong positive relationship between average annual 30-year U.S. Treasury yields and the average annual dividend yields for a representative group of U.S. gas distribution utilities.*

**[Figure 2]: Comparison of U.S. Gas Utility Dividend Yields and U.S. 30-Year Bond Yields (1991 – 2006)[24]**




> *This strong positive relationship is attributed both to the capital (and debt) intensive nature of a utility, such that a decrease in debt capital costs will result in higher earnings and higher stock prices (lowering dividend yields), and to the fact that utilities' equity returns compete with debt yields in capital markets, as utilities are generally considered among investors to be relatively stable, lower risk investments.*

[24] This analysis was provided in Concentric's Report to the OEB, "A Comparative Analysis of Return on Equity of Natural Gas Utilities" (June 2007) at 12 [Clarification Added]. Dividend yields were represented for the average of all 15 natural gas distribution utilities covered by the Value Line Investment Survey's March 16, 2007 publication. 30-Year Treasury bond yields were obtained from Yahoo! Finance.

Similarly, bond yields are positively correlated to utility authorized equity returns as regulatory commissions recognize that the return they provide to equity holders should provide a premium over corporate borrowing costs. That premium varies with the level of interest rates and generally moves inversely to interest rates. Below, we have included an analysis of U.S. and Canadian bond yields, which demonstrates the relationship between authorized utility equity returns and both corporate and government bond yields using both Canadian and U.S. bond yield data. We have used U.S. authorized equity return data as a proxy for Canadian utility equity return data, since the prevailing authorized utility equity returns in Canada for the period under study were formulaically determined using bond yields as a direct input, creating a problem with circularity. Because the level of interest rates has trended similarly between Canada and the U.S., we believe it is reasonable to expect that equity returns would also trend similarly. As reflected by the large red circle, the sensitivity to government bond yields ranges from 0.2888 to 0.4657; and to corporate bond yields ranges from 0.4302 to 0.5205.

**Table 1: Statistical Analysis Describing Sensitivity of Authorized Returns to Long Term Bond Yields**

| | Intercept | t-stat$_\alpha$ | B | t-stat$_x$ | $R^2$ |
|---|---|---|---|---|---|
| **RRA Quarterly Avg. Authorized Returns vs. 30-Year Government Bond Yield** | | | | | |
| Quarterly weighted-average (weighted by the number of electric and gas cases) Q4 1989 - Q3 2010 (84 observations) versus the 30-Year U.S. Treasury Bond | 8.4057 | 41.3305 | 0.4657 | 13.9068 | 0.7022 |
| Quarterly weighted-average (weighted by the number of electric and gas cases) Q4 1989 - Q3 2010 (84 observations) versus the 30-Year Government of Canada Long Bond | 9.3038 | 59.2100 | 0.2888 | 11.7477 | 0.6419 |
| **RRA Quarterly Avg. Authorized Returns vs. 30-Year A-Rated Utility Bond Yield** | | | | | |
| Quarterly weighted-average (weighted by the number of electric and gas cases) versus Moody's A-rated Utility Bond Index Quarterly average (daily average for each month in the quarter then three months averaged) Q4 1989 - Q3 2010 (84 observations) | 7.3311 | 27.3554 | 0.5205 | 14.4970 | 0.7193 |
| Quarterly weighted-average (weighted by the number of electric and gas cases) versus Bloomberg Canada A-rated Utility Bond Index[25] Quarterly average (daily average for each month in the quarter then three months averaged) Q2 2002 - Q3 2010 (34 observations) | 8.0691 | 16.4233 | 0.4302 | 5.0879 | 0.4472 |

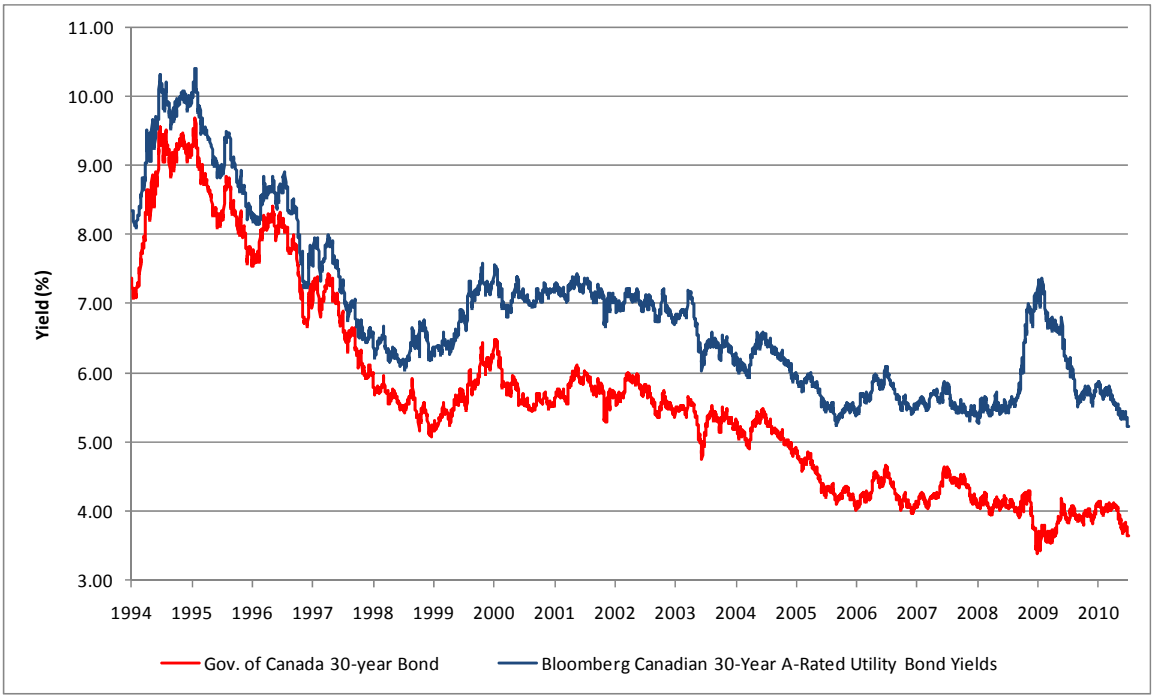
This level of sensitivity may be compared to the 0.75 coefficient which has prevailed in the Canadian ROE formula, where for every one percentage point change in government bond yields the return on equity moves by 0.75. In the analyses summarized in Table 1, the

[25] The Bloomberg A-rated Utility Bond Yield Index was first reported on March 5, 2002.

regression results indicate that this sensitivity anticipated by the Canadian ROE formula has been overstated and is more appropriately in the range of 0.50.[26]

Generally, government bond yields and corporate bond yields enjoy a strong positive relationship. However, as Figure 3 shows, they do differ. Government bond yields are heavily influenced by changes in fiscal and monetary policy, whereas the influences of fiscal and monetary policy on interest rates may be very different than corporate risk. As a case in point, Figure 3 illuminates the divergence between corporate bonds and government bonds that occurred from September 2008 through early 2009, during the global economic crisis. The credit spreads increased dramatically as the corporate bond moved higher and the government bond moved lower. Today, those spreads have returned largely to their previous levels.

**Figure 3: Corporate Utility A-Rated 30-Year Bond Yields versus Canadian Government 30-Year Bond Yields**




As the Figure shows, corporate bond yields and government bond yields may become delinked. Corporate utility bond yields provide a better indication of the utility's true capital costs as the increase in corporate risk implied by the increase in credit spread will likely be at least paralleled on the equity side. It is a rare occurrence when debt carries a higher risk (credit spread) than equity (equity risk premium). This matter was recently considered by the California Commission, where its decision considered the relative merits of using a government bond yield versus a corporate bond yield as the platform for the ROE formula:

[26] This conclusion is consistent with conclusions reached in the Concentric Energy Advisors comments filed on behalf of EGDI, OEB 2009 Consultative Process on Cost of Capital Review EB-2009-0084, September 8, 2009, at 5.

> *The purpose of an interest rate benchmark is to gauge changes in interest rates that also indicate changes in the equity costs of utilities. U.S. Treasuries are more sensitive to economic changes and risks in the international capital markets than utility bonds because they are bought and sold globally. However, U.S. utility bonds are generally affected less than Treasuries as a result of major shifts of international capital because a majority of U.S. utility bonds are traded within the U.S.*
>
> *Consistent with our use of utility bond interest rates in ROE, PBR, and MICAM proceedings and desire to use an index that more likely correlates and moves with utility industry risk, utility bonds should be adopted for the CCM (Cost of Capital Mechanism) index. In this regard, the Moody's Aa utility bond rates should be used for those utilities having an A credit rating and Moody's Baa utility bond interest rates for utilities having a B credit rating.*[27]

Though a formula tied to government or corporate bond yields may, with proper specification of inputs and a pre-determined process for review and calibration, provide a reasonable basis for an automatic adjustment mechanism for ROE, other jurisdictions have incorporated direct estimates of equity returns into their AAMs. For example, Mississippi utilizes a weighting of a series of ROE analyses, i.e. DCF, risk premium and CAPM, developed in accordance with prescribed parameters, to develop their adjustment mechanism. This methodology most closely emulates the evidence typically provided in a litigated rate process, but it is complex and would require greater staff resources for administration.

Other means of factoring equity returns into AAMs might include incorporating the ROEs authorized by other jurisdictions into the formulaic mechanism. Concentric proposed such a formula in Alberta and Ontario, where an equal weighting of the formulaic adjustment mechanism (specified with a coefficient of 0.50 and use of the Bloomberg 30-year A-rated utility bond yield) was combined with an index of North American allowed utility returns applied to the initial ROE.

### ii. Inputs that Mitigate Revisions to Equity Returns

One cannot be sure that any of the formulaic approaches would satisfy the fairness standard over time. To provide a safeguard against the formula resulting in deficient or excess returns in a period of unanticipated capital market circumstances, there are a number of safeguards that may be employed to ensure that equity returns do not get too far off track.

<u>Deadband</u>

The deadband is a specified range in which no changes will occur. Deadbands used within a certain range promote regulatory efficiency by not changing the return portion of the utility's calculated revenue requirement for relatively small changes in the formulaic ROE. Recognizing that the ultimate objective is a fair return, a dead band is viable as long as the base ROE is fair, the expected deviation from the allowed return is neutral and fluctuations

[27] *Application of Southern California Edison Company (U338E) for Authorized Cost of Capital for Utility Operations for 2008 and Related Matters*, Decision of ALJ Michael J. Galvin, mailed April 29, 2008, at 13.

do not jeopardize the financial integrity of the utility or overcompensate shareholders at the expense of ratepayers. The deadband is appropriate when regulatory efficiency can be optimized without sacrificing a fair return.

Ceilings and Floors

Ceilings and floors provide parameters around a formula, inhibiting any results that are either higher than the ceiling or lower than the floor. If the formula yields results outside of those parameters, the default result is either the ceiling or the floor. Ceilings or floors may not be symmetrical, and may be tied to inputs, ROE determinations, or ultimate revenue requirement increases (rate caps) produced by the formula.

Trigger Mechanism

Trigger mechanisms are generally used so that if the formula yields results outside of established limits, some action is taken. Often times, moving beyond the limit will trigger a review or rebasing of the formula. Trigger mechanisms may be tied to a benchmark (such as specified deviation from average North American litigated allowed returns), may be tied to changes in the formulaic inputs (such as specified changes in bond yield inputs), or may be tied to the actual result of the formula (symmetrical ceiling and floor established from the starting ROE).

Specified Review Period

A formal review proceeding may be implemented at specified time periods, where ROE may be reviewed, recalibrated and reset, if parties deem necessary. It provides certainty that the formula's ability to adequately track returns will be periodically addressed.

A more complete discussion of these formulaic inputs may be found at Appendix A.

### b. Profiles of Formulaic ROE Adjustment Mechanisms

Concentric has identified formulas in use in Canadian and U.S. jurisdictions. A brief overview of each formula follows.

Ontario ROE Formula

The Ontario Energy Board recently decided in its 2009 Consultative Process that the specification of the relationship between interest rates and the equity risk premium in the then prevailing Ontario formula (described previously) would be improved by the addition of a term that incorporates corporate bond yields. The Board determined that it would use a utility bond spread based on the difference between the Bloomberg Fair Value Canada 30-year A-rated utility Bond Index yield and the long Canada bond yield. The Board also determined that the sensitivity of the formula to bond yields should be reduced from 0.75 to a 0.50 adjustment factor for each 1 percent change in the long-term bond yield forecast. In addition, the Board provided that parties may ask the Board to review cost of capital policies when they feel it is appropriate or the Board may do so on its own initiative. The Board has determined that a review period of five years provides an appropriate balance between the need to ensure that the formula-generated ROE continues to meet the Fair Return Standard

and the objective of maintaining regulatory efficiency and transparency. The current Ontario formula is given by the following equation:

$$ROE_t = ROE_{t-1} + \left[0.50 \times (LCBF_t - LCBF_{t-1}) + 0.50 \times \sum_i \frac{30\_CUtA\_B_{i,1} - 30\_CB_{i,1}}{i_t}\right]$$

In this formula, the long Canada Bond Forecast is combined in equal weighting with the Average daily Spread for the most recent three months, between A-rated Canadian Utility Bonds and 30-year Government of Canada Bonds. The Long Canada Bond forecast is given by the following equation:

$$LCBF_t = \left[\frac{10\_CBF_{3,t} + 10\_CBF_{12,t}}{2}\right] + \sum_i \frac{30\_CB_{i,1} - 10\_CB_{i,1}}{i_t}$$

Quebec

Similar to the former NEB, Ontario and BC Automatic Adjustment Mechanisms, Quebec's Automatic Adjustment Formula was adopted in 1999 by Decision D-99-11, case R-3397-98. The Formula was subsequently reviewed and renewed in 2004 by Decision D-2004-196, case R-3529-2004, and again in 2009 by Decision D-2009-156, case R-3690-2009 for the 2011 test year. The adjustment coefficient in the Automatic Adjustment Formula reflects 75% of the variation in the forecast rate of return on 30-year Canada bonds.[28] The Quebec formula is pictured in Section 1 of this Report.

Newfoundland and Labrador

The automatic adjustment formula was implemented as a result of Board Order P.U. 16 (1998-99). Calculation of the return on common equity is based on the equity risk premium model with 30-year Government of Canada bonds representing the risk-free rate. The forecast long-term government bond rate for the current year is subtracted from the following year's forecast value; the difference is then multiplied by a factor of 0.20 and the result is used to adjust the risk premium in the opposite direction. The adjusted risk premium is added to the forecast long-term bond rate to produce the rate of return on common equity for the following year. (This is mathematically equivalent to applying 80% of the change in long-term government bond yields to the previous year's ROE).

The formula is given by the following series of equations:

$$ROE_t = RP_t + LCBF_t$$

Where the current risk premium is given by:

$$RP_t = RP_{t-1} - 0.20 \times (LCBF_t - LCBF_{t-1})$$

[28] Regie de l'energie, Decision D-2009-156, December 7, 2009.

And the Long Canada Bond Forecast is given by the average forecast for the 10-year bond plus the average daily spread for the most recent month between the 30-year Government of Canada Bond and the 10-year Government of Canada Bond.

$$LCBF_t = \left[\frac{10\_CBF_{3,t} + 10\_CBF_{12,t}}{2}\right] + \sum_i \frac{30\_CB_{i,1} - 10\_CB_{i,1}}{i_t}$$

Vermont ROE Formula

The Vermont Public Service Board ("VPSB") has (under state law) permitted its utilities to adopt alternative regulation plans ("ARPs"), which have been developed and proposed by the utilities and their terms and have been negotiated and settled in Memorandums of Understanding ("MOUs") with the VPSB. Green Mountain Power has been operating under an Alternative Regulation Plan, which includes an AAM, since 2006. The Board approved a formulaic ROE and an adjustment factor that provides incentives for managing controllable costs as part of Green Mountain Power's ARP. The Formula adjusts ROE by 50% of the difference between the average ten-year Treasury note yield to maturity as of the last 20 trading days ending two weeks before the annual filing, and as of the 20 trading day period used for the last adjustment to the return on equity component. The ROE Performance Adjustment is intended to offer an opportunity to earn a higher ROE by exceeding the standard of excellence the Company had reached to date, when benchmarked against comparable utilities.[29] The incentive adjustment is limited to 50 basis points (upward or downward), and is allotted based on the quintile in which the company's peer group ranking falls.

The Green Mountain Power formula combines an earnings sharing mechanism with its formulaic ROE methodology that reflects the difference between the achieved versus authorized ROE for the preceding calendar year. The earnings sharing adjustor employs a 75 basis point deadband and a 50/50 sharing of earnings shortfalls between 75 and 125 basis points below the target return. There is no sharing of earnings above the targeted return.

The formula may be expressed as follows:

$$ROE_t = ROE_{t-1} + 0.50 \times \left[\sum_i \frac{10\_USB_{i,20}}{i_t} - \sum_i \frac{10\_USB_{i,20}}{i_{t-1}}\right]$$

Since the adoption of the formula by Green Mountain Power, Central Vermont Public Service has adopted the same formulaic methodology to adjusting ROE with the commencement of its Alternative Regulation Plan in 2008. Vermont Gas's formula remains fixed under their current Alternative Regulation Plan, which will be up for renewal in September 2011.

29 State of Vermont, Public Service Board, *Petition of Green Mountain Power Corporation for Approval of an Alternative Regulation Plan (Plan II)*, Docket No. 7585, Order entered April 16, 2010, at 4.

California ROE Formula

A formulaic approach to adjusting ROE was implemented in 2008. The 2008 test year cost of capital applications were divided into two phases. The first phase established the applicable ROE for each of the utilities. The second phase led to the adoption of a cost of capital mechanism for the three major energy utilities. This mechanism is applied to each individual utility's established ROE from Phase I, and required the utilities to file cost of capital applications every third year, beginning with the 2011 test year. The principal features of the approach are:

- Establishes an interest rate benchmark (Moody's utility bond yield on date formula commences);
- The adjustment is based on 0.50 of the annual change in Moody's utility bond yields;
- There is a 200 basis point deadband, meaning that if interest rates change by less than 100 basis points from the benchmark interest rate, either up or down, the ROE remains unchanged;
- The interest rate benchmark is updated each time the formula exceeds the deadband and results in an adjustment to ROE; and
- A full ROE hearing is conducted every three years.

The California Commission looked favorably on the proposition that that the cost of capital formula would enable utilities, stakeholders, and the Commission to reduce and reallocate their respective workloads for litigating annual cost of capital proceedings. The formula may be expressed as follows:

$$if\ (Moodys\_Ut\_Bnd_t - Moodys\_UT\_Bnd_{benchmark}) > 100\ basis\ points, then$$

$$ROE_t = ROE_{t-1} + 0.50 \times (Moodys\_Ut\_Bnd_t - Moodys\_UT\_Bnd_{benchmark})$$

and

$$Moodys\_Ut\_Bnd_{new\ benchmark} = Moodys\_UT\_Bnd_t$$

Or

$$if\ (Moodys\_Ut\_Bnd_t - Moodys\_UT\_Bnd_{benchmark}) < 100\ basis\ points, then$$

$$ROE_t = ROE_{t-1}$$

The Commission selected a corporate utility bond index over U.S. Treasuries, reasoning that the latter is more sensitive to economic changes and risk in international capital markets than utility bonds because they are bought and sold globally, and found that U.S. utility bonds are generally less affected by major shifts in international capital. The Commission also found that a utility bond index would more closely correlate to a utility's risk than would a Treasury bond.

The Commission order cautions that "a deadband that is overly sensitive to interest rates causes needless volatility in revenues and rates. Conversely, a deadband that never triggers can impose unnecessary costs on shareholders or ratepayers, depending on which direction

interest rates move." A deadband needs to strike a reasonable balance between triggering too often and not triggering often enough. The Commission found that a 100 basis point deadband over a 12-month average measurement period appropriately mitigated the volatility of interest rates.

The Commission decided in the absence of long term experience with this formula, that a shorter-term review period be established. As a result, and consistent with majority consensus, the Commission required a full cost of capital review on a triennial basis.

Mississippi ROE Formula

Mississippi's utilities operate under formula rate plans tailored to each utility. These rate plans incorporate a prescriptive approach to setting ROE based on specified weightings of common ROE methodologies: DCF, Risk Premium and CAPM. The prescriptive approach defines any areas of contention, such as proxy group selection criteria and data inputs, and though complicated and comprehensive, results in an ROE analysis without litigation or contention. The Commission in effect has reached agreement with the utilities and stakeholders as to methodological approach and sources of inputs necessary to arrive at a reasonable estimate of ROE. The inputs are agreed upon and specified, such as growth rates, betas, etc., as are any adjustments to ROE for flotation costs and performance incentives, and are used annually to adjust ROE.

In simple terms, a benchmark ROE is calculated each year based upon the prescribed methodologies and inputs. The benchmark ROE is further adjusted by a performance factor, to arrive at the annual performance-adjusted benchmark. If the resulting performance-adjusted benchmark ROE yields an authorized return that differs from the calculation of the expected return (detailed below) by greater than a specified deadband, revenues are either increased or decreased to make up for the shortfall or overage in expected returns. The authorized revenue increase for annual rate increases is subject to a 4% revenue cap. For some utilities, the revenue cap acts as a hard cap (or ceiling) and for others it may signal the need for an ROE proceeding (a trigger mechanism).

Below is a summarization of the approach used to develop Atmos Energy's performance adjusted ROE benchmark in accordance with its rate stabilization rider. Atmos Energy is a Mississippi gas utility and the methodologies prescribed in its rate stabilization rider are generally characteristic of those applied to other Mississippi utilities.

The first step is calculating the Expected Equity Return given by the following formula:

$$\left(\frac{Test\ Year\ Revenues - Test\ Year\ Expenses - Adjs.\ for\ Known\ \&\ Measureable\ Differences}{Average\ Rate\ Base\ Equity}\right)$$

The performance adjusted ROE benchmark is given by the following formula:

$$PA\_ROE_{bench} = \frac{DCF + Regression\ Analysis + CAPM}{3} \mp PA$$

The methodologies are prescribed as follows:

Proxy group screening criteria for parent companies of operating utilities:

- Gas Distribution Utilities listed by the Value Line Investment Survey
- Must have annual operating revenues not less than one-half nor more than twice those of Atmos Energy Corporation. If this results in less than 10 sample companies, such group shall be represented by the ten companies in the Value Line Survey list having the closest annual revenues to Atmos Energy Corporation.
- Must have each of the following earnings growth rates: Value Line, Zacks, I/B/E/S.
- Must have Value Line beta
- Must pay dividends and have a positive dividend growth rate
- Atmos Energy must be excluded from the Group

DCF Approach

$$k = \frac{D_1}{P_0} + g$$

- Expected dividend yield is calculated by increasing the current dividend by the applicable growth rate (g) at the normal dividend change timing pattern as stated in Value Line.
- Stock prices are the average daily closing stock prices from Yahoo Finance for the one month prior to the determination of the ROE.
- Earnings growth rates are the average of the projected earnings growth rate for each of the comparable companies in Value Line, I/B/E/S Thomson Financial, and Zack's.
- The DCF model is performed for each comparable company, and the truncated mean is used, which is derived by discarding the highest and lowest DCF results.

The Regression Analysis Approach

$$Y = a + b\,(x)$$

- "Y" represents the average return on common equity capital allowed in all gas rate cases by state regulatory commissions as reported by RRA for a given calendar year.
- The independent variable "X" represents Moody's average annual A-rated public utility bond seasoned for the year corresponding to the allowed return on equity.
- The model uses 15 years of historical monthly data.
- $Y_{current}$ is solved by applying the resulting regression coefficients "a" and "b" to the average monthly Moody's A-rated utility bond yields "x" for the most recent calendar quarter.

CAPM Approach

$$CAPM = R_f + \beta\,(RP)$$

- Risk-free rate is the simple average of the last three monthly averages of yield on 20-year Treasury bonds as reported by Federal Reserve Statistical Release H.15(519).
- Beta is the average of the betas (adjusted) as stated in Value Line for the same group of comparable utilities in the DCF analysis.
- The Risk Premium is the difference between the arithmetic average annual return on Common Stock (Total Return Index) and in Long-term Government Bonds (Total Return Index) found in the Ibbotson Associated Yearbook from 1926 through most recent data.

Performance adjustments ranging from positive to negative 50 basis points are added to the benchmark ROE to arrive at the performance adjustment benchmark ROE. The performance adjustments vary among utilities in Mississippi, but in the case of Atmos Mississippi, the performance adjustment is based on the weighting of a price benchmark study (weighted 75%) and a customer satisfaction survey (weighted 25%).

To determine the actual revenue increase or decrease, an example of the calculation, which assumes a rate base of $50 million and an equity ratio of 40%, or an equity rate base of $20 million and annual revenues of $10 million is as follows:

| | |
|---|---|
| Expected Equity Return | 8.00 |
| Less: Performance-Adjusted Benchmark ROE | 11.50 |
| Difference | (3.50) |
| Absolute Value of Difference > 100 basis point deadband? | YES |
| Allowed Adjustment to Rates | 3.50 |
| Multiplied by: Equity Rate Base | 20,000,000 |
| Δ in Equity Revenue to Achieve Rate Base Required Return | 700,000 |
| Divide by: (1-Tax) for tax expansion | .65 |
| Total Revenue Change Required | 1,076,923 |
| Actual Gross Revenue for Test Period | 10,000,000 |
| Apply 4% Cap to Actual Gross Revenues | 400,000 |
| Rate Adjustment = MIN(Revenue Change Required or 4% Revenue Cap) | 400,000 |

The Mississippi Commission has attributed the following benefits to the adoption of its formula rate plan:

- A systematic process that essentially stabilizes earnings, while allowing the utility a reasonable opportunity, with efficient operation, to achieve its allowed return with neither on-going excess earnings nor ongoing under-earnings;
- Rates can be adjusted based on performance and/or service quality;
- More systematic and frequent reviews of utility books and records which results in a utility's earnings and services being more closely monitored by its regulators;
- Stability of rates;
- A significant savings in time, resources, and costs that are generally related to traditional rate case filings; and
- Higher credit rating.

### c. Backcast Review of Alternative Formulae Performance

In an effort to evaluate the performance of the alternative methodologies relative to one another and to non-formulaic allowed returns, Concentric benchmarked the formulas in a backcast analysis that commences in 1994, the beginning of the BC formulaic adjustment approach. Each formula (with the closest proxy for inputs) is modeled to mimic its hypothetical performance over the past 16-year period. In this analysis, we begin with a starting point of 10.75% in 1994, the actual starting point for Terasen's (then BC Gas) ROE awards under the formula. To promote comparability across formulas and to eliminate variability due to timing alone, we have adjusted each formula annually based on a March 31st closing value for all inputs (except as noted) regardless of the adjustment time frames prescribed by each of the respective Commissions. In cases where the formulas relied upon forecast inputs, such as forecasted bond yields, we have backcast the actual bond yields for the given bond in our analysis. Because the backcast analysis establishes each formula beginning in 1994 at 10.75%, and updates each formula in the first quarter of the year, which differs from the actual timing in which the formulae are set and updated, and because we have used actual historical inputs as a proxy for forecast formula inputs, there are differences between the formula results we have generated in our backcast analysis and the actual ROE results for each respective formula's historical ROE application. This method allows for a comparison of each formula on an apples-to-apples basis.

The alternatives considered in our backcast analysis are those unique formulas identified through our research both in Canada and the U.S.: (i) the newly adopted Ontario formula; (ii) the Quebec (former BC, Ontario and NEB) formula; (iii) the Newfoundland and Labrador formula; (iv) the Vermont formula; (v) the California formula (with a 100 basis point deadband); (vi) the California formula (excluding the deadband); and (vii) the Mississippi formula (as it has been applied to its natural gas utility ATMOS). In addition, we have modeled a formula that is tied entirely to an index of U.S. utility authorized return data generated by Regulatory Research Associates ("RRA")[30] to facilitate comparison to the average U.S. litigated authorized returns over the same period. Concentric had also developed a formula which weights U.S. authorized returns equally with a corporate bond yield adjustment mechanism (using a 50% adjustment factor). Concentric recommended this formula in Alberta and Ontario to recognize the importance of litigated North American authorized returns for ROE determinations in Canada, and the integration of capital markets and similarity of regulatory models and corresponding risks for utilities in the two countries. Lastly, we have included Terasen Gas Inc.'s actual allowed returns for comparison purposes. The details of how each formula is modeled in our backcast analysis are described more fully in Table 2.

[30] A comprehensive data base of regulated utility sector data (including summary data and ranking of all U.S. utility commissions) and utility-specific regulatory data. RRA is owned by SNL Financial which collects, standardizes and disseminates all relevant corporate, financial, market, and M&A data, as well as news and analysis for the Banking, Financial Services, Insurance, Real Estate, Energy and Media & Communications industries.

Table 2: Description of Formulas in Backcast Analysis

| Backcast Modeling Description | Technical Attributes |
|---|---|
| ***Ontario Formula-based Return on Equity (gray line)***<br><br>**$ROE_n = ROE_{n-1} + 0.50 \times (\text{Gov Can 30-year}_n - \text{Gov Can 30-year}_{n-1}) + 0.50 \times [(\text{Can Util Bond}_n - \text{Gov Can 30-year}_n) - (\text{Can Util Bond}_{n-1} - \text{Gov Can 30-year}_{n-1})]$** | o Gov Can 30-year equals Government of Canada 30-year bond yield<br>o Can Util Bond equals Bloomberg Fair Value 30-year Canada A-rated Utility bond index |
| ***Québec (former BC/Ontario/NEB) Formula-based Return on Equity as it has been most recently applied (orange line)***<br><br>**$ROE_n = ROE_{n-1} + 0.75 \times (\text{Gov Can 30-year}_n - \text{Gov Can 30-year}_{n-1})$** | o Gov Can 30-year equals Government of Canada 30-year bond yield<br>o The formula, as prescribed by the Régie (and formerly BC, Ontario, and the NEB), depends on forecasts of long-term Government of Canada bond yields. In order to express the formula on an apples-to-apples basis with others, actual bond yields were used. |
| ***Newfoundland and Labrador Automatic Adjustment Mechanism (blue dotted line)***<br><br>**$ROE_n = \text{Gov Can 30-year}_n + ((ROE_{n-1} - \text{Gov Can 30-year}_{n-1}) - 0.20 \times (\text{Gov Can 30-year}_n - \text{Gov Can 30-year}_{n-1}))$** | o Gov Can 30-year equals Government of Canada 30-year bond yield<br>o The formula, as amended by the PUB, depends on forecasts of long-term Government of Canada bond yields. In order to express the Newfoundland and Labrador formula on an apples-to-apples basis with others, actual bond yields were used. |
| ***Vermont ROE Adjustment Mechanism (purple line)***<br><br>**$ROE_n = ROE_{n-1} + 0.50 \times (\text{US 10-year Treas}_n - \text{US 10-year Treas}_{n-1})$** | o US 10-year Treas. equal to U.S. Government 10-year Treasury bond yield |
| ***California Cost of Capital Mechanism (red line)***<br><br>**$ROE_n = ROE_{n-1} + 0.50 \times (\text{Moody's Baa}_n - \text{Moody's Baa benchmark})$ where $(\text{Moody's Baa}_n - \text{Moody's Baa benchmark})$ must be greater than 100 basis points (1.00%)** | o Moody's Baa equals Moody's Baa-rated Utility Bond Index<br>o Moody's Baa benchmark initially equal to March 31, 1994 closing value, reset to any value of the Moody's index that triggers the cost of capital mechanism (year-over-year change greater than 100 basis points) |
| ***California Cost of Capital Mechanism without dead band (red dotted line)***<br><br>**$ROE_n = ROE_{n-1} + 0.50 \times (\text{Moody's Baa}_n - \text{Moody's Baa benchmark})$** | o Moody's Baa equals Moody's Baa-rated Utility Bond Index<br>o Moody's Baa benchmark initially equal to March 31, 1994 closing value. |
| ***Atmos Energy Corp. – Mississippi (green line)***<br><br>**Actual results of "calculation of benchmark return on rate base equity" for 2002 through 2009, calculated each year by Atmos based on a prescriptive formula** | o Formula is the average of a Discounted Cash Flow Analysis, Capital Asset Pricing Model, and Risk Premium Regression Analysis<br>o A backcast of this formula is not feasible due to data constraints but historical results of the formula are presented. |
| ***U.S. Weighted-Average Authorized ROE Index (thick black line)***<br><br>**$ROE_n = ROE_{n-1} \times \text{US\_ROE\_Index}_n$** | o *US ROE Index* equal to weighted-average authorized ROE for U.S. electric and natural gas utilities provided by Regulatory Research Associates<br>▪ Average for each quarter weighted by number of cases<br>▪ Index equal to $\text{Year}_n\text{Q1} / \text{Year}_{n-1}\text{Q1}$ |
| ***Concentric Alberta/Ontario Recommendation (blue line)***<br><br>**$ROE_n = \text{Average}(ROE_{n-1} + 0.50 \times (\text{Can Util Bond}_n - \text{Can Util Bond}_{n-1}), ROE_{n-1} \times \text{US ROE Index}_n)$** | o Can Util. Bond equals Bloomberg Fair Value 30-year Canada A-rated Utility bond index<br>▪ Index did not start until 3/5/2002, quarterly data prior to that provided by Canadian Bond Rating Service |
| ***Terasen Gas Inc. Actual Authorized ROE (black dotted line)*** | o BCUC allowed ROE for BC Gas Utility Ltd. and Terasen Gas Inc. as reported in annual reports |

If we were to use the BCUC litigated ROE proceedings beginning with a 10.75% ROE, authorized by the Commission in 1994, and a 9.5% ROE, authorized by the Commission in 2009 as data points to indicate the desired formulaic path over the period, in Figure 4, we observe that formulae with a lower sensitivity to changes in bond yields, i.e. the California, Ontario and Vermont formulae or the Concentric recommended weighted formula (50% regression formula and 50% index of average North American litigated returns) have generated the formulaic path that best connects the BCUC's decisions at each end of that 16-year period.

It is interesting to note that the coefficient that would have been necessary under the former BC ROE adjustment formula to link the ROE set by the Commission in 1994 of 10.75%[31] to the ROE set in 2009 of 9.5%[32], as a function of 30-year government bond yields, all else being equal, would have been 0.34 (or each one percent change in the 30-year government bond yield would effect a 0.34 percent change in the allowed return), much lower than the BC formula coefficient at any time during the history of the formula, and closer to the historical relationship between government bond yields and U.S. regulated authorized returns represented in Table 1, of 0.29 to 0.43.

Conversely, formulae that are highly sensitive to changes in bond yields (Newfoundland and Labrador with a coefficient that effectively has 0.80 sensitivity to changes in government bond yields) and the Quebec (former BC/Ontario/NEB) formula (with a 0.75 sensitivity to changes in government bond yields) have generated progressively lower ROEs over the 16-year period than actual litigated returns in either BC or the U.S. Our research has shown that this is due to the formulas' sensitivity to the sustained decline in interest rates, which has characterized government bond yields over the period. These effects are illuminated by comparing the results of those formulae to the Vermont formula, also based on government bond yields, but with reduced sensitivity of 0.50 (applied to the 10-year U.S. Treasury bond yield). As we may observe in Figure 4, the lesser sensitivity to changes in government bond yields in the Vermont formula results in formulaic outcomes that are much more in line with litigated ROEs over the period and accordingly results in a more moderate response to volatility in government bond yields. We observe that the California formula, with a sensitivity of 0.50 to changes in corporate utility bond yields, also yields a moderate ROE result on par with ROEs determined in litigated rate hearings and only slightly higher than the results of the Vermont formula (based on government bond yields).

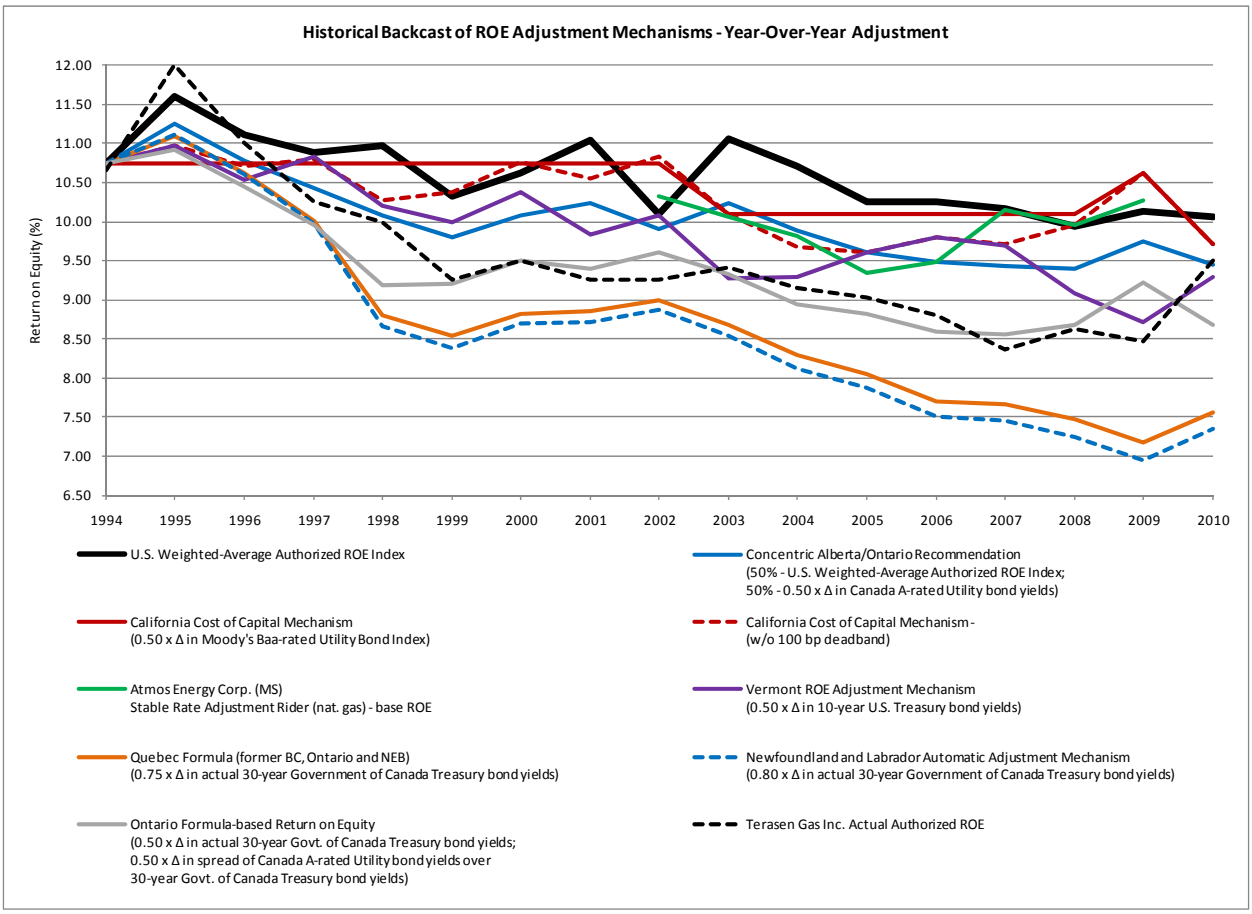
Because of the abundance of regulated utilities in the U.S. and the number of litigated returns that arise out of the regulatory process in 50 state regulatory jurisdictions, the U.S. provides an excellent source for North American utility equity return data. Though we would not expect the average U.S. utility return to necessarily be identical to a return issued for a given Canadian utility (although it is possible to select a proxy group of U.S. companies that would be comparable to a Canadian utility), directionally we would expect average returns in the two countries to move in tandem. To that end, we have developed an index, which divides the current year weighted average U.S. ROE decisions by the base year average and applies that index on a year over year basis to the litigated BCUC decision in

[31] BCUC Decision No. G-35-94, June 10, 1994.
[32] BCUC Decision No. G-158-09, December 16, 2009.

1994 of 10.75%, to develop a directional benchmark for BCUC ROE that would parallel the changes in U.S. litigated returns.

As illustrated in Figure 4, formulae that are moderately sensitive (0.50 coefficient) to corporate utility bond yields (California or Ontario formula), or government bond yields (the Vermont formula), or calculations of the equity returns such as a prescriptive ROE approach (Mississippi formula) or a formula that tracks U.S. litigated equity returns (the RRA Index) as recommended by Concentric in Alberta and Ontario (50% regression formula and 50% index of average North American litigated returns), provide results most comparable to the directional U.S. litigated returns benchmark.

**Figure 4: Backcast Analysis**




### d. Relative Performance Across Varying Economic and Market Conditions

To better understand how each of the formulas would perform across varied economic and market conditions, we developed a stress test analysis, to identify the formulaic approaches that were more subject to the volatility of inputs and accordingly more prone to instability or outlier results. Concentric conducted this test by varying each of the formulas' inputs by 2 standard deviations above and below its current value to approximate a sustained increase or

decrease in the value of the input.[33] For each input, we computed the standard deviation of daily closing values between January 1, 1994 and June 30, 2010. We then ratably grew each input, over a 10-year period, so that by the end of the tenth year, each input variable would be exactly two standard deviations greater than its original value and conversely, two standard deviations less than its original value. We calculated and graphed how each of the formulae would perform under those circumstances in each year of our test period (heavy solid line). Additionally, we computed what the ROE result of each formula would be if long-term forecasts (Consensus Forecasts and Blue Chip) were to be realized. We have plotted this ROE result on the graphs that follow (heavy dashed line) to indicate the formulaic ROE that would be produced by the current long-term forecasts of certain formula inputs.[34]

The general statistics we calculated for each formula input are summarized in Table 3. For each primary input, i.e. U.S. ROE decisions, Bloomberg A-Rated Utility Bonds, Moody's Baa-Rated Utility Bonds, U.S. 10-Year Treasury Bond, and Government of Canada 30-Year Long Bonds, we generated the mean, median, standard deviation, sample variance, range, minimum, and the number of observations for the sample.

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33 Daily closing value as of June 30, 2010 except for 'U.S. ROE Decisions' which is a quarterly weighted average

34 Long-term forecasts are not available for the following variables: U.S. ROE Decisions, Moody's Baa-rated Utility Bond Index, Government of Canada 30-year bonds, and Bloomberg Canada A-rated Utility Bond Index. For the Moody's Baa-rated Utility Bond Index, we estimated the spread between the Moody's Index and U.S. Government 30-year Treasury bonds using linear regression (using daily data from 1/1/1994 – 6/30/2010). The resulting linear equation was applied to the Blue Chip forecast of U.S. Government 30-year Treasury bonds to arrive at a forecast estimate of Moody's Baa-rated Utility Bond Indices. For Government of Canada 30-year bonds, we took a similar approach and estimated the spread between 10- and 30-year bonds using linear regression (using daily data from 1/1/1994 – 6/30/2010), which was applied to the Consensus Forecast of Canada 10-year Treasury bonds to arrive at an estimate of the Forecast for the 30-year Government of Canada Bond Yield. Lastly, For the Bloomberg Canada A-rated Utility Bond Index, we estimated the spread between the Bloomberg Index 30-year A-rated Utility Index and the Government of Canada 30-year bonds using linear regression (using daily data since the inception of the Bloomberg index from 3/5/2002 – 6/30/2010), which was applied to the derived forecast of Canada 30-year government bond yields to arrive at a forecast for the 30-year Canadian A-rated Utility Bond Yield.

**Table 3: Descriptive Statistics of Formula Inputs**

DESCRIPTIVE STATISTICS (January 1, 1994 - June 30, 2010)

| | [A] | [B] | [C] | [D] | [E] |
|---|---|---|---|---|---|
| | U.S. ROE Decisions | Bloomberg Canada A-rated Utility Bond | Moody's Baa-rated Utility Bond | U.S. Government 10-year Bond | Government of Canada 30-year Bond |
| Mean | 10.91 | 5.81 | 7.38 | 5.08 | 5.65 |
| Median | 10.94 | 5.61 | 7.54 | 4.90 | 5.49 |
| Standard Deviation | 0.53 | 0.62 | 0.94 | 1.18 | 1.49 |
| Sample Variance | 0.28 | 0.38 | 0.87 | 1.40 | 2.23 |
| Range | 2.23 | 2.35 | 3.87 | 5.97 | 6.30 |
| Minimum | 10.03 | 4.86 | 5.58 | 2.08 | 3.39 |
| Maximum | 12.26 | 7.21 | 9.45 | 8.05 | 9.69 |
| Count | 66 | 2,172 | 4,118 | 4,129 | 4,278 |

Notes:

[A] Source: Regulatory Research Associates; quarterly weighted-average authorized ROE for electric and natural gas distribution companies

[B] Source: Bloomberg Professional; daily data available beginning 3/5/2002

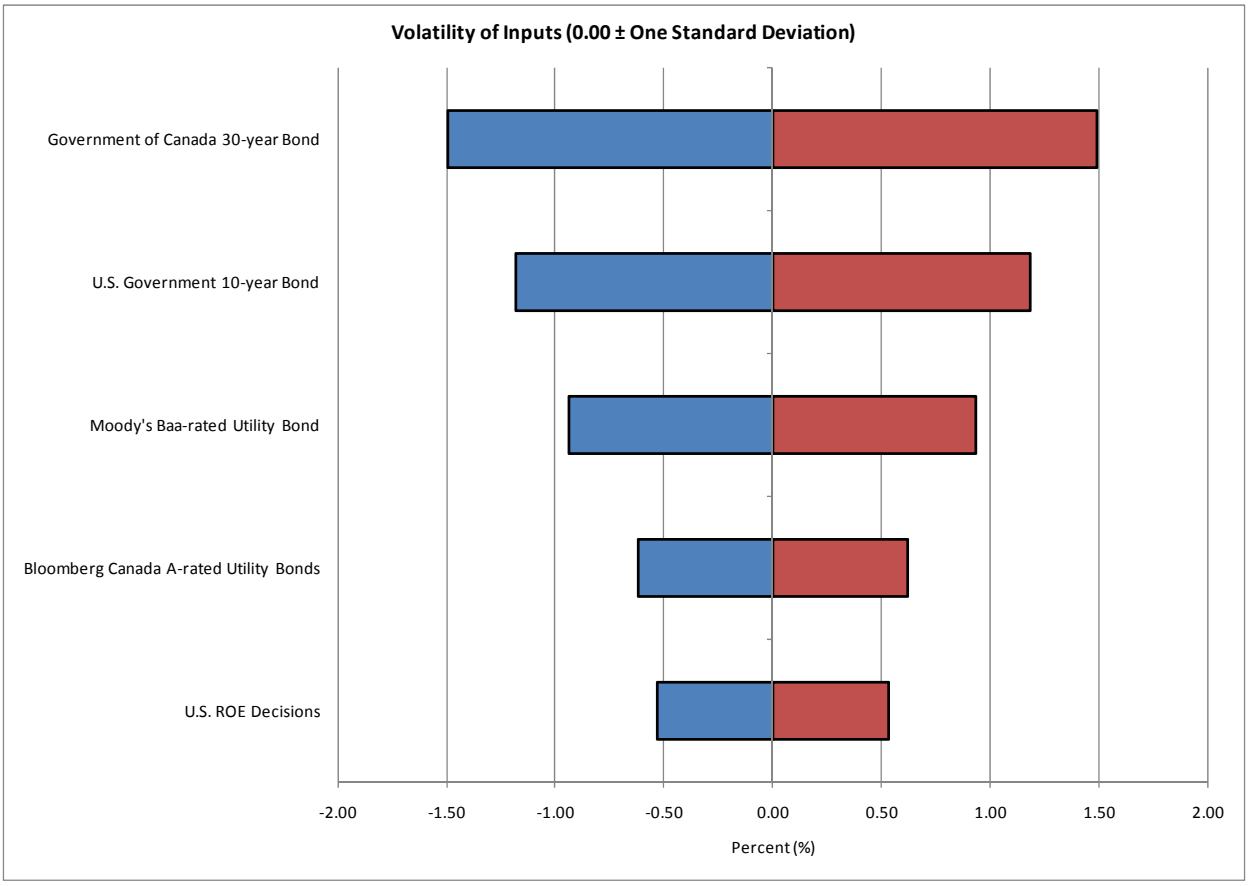
[C] Source: Bloomberg Professional; daily data

[D] Source: Bloomberg Professional; daily data

[E] Source: Bloomberg Professional; daily data

In the statistics above, we can see that the variability of government bond yields, as measured by the standard deviation and the sample variance are much greater than the variability in U.S. ROE decisions or corporate utility bond yields. They also possess the largest percentage point range between the high yield and the low yield of all the samples (5.97 and 6.30 percentage points for the U.S. 10-year bond and the Canadian 30-year bond, respectively). The variability in U.S. ROE decisions is the lowest within the sample of formula inputs with a total range between the high and low ROE percentage of 2.23 percentage points. This is further illustrated in Figure 5, which shows the standard deviation of each input.

**Figure 5: Standard Deviation of Formula Inputs**

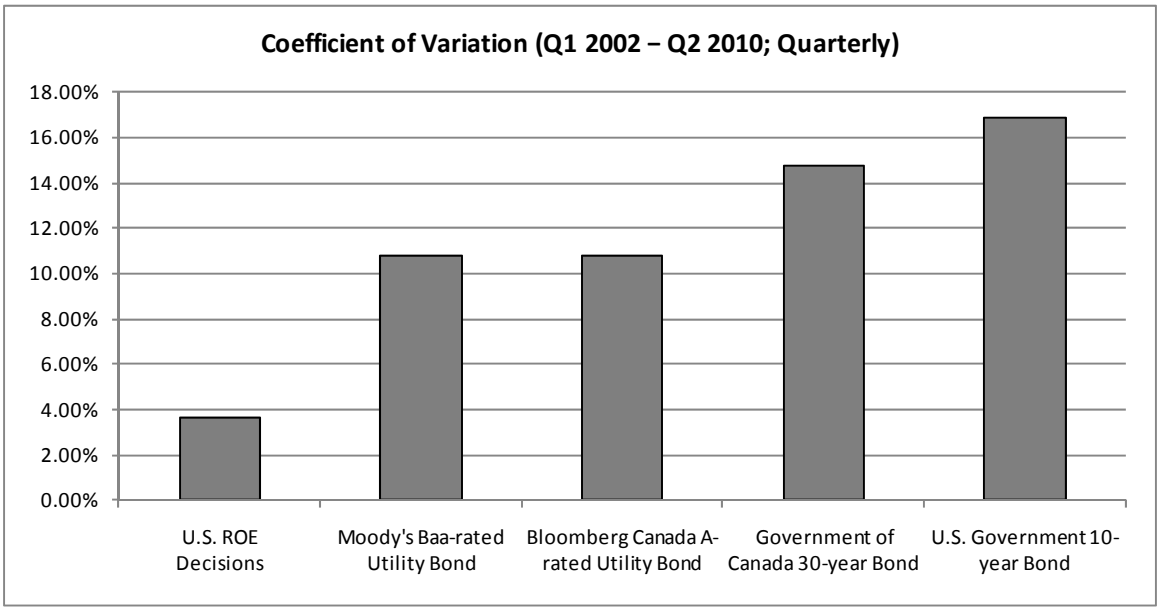



We have further standardized the above volatility measures by dividing by the mean of each of the respective inputs to find the coefficient of variation ("COV"), or the standard deviation relative to the mean, for comparison across all of the inputs. This is a useful way to compare the degree of variation across these inputs, even though their means vary. The lower the COV, the lower the variability in relation to its mean value, implying greater stability in a formula employing this input. Again, we observe that government bond yields are the most volatile of the inputs generally relied upon for ROE adjustment mechanisms[35] and U.S. litigated authorized returns are the least variable.

[35] Notes:

1. 'Coefficient of Variation' equals Standard Deviation / Mean.
2. Time period (Q1 2002 – Q2 2010) dictated by 'Bloomberg Canada A-rated Utility Bonds' which became available March 5, 2002.
3. Quarterly data used for all inputs because 'U.S. ROE Decisions' are only available quarterly. The remaining inputs are available daily, weekly, monthly, quarterly, and annually.

**Figure 6: Standardized Volatility of Formula Inputs – Coefficient of Variation**

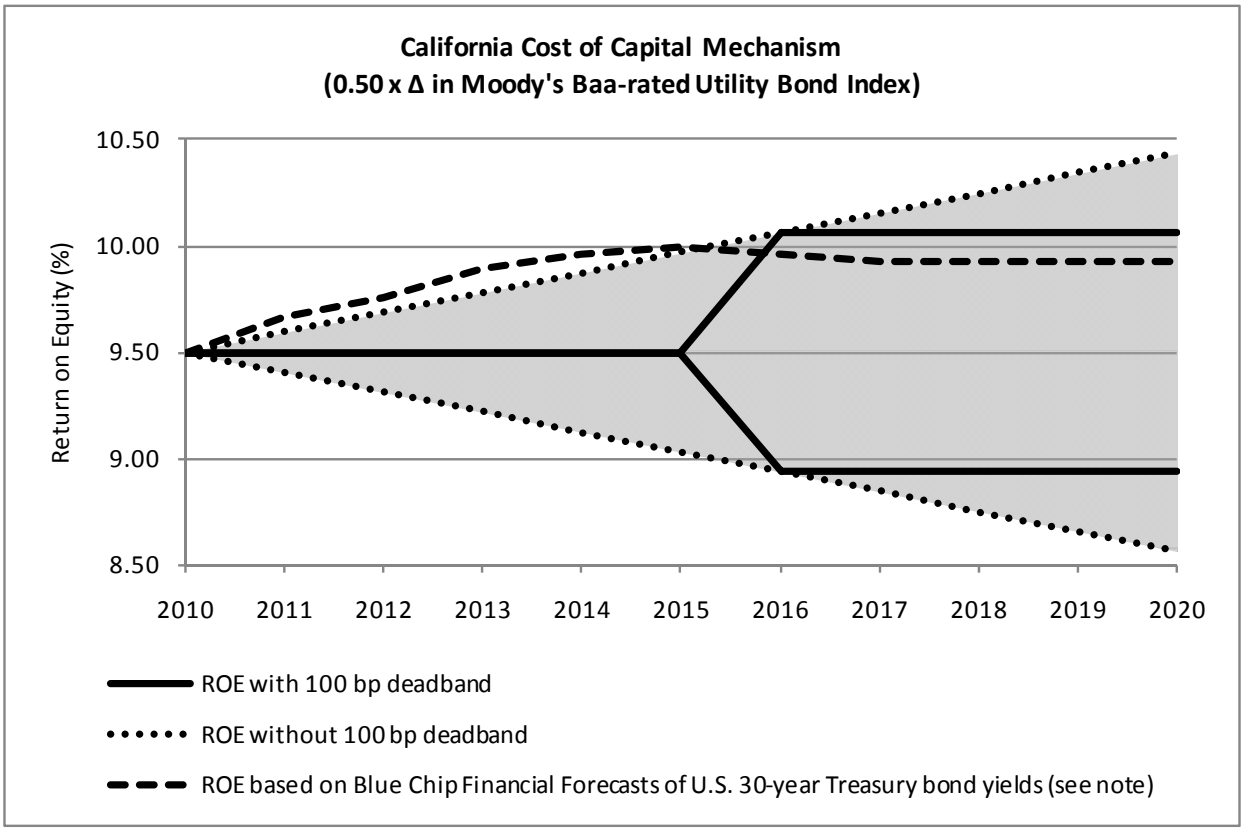



Note: Time period (Q1 2002 – Q2 2010) dictated by Bloomberg Canada A-rated Utility Bond Index which commenced on 3/5/2002.

Results of Stress Test - California

From the 9.5% ROE currently in effect for Terasen today, the shaded area in Figure 7 represents the results of our stress test on the projected inputs in the California ROE adjustment formula. The Moody's Corporate Baa utility bond standard deviation is 0.94. The solid lines below represent the ROE results at each point of the stress test, when employing the 100 basis point deadband; while the fine dotted lines reflect the results of the formula under stress with no deadband. The heavy dotted line represents the ROEs that would result from the long term forecast for these inputs, according to Blue Chip Consensus Economic Forecast. That graph reflects that forecasted corporate bond yields are currently projected to increase by more than that provided by our stress test (1 standard deviation in 5 years; 2 standard deviations in 10 years), hence the forecast falls outside the shaded range in the early and middle years. The Blue Chip Economic Forecast projects that 30-year U.S. Treasury Bond is forecast to grow from 4.5% in 2010 to a high of 6.0% in 2015 and settle at 5.8% towards the end of the ten-year period.

**Figure 7: California Cost of Capital Mechanism Stress Test Range and Forecasted Results**




Note: Historical relationship between U.S. 30-year Treasury bond yields and Moody's Baa-rated Utility Bond Index estimated by linear regression and applied to forecasts of U.S. 30-year Treasury bond yields.

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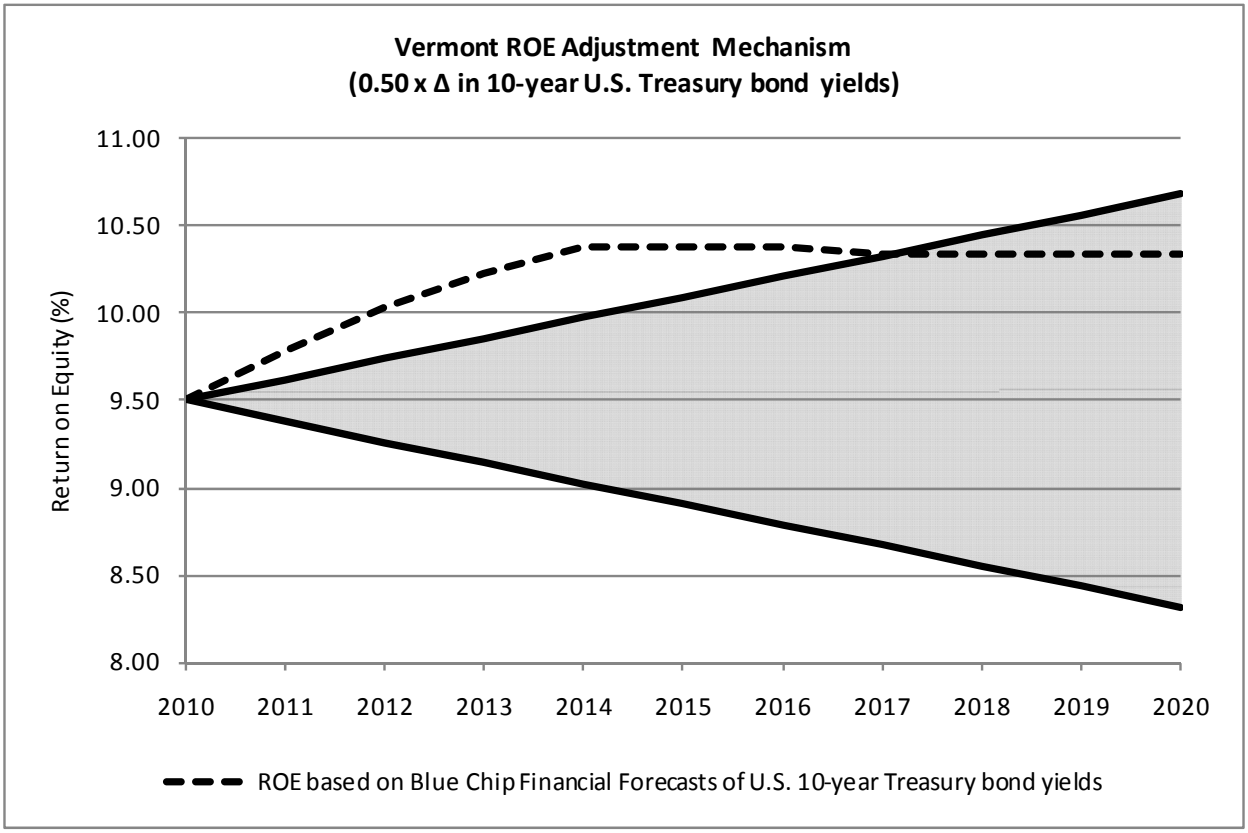
Results of Stress Test - Vermont

As indicated in Table 3, the standard deviation for the 10-year U.S. government bond yield is 1.18. The solid lines in Figure 8 show the impact of an increase/decrease in the starting bond yield equal to two standard deviations (2.36%) over 10 years. Figure 8 also shows (dotted line) a rapid increase in forecasted government bond yields that cause the projected results to fall outside the shaded range during the early and middle years. Blue Chip Consensus estimates for 10-year U.S. Treasuries climb to a high of 5.5 percent by 2014, from a current value of 2.97 percent as of the end of the second quarter in 2010, settling at 5.4 percent from 2017 through 2020.[36]

**Figure 8: Vermont Cost of Capital Mechanism Stress Test Range and Forecasted Results**

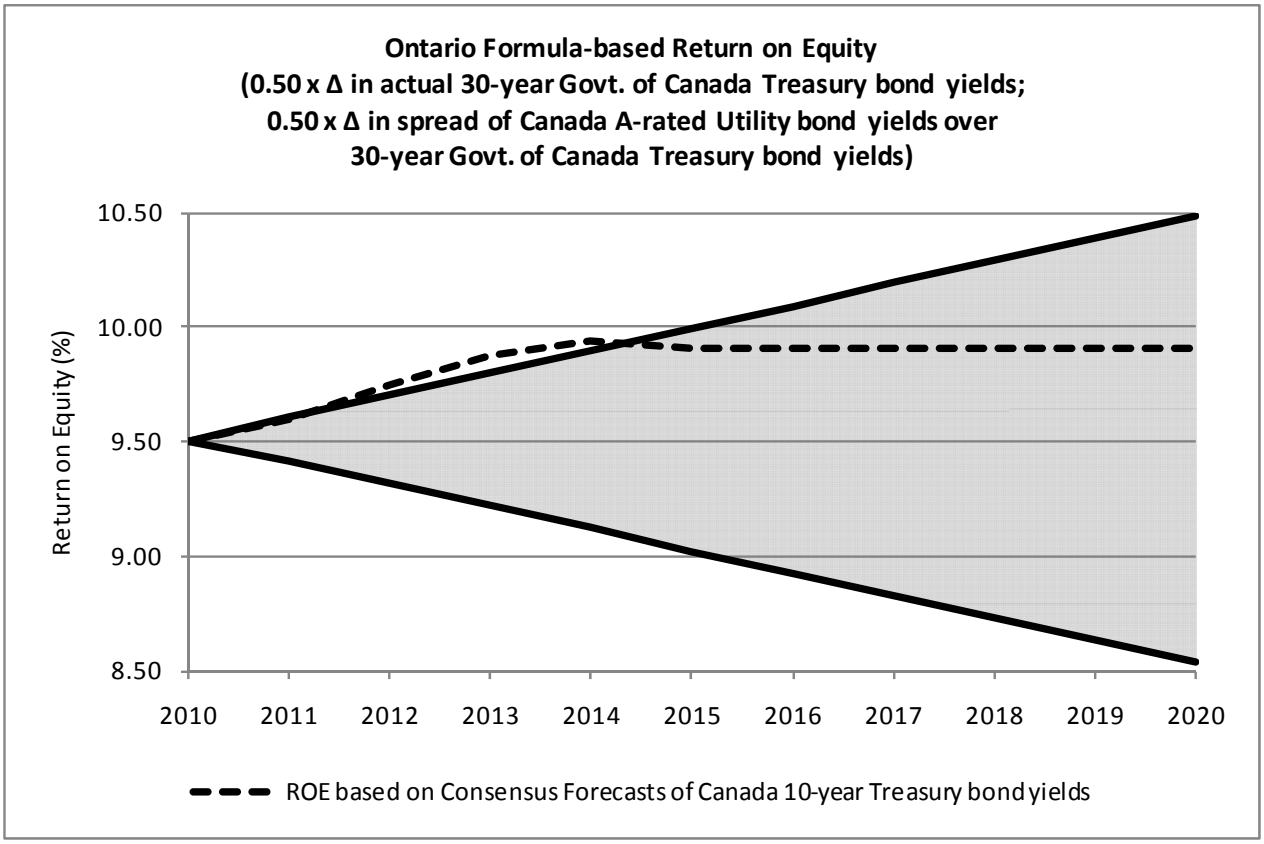



[36] Blue Chip Financial Forecasts, Vol. 29, No. 6, June 1, 2010.

Results of Stress Test - Ontario

The current Ontario formula is diagrammed in Figure 9, under stress parameters of 2 x the standard deviation of 1.49 for the 30-year Government of Canada Bond yield, which serves as a basis for the formula. Our forecast projection (dotted line) and stress test (solid lines) are based upon the Consensus Economics long term 10-year long bond forecast (projected to increase from 3.8% in 2010 to 5.1% in 2020)[37], plus our estimate of the projected spread between Canada 10-year bonds and Canada 30-year long bonds determined using regression analysis and the following equation ($Spread_{10,30}$ = 0.4889 - 0.0299(Canada 10-year bond)). To that derived 30-year government of Canada bond yield projection, we estimated the projected spread between Canada 30-year long bonds and 30-year Bloomberg A-rated utility bonds using the following linear regression equation: ($Spread_{30,Util30}$ = 2.8297 - 0.3481(Canada 30-year bond)).

**Figure 9: Ontario Cost of Capital Mechanism Stress Test Range and Forecasted Results**



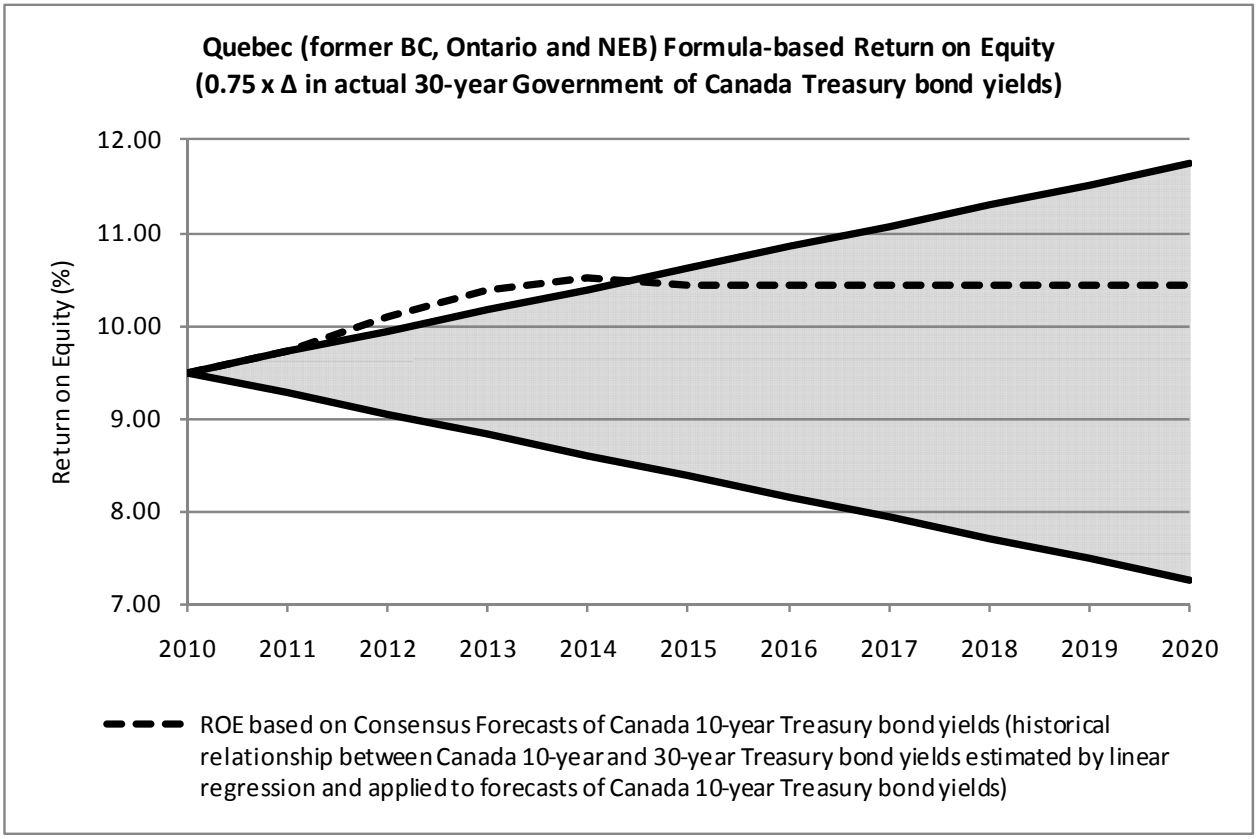

Note: Historical relationship between Canada 10-year and 30-year Treasury bond yields and Canada 30-year Treasury and Canada 30-year A-rated utility bond yields estimated by linear regression and applied to forecasts of Canada 10-year Treasury bond yields.

[37] April 2010 long term Consensus Forecast for Canadian 10-Year Treasury Bonds

Results of Stress Test –Quebec (former BC, Ontario and NEB formula)

Similarly, we modeled the former BC formula under stress parameters of 2 x the standard deviation of 1.49 for the 30-year Government of Canada Bond. Our projection and stress test is based on the Consensus Economics long term 10-year long bond forecast (projected to increase from 3.8% in 2010 to 5.1% in 2020)[38] plus the estimated spread between Canada 10-year bonds and Canada 30-year long bonds determined by the linear regression analysis ($Spread_{10,30}$ = 0.4889 - 0.0299(Canada 10-year bond).

**Figure 10: Quebec (former BC, Ontario and NEB) Cost of Capital Mechanism Stress Test Range and Forecasted Results**

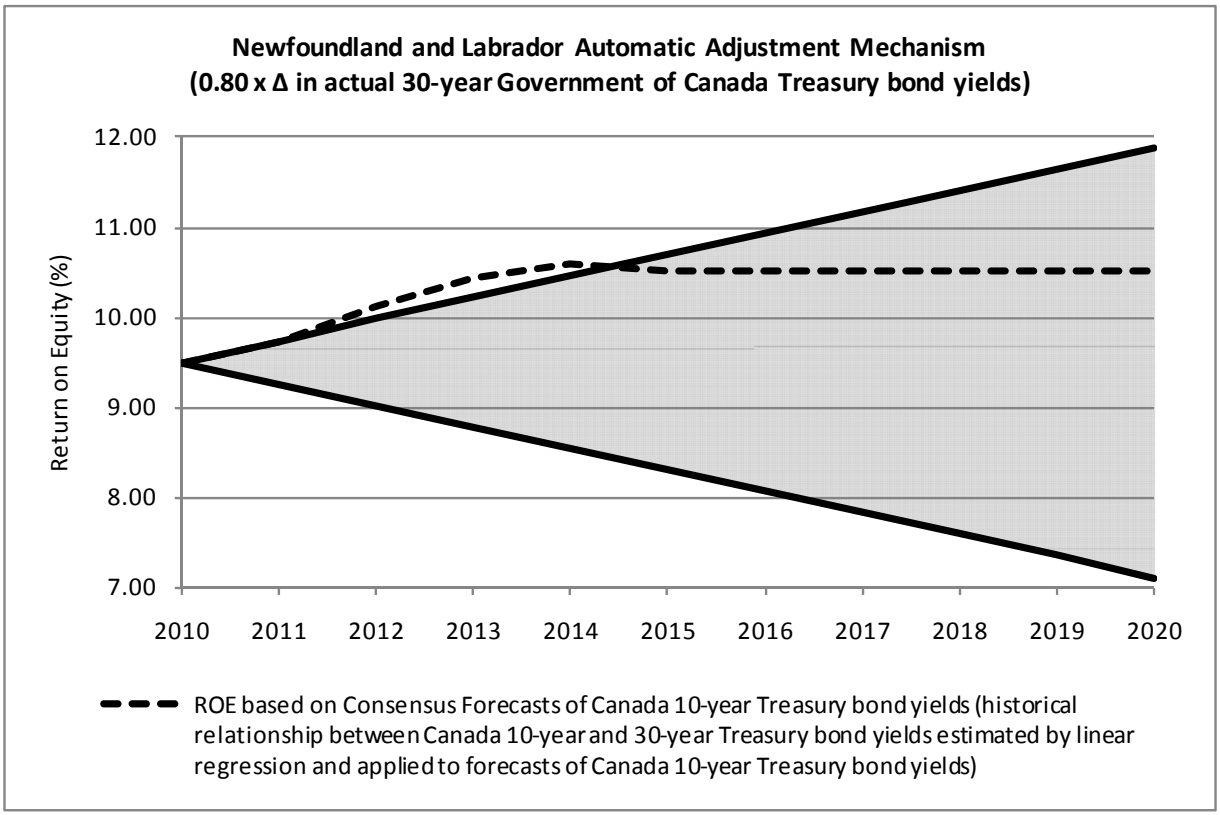



[38] Ibid.

Results of Stress Test – Newfoundland and Labrador

Similarly, we modeled the Newfoundland and Labrador formula under stress parameters of 2 x the standard deviation of 1.18 for the 10-year Government of Canada Bond. Our projection and stress test is based on the Consensus Economics long term 10-year long bond forecast (projected to increase from 3.8% in 2010 to 5.1% in 2020)[39] plus the estimated spread between Canada 10-year bonds and Canada 30-year long bonds determined by the following linear regression equation: ($Spread_{10,30}$ = 0.4889 - 0.0299(Canada 10-year bond)). Those results are presented in Figure 11.

**Figure 11: Newfoundland and Labrador Cost of Capital Mechanism Stress Test Range and Forecasted Results**

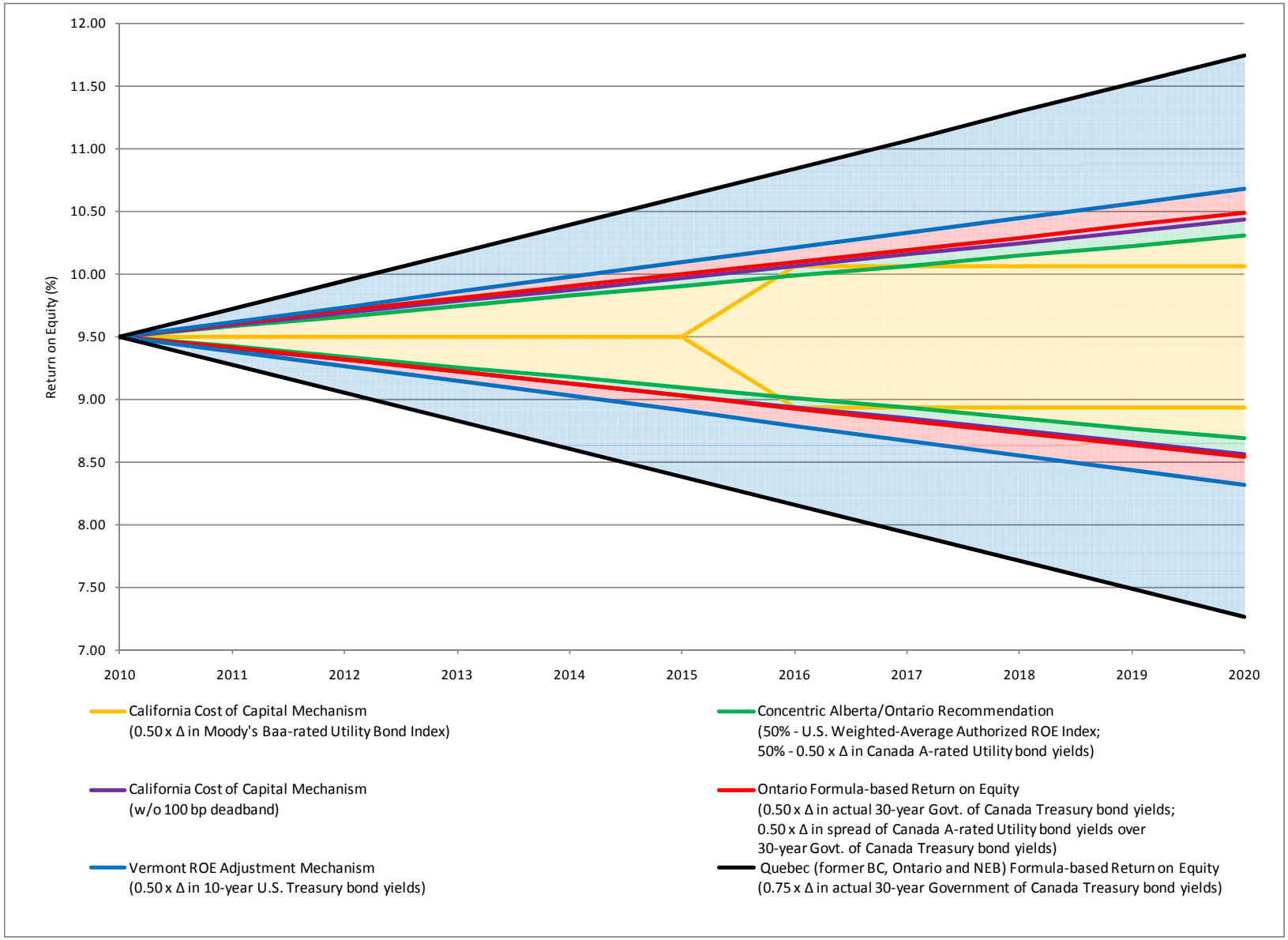



Stress Test Summary

The range of formula outcomes from applying the stress test of two standard deviations is pictured in Figure 12 for each of the formulas reviewed. We have found that a formula based on utility bond yields with a 50% adjustment factor (as is the case in California, Ontario, Vermont and that proposed by Concentric in the OEB and Alberta ROE proceedings which employed an equal weighting of the movement of the RRA index with an adjustment formula based upon Canadian utility bond yields, with a 50% adjustment factor) display the least variation in predicted outcomes based on historic volatility. The current Ontario formula introduces slightly greater volatility as a result of its reliance on the government bond yield to which the spread between the government bond yield and the Bloomberg Canadian A-Rated utility bond yield is added. Those formulae with a high sensitivity to government bond yields display the greatest range of outcomes, and also the most rapid increases in ROEs based on forecast increases in government bond yields (denoted by the heavy dashed lines in each preceding chart).

[39] Ibid.

**Figure 12: Stress Test Range of ROE Outcomes for all Formulae**



### e. Transparency and Data Availability

Regulatory transparency refers to the general understanding of the ROE setting process and the predictability of outcomes. This is an advantage of the formulaic approach to determining ROE over the litigated ROE process where regulatory outcomes are difficult to predict. A formulaic ROE that can be estimated by stakeholders promotes regulatory transparency as investors know how the utility's returns will be determined and may be able to make forward projections on that basis. Consumer interests can also gauge future rate impacts. A formula that invites regulatory tinkering in its application would not satisfy the objective of regulatory transparency. Any formula that is selected should utilize data that is commercially available. Often, subscription charges apply to the most widely-used data services (e.g., Consensus Forecasts, Bloomberg, Value Line, SNL, I/B/E/S, Thomson, DEX Universe Bond Indices, Moody's), but these costs may be more than offset by the value of the data to the process. Generally, government bond yield data are publicly available, as is dividend data on all publicly traded issues in the U.S. and Canada. Authorized ROE data are publicly available through Board Orders, or subscribing to a research service similar to Regulatory Research Associates (owned by SNL data) that performs this research. Generally, SNL research focuses on U.S. companies and we are not aware of a similar data service for Canadian utilities. Earnings growth rates and betas typically require a subscription to Value Line or Bloomberg, though Bloomberg provides international coverage, while Value Line focuses on companies traded on American stock exchanges. Corporate bond yield indices are often proprietary.

The three primary sources of bond yield data are: Bloomberg, Moody's and DEX by PC Analytics. The following is a brief summary of these data series and sources.

Bloomberg develops a Fair Value Canada 30-Year A-rated Utility curve which is extrapolated from the yields of Canadian A-rated utility bonds at their various maturities. The curve is constructed by applying specific points for various bonds of certain maturities to the curve, adjusting for any mismatch. This curve is updated daily based on the valuations of the securities which comprise the basis for the curve. As each of the bonds rolls down the curve new longer maturities are added. Though these curves are derived, our analyses in Figures 13 and 14 below show that the Bloomberg Fair Value Curve is a reasonable proxy for an actual Canadian bond index, based on A-rated bonds with maturities of 20-30 years.

Moody's provides long term corporate bond yield averages that are derived from pricing data on a regularly replenished population of corporate bonds in the U.S. market, each with current outstanding bond issuances over $100 million. The bonds have maturities as close as possible to 30 years; they are dropped from the list if their remaining life falls below 20 years, or if the bonds are susceptible to redemption, or if their ratings change. All yields reflect yield to maturity calculated on a semi-annual basis. Each observation is an un-weighted average. The average corporate bond yield index represents the average of the corresponding average Industrial and Average Public Utility observations.

DEX – PC Bond Analytics PC-Bond* publishes indices to measure the performance of the Canadian fixed income market. Indices are exclusively Canadian and are widely relied upon for Canadian fixed income performance benchmarks. The Universe Bond Index tracks the broad Canadian bond market for all Canadian corporate bond issuances and is further

divided into sub-sectors based on major industry groups: Financial, Communication, Industrial, Energy, Infrastructure, Real Estate, and Securitization. These sectors may also be sub-divided based on credit rating: a combined AAA/AA sector, a single A sector, and a BBB sector; and/or term, which is classified as short (1 – 5 years), mid (5 – 10 years), and long (10 + years). Eligibility requirements include $100 million minimum issues size and investment grade credit rating, among others.

In addition, DEX provides a 20+ Universal Bond Index which includes all corporate bond issuances within a particular credit sector with remaining maturities in excess of 20 years. Eligibility requirements are as stated above. Though this bond index encompasses long term maturities, it is not subdivided by credit rating.

The Universal Bond indices are built with daily history, calculated and available from December 29, 2000 and are published daily. These are also transparent indices, with individual security holdings and prices, disclosed electronically each day. We understand that DEX and PC Bond Analytics tailors its subscription prices to their clients' requirements and price their product accordingly. Concentric's inquiry to pricing indicated a fee of $2,500 for a one-time snap shot of constituents making up the sub-sector "energy" index, and a one-time fee of $1,500 for a complete historical data stream for any one bond index data series requested. We also note that the Company is very restrictive in the use of its data to protect its propriety.

Below we have provided a comparison of the three price series relative to one another for both utility bond indices and corporate bond indices. As the figures below demonstrate, the Bloomberg Fair Value Curve and the DEX PC Bond Analytics Universe curve, both representing Canadian bond yield indices for the utility and energy sectors, respectively, are nearly identical, and accordingly, we conclude that these series are reasonable substitutes for Canadian utility bond yields. The Moody's utility data suggests that the U.S. bond indices and Canadian utility bond indices have diverged in the past, though today all three indices provide similar yields for utility bonds.

Turning to Figure 13, though the corporate bond yield data among the three indices generally move in tandem, we believe the utility bond index (as available in Bloomberg or DEX) is preferable for purposes of adjusting utility equity returns in Canada.

Figure 13: Moody's, Bloomberg, DEX Comparison of Utility Bond Indices

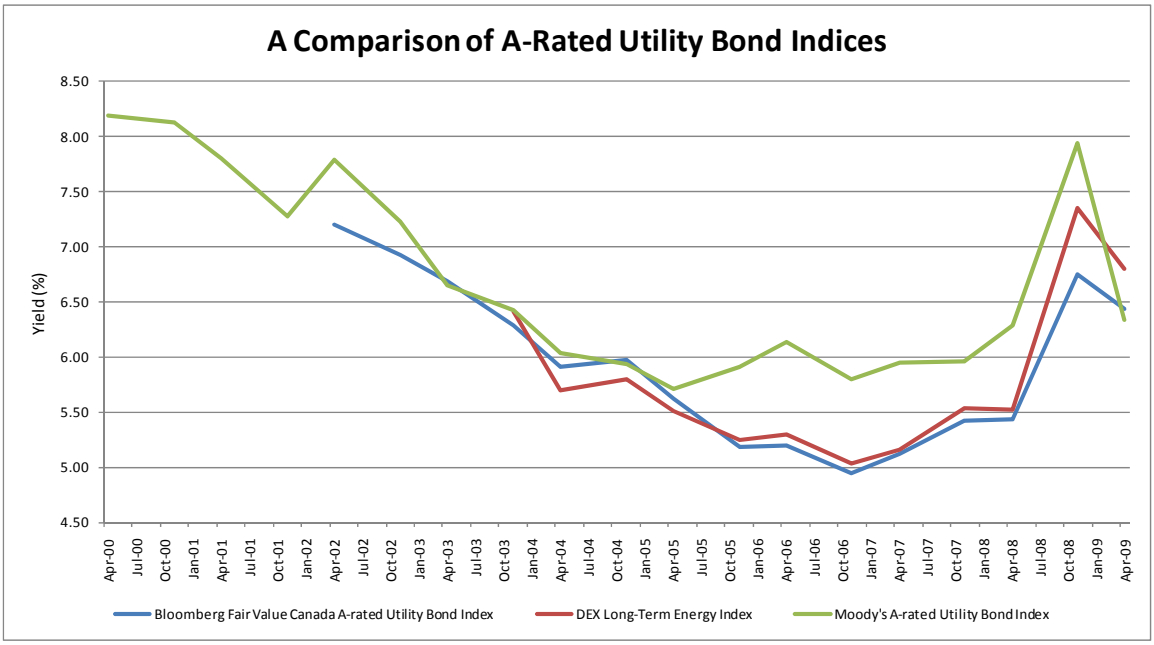
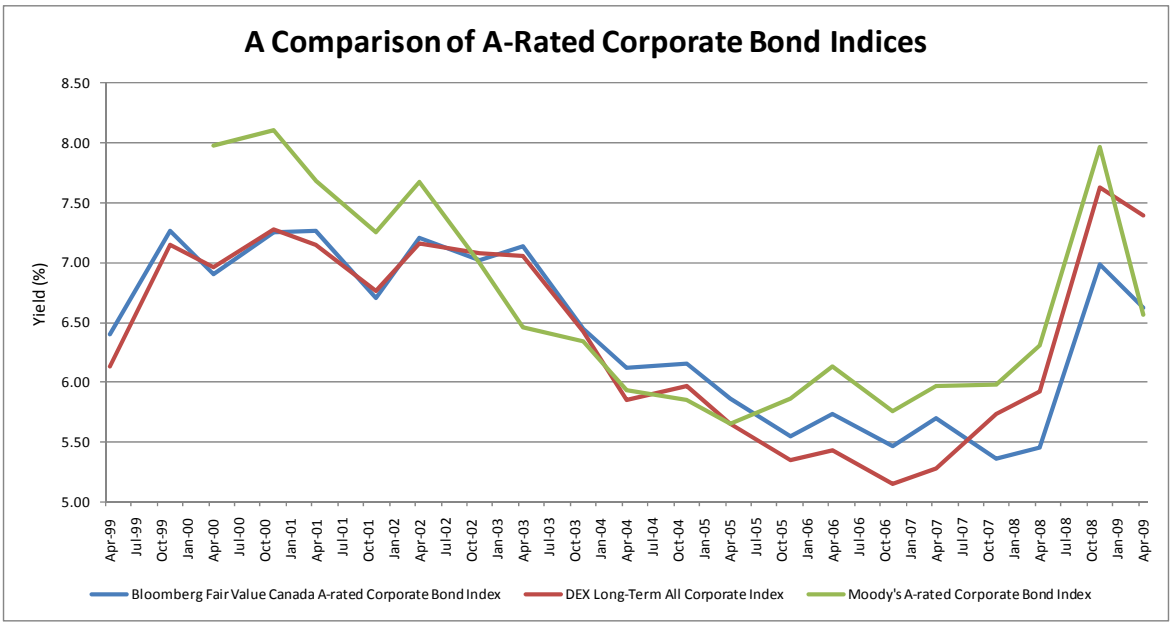



Figure 14: Moody's, Bloomberg, DEX Comparison of Corporate Bond Indices




## 4. Potential Approaches for British Columbia

In response to the BCUC's December 2009 Order, Concentric has researched and evaluated alternative ROE automatic adjustment mechanisms. In doing so, we have examined formulas used in other North American jurisdictions, selectively researched overseas, and we have also considered other alternatives. Though Concentric is not recommending a formulaic approach, we have identified attributes to be considered should the Commission determine in a future

proceeding that a new formula will be adopted in BC. Further, we have examined alternative inputs and parameters used to construct formulas, and compared how these formulas perform over time against non-formulaic results and under varying market conditions. Based on this assessment, we have identified several potential options for a formulaic adjustment mechanism. These approaches vary in terms of their complexity and ease of administration. The first three are indexed based; the last is a more complex multifactor model. Finally, the BCUC may elect to have periodic litigated proceedings (with the potential for settlements) on this matter. Each is described below.

All of the formulaic methodologies provided below could be used to establish a generic benchmark for a low risk, high grade utility, to which adjustments are made to account for risk of a specific utility relative to the benchmark (as is the historic practice in BC); or alternatively could be applied to utility specific ROEs where the base ROE is set specifically for each utility and adjusted in accordance with the AAM (as is the practice in California).

**(1) Utility Bond Yield Index**

As a general premise, the straight utility bond index is simple to understand and administer and closely resembles the prior BC model, with the substitution of utility bonds for government bonds and a reduced sensitivity to changes in bond yields. Ontario adopted a variation of this approach, which used forecast government bond yields and utility bond spreads (over government bonds) to project utility bond yields.

The general specification for this formula is:

Index: average yields on long term utility bonds of comparable grade to the target utility

- California utilizes the 12 month moving average Moody's Baa or A, depending on the utility rating.
- Ontario utilizes the utility bond spread based on the difference between the Bloomberg Fair Value Canada 30-Year A-rated Utility Bond index yield and the long Canada bond yield, plus the change in the forecast long Canada bond.
- Concentric observes that the Bloomberg Fair Value Canada 30-Year A-rated Utility Bond yield and the DEX alternative move in close proximity, and either should be a reliable indicator of long-term Canadian utility bond yields.

Formula Coefficient Adjustment Factor of 50% - based on the historical relationship between utility bond yields and regulatory authorized returns. For every one percentage point movement in the utility bond yield index, the authorized return will move in the same direction by 50 basis points.

Deadband: none (but could be established)
Trigger Mechanism: none (but could be established)
Term: 3 – 5 years

As a numeric example, the California specification of this model is as follows:

$$ROE_n = ROE_{n-1} + 0.50 \times (Moody's\ Baa_n - Moody's\ Baa\ benchmark)$$

So, if the starting ROE (n-1) is 9.5%, and the utility bond yield increases from 5% to 6%, the new ROE is:

$$ROE = 9.5 + 0.5*(6.0 - 5.0) = 10.0\%$$

**(2) Utility Bond Yield Index with a Deadband and Trigger**

A variation of the above simplified bond index approach incorporates a deadband mechanism, as we have seen in California, and potentially a trigger mechanism. The deadband can be used to negate the impacts of smaller changes in the annual bond index, while a trigger can be used to signal a large change from a specified benchmark warranting re-examination of the formula. These features serve as "rails" on the results from the formula.

Index: Similar to the California and Ontario approaches, ROE is indexed to the average yields on long term utility bonds

Formula Coefficient Adjustment Factor of 50%, as above.

Deadband: 50 basis points – To avoid the need to make adjustments to the return portion of the cost of service for small changes in ROE, a deadband may be adopted so that only significant changes from the benchmark lead to a change in authorized return. If the change in the bond yield index is within 50 basis points of the original benchmark, no adjustment to ROE is made. If the bond yield index exceeds the original benchmark by greater than 50%, ROE would be adjusted accordingly and the new bond yield would become the new benchmark. Concentric believes that 50 basis points is a threshold that provides a reasonable balance between regulatory efficiency and providing a return that is reflective of prevailing equity markets.

Trigger Mechanism 100 basis points: A review of the formula is triggered in the event that the formula produces results that are outside plus or minus 100 basis points of a given benchmark. Concentric suggests that the benchmark should be established as the average awarded ROE ("AAROE") for all major Canadian[40] and U.S. gas and electric utilities for the preceding 12 month period. As described earlier, the data for U.S. utilities is readily available through SNL's RRA database. Canadian utility ROEs would be added to this data through an annual review of commission orders for major utilities. To make this trigger non-circular, it would be set only taking into account litigated (non-formulaic) ROE awards. When applying a trigger mechanism, it should be sufficiently wide so as not to trigger a review at the onset of the formula, or alternatively could be calibrated to consider the opening differential between the AAROE benchmark and the utility authorized ROE at the onset.

Term: 3 – 5 years

[40] Except those operating under the prior Canadian formula linked to government bond yields.

As a numeric example, the basic model is:

$$ROE_n = ROE_{n-1} + 0.50 \times (\text{Moody's } Baa_n - \text{Moody's Baa benchmark})$$

To account for the deadband:

If *(Moody's* $Baa_n$ *– Moody's Baa benchmark)* is less than 0.50, then no change to ROE

If greater than .50, then:

$$ROE_n = ROE_{n-1} + 0.50 \times (\text{Moody's } Baa_n - \text{Moody's Baa benchmark})$$

$$\text{Moody's } Baa_n = \text{New Moody's Baa benchmark}$$

And, to account for the trigger:

If *ROEn* is greater or lesser than AAROE +/- 1.0%, then a review of the formula is triggered.

So, if the starting ROE (n-1) is 9.5%, and the utility bond yield increases from 5% to 6%, the new ROE is:

ROE = 9.5 + 0.5*(6.0 – 5.0)= 10.0%

If AAROE is 9.25%, no review of the formula is triggered.

**(3) Combined Utility Bond Yield and Average Awarded ROE Index**

The intuitive appeal of this approach is equal weighting of the historic Canadian formula (with utility bond yields replacing government bond yields and an updated coefficient of 0.50), and an index of average awarded ROEs in litigated proceedings in Canada and the U.S. It remains relatively straight forward, and captures more information on required investor returns (assuming awarded returns are a reasonable proxy for required returns) than a pure bond related index.

Index: ROE is indexed to the weighted average of average yields on long term utility bonds (as described above) and the AAROE.

Weighting: 50% Bond Yield Index / 50% AAROE Index

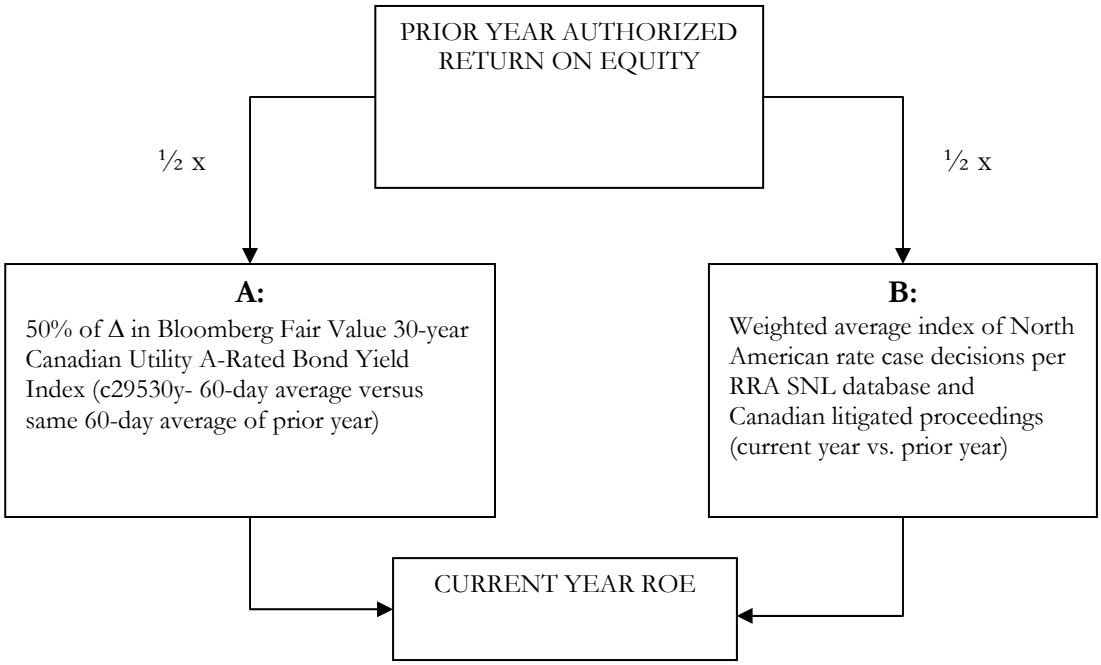
Adjustment Factor: 50% for Bonds, 100% for AAROE

Trigger Mechanism: none

Deadband: none (but could be established)

Term: 3 – 5 years

A diagram of the formula follows:




A numeric example of this formula is:

$$ROE_n = .5\ [ROE_{n-1} + (0.50 \times (Can\ Util\ Bond_n - Can\ Util\ Bond_{n-1})] + .5\ [ROE_{n-1} \times (AAROE_n / AAROE_{n-1})]$$

So, if the starting ROE (n-1) is 9.5%, and the utility bond yield increases from 5% to 6%, and the index of average awarded ROEs increases from 10.0% to 11.0%, the new ROE is:

$$ROE = .5\ [9.5\% + .50(6.0 - 5.0)] + .5\ [9.5\%\ (11.0/10.0)] = 10.225\%$$

Intuitively, because of the inclusion of the awarded ROE index which fell further than the bond yield driven formula, and equal weighting of these results, the new ROE falls in between the two results (10.0% vs. 10.45%) at 10.225%. The use of a deadband is a judgment call, but a trigger mechanism in this case is not deemed necessary because of the inclusion of an average awarded ROE term in the formula.

**(4) Multiple Method Model**

Recognizing that simple models based on one or two inputs may not adequately reflect required returns for utility equity investors, it is possible to create the results from standard estimation techniques employed by cost of capital experts. Rather than scrutinizing the methodologies of competing experts, ROE is estimated based on a predetermined set of methods and inputs. This is analogous to the Mississippi model and proposed NY state framework, and similar to the methodology adopted by FERC. Concentric has adapted a variation of those approaches in this

model. The selection of specific inputs and the choice of methods to include in this multi-method model would require further refinement, but the general approach would be as follows.

Determinants:

Proxy Group selection criteria

- North American utilities
- Publicly traded
- Pays dividends
- Primarily regulated utility business (>60% total consolidated revenues)
- Differentiated for gas or electric according to primary business (>60% of regulated utility revenues)
- Comparable credit rating (1 notch above or below is an appropriate guideline)
- No announced significant M&A activity

Discounted Cash Flow Model (DCF)

- The current dividend yield for each company in the proxy group is calculated using the annualized current dividend divided by the average stock price for the most recent 90-trading days. The dividend yield for each proxy group company is increased by one-half of the projected growth rate to reflect the expected growth in dividends over the coming year.
- Earnings growth estimates are averages of the estimates for each of the proxy companies (as available) from Bloomberg, Value Line, Zacks, and Thomson First Call.
- DCF computed as the average for each company in the proxy group.

Equity Risk Premium Model (ERP)

- Risk free rate from the forecasts of U.S. and Canadian 30-year bond yields by taking the average of the 3-month and 12-month forecasts of the respective 10-year government bond yields, as reported in the most recent Consensus Forecast issue. To the forecast of the respective 10-year government bond yield, add the daily average historical spread between 10-year and 30-year bonds for the most recent [30] days. This results in the 30-year bond yield forecasts for the U.S. and Canada in each country's native currency [which are then averaged].
- Market equity risk premium (MERP) from Morningstar Ibbotson, arithmetic mean, average of the long term MERP calculated for the U.S. and Canada
- Utility risk differential calculated based on one of three methods:
    - Historical differential between a broad base of utility stock returns (e.g., Moody's Utility Stock Index) and the broader equity market,
    - Awarded returns in North American litigated proceedings (AAROE) vs. the risk free rate, or
    - The CAPM specification of the ERP, using average adjusted betas for the proxy group from Bloomberg and Value Line, as available.

Weights: 50% DCF / 50% ERP

Trigger Mechanism: none

Deadband: none (but could be established)

Term: 3 – 5 years

A numeric example of this approach is:

$$ROE_n = .5 \times DCF + .5 \times ERP$$

Thus, if the DCF model produces an average of 11.25% for the proxy group, and the ERP produces 8.75%, the new ROE is set as follows:

ROE = .5 (11.25%) + .5 (8.75%) = 10.50%

There are many variations of this method that could be specified. The DCF could be computed using single-stage, two-stage, or sustainable growth specifications, or taken as an average of these methods. Similarly, the ERP could be computed using all three sources for equity risk premia mentioned above, or extended with the empirical CAPM model (ECAPM). Using multiple methods increases the complexity of the approach, but provides more confidence that the results would emulate those calculated by experts using a variety of methods to bracket the ROE estimate.

**(5) Periodic Rate Proceedings**

Concentric's research indicates most North American jurisdictions do not rely on a formula for setting the utility cost of capital. Cost of capital is typically set during the course of litigated rate proceedings where company and stakeholder witnesses present independent estimates and the Commission weighs the evidence and determines the fair ROE. Within this approach, several variations are possible:

- Fixed schedule for reset - typically coinciding with a fixed rate application schedule (e.g., annually, bi-annually, etc.)
- Request of the parties - the utility, Commission, or stakeholders may request a rate hearing, including cost of capital, as changed circumstances warrant
- Settlement - the parties may agree to hold rates fixed for a certain period of time, including cost of capital, unless unforeseen market circumstances cause a re-hearing.

The advantage of this approach is its adaptability to changing market conditions, the periodic input from stakeholders, and the ability of the Commission to act on updated capital market information. Generally, ROEs are not volatile over time and in the case of many utilities, periodic rate hearings provide a sufficient response to changing market conditions while retaining stability and predictability in returns. Drawbacks include the additional resources required for litigated cost of capital proceedings, the potential politicization of ROE determinations when other rate pressures emerge, and the potential for companies to remain out of hearings when costs are decreasing.

## 5. Conclusions

In this report we have examined the utilization of ROE formulas in other jurisdictions and found that a formulaic approach has been selectively adopted by regulatory commissions in Canada and with less frequency in the U.S. In Canada, three provinces remain on a formula (ON, QC and NL). In the U.S., three states have adopted a formula (CA, MS and VT). In addition, Virginia and Florida utilize formulas to establish a range of reasonableness for ROE, as does the FERC with its prescribed ROE methodology. Connecticut is currently investigating the use of a formula.

Formulas adopted in these jurisdictions range from relatively simple models (e.g., the traditional Canadian government bond yield, California's utility bond yield, or Ontario's hybrid of these two), to the more complex multi-method approach adopted in Mississippi. Concentric has evaluated several of these alternatives, a method Concentric has recommended elsewhere, and the prior BC formula. We have compared backcast results with a benchmark of U.S. litigated returns and authorized returns for Terasen, and "stress-tested" the results using the underlying volatility of each model's inputs. Of those we have evaluated using a backcast, the Concentric approach would have come closest to yielding the authorized return by the BCUC in December 2009, assuming this formula was adopted in 1994. The California and Mississippi approaches come closest to the litigated return benchmark over time.

The stress tests suggest that the California and Concentric models are the least volatile, based on the historic standard deviations of the model inputs. Conversely, the Quebec formula (and the prior BC, Ontario and NEB formulas) and the Newfoundland and Labrador formula are the most volatile, due to the greater standard deviations of government bond yields in contrast with other model inputs, and a higher sensitivity to those inputs.

The Commission did not direct Terasen to provide a recommended formula, but rather to "complete a study of alternative formulae and report to the Commission by December 31, 2010." In Concentric's view, this study accomplishes this objective. Each of the four specific formulas described in Section 4 are potential candidates should the Commission elect to adopt a new formulaic approach to ROE. The fifth option, periodic rate hearings, will yield the actual results that a formulaic methodology attempts to emulate and is most likely to meet the Fairness Standard. Based on Concentric's assessment of the ability of each approach to meet the desired attributes discussed earlier, and if the Commission deems it appropriate to reintroduce the formula at a later date, Concentric recommends that the Commission make its determination in consideration of the options presented in Section 4.

| INPUTS | ADVANTAGES | DISADVANTAGES |
|---|---|---|
| Forecast 10-Year Government Bond Yield | • Widely available<br>• Historical relationship between government bond yields and utility equity returns<br>• Forward looking | • May significantly depart from corporate equity returns - no equity market input<br>• Significantly influenced by national monetary policy and broad macroeconomic trends.<br>• 10-year horizon is not sufficiently long to parallel corporate asset investment horizon (requires a increment to bring the life to 20 to 30 years – could result in mismatching of forecast and historical data)<br>• Not specific to utilities |
| Historical Avg. 10-Year Government Bond Yield | • Widely available<br>• Historical relationship between government bond yields and utility equity returns | • May significantly depart from corporate equity returns - no equity market input<br>• Significantly influenced by national monetary policy and broad macroeconomic trends.<br>• 10-year horizon is not sufficiently long to parallel corporate asset investment horizon (requires a increment to bring the life to 20 to 30 years – could result in mismatching of forecast and historical data)<br>• Historical performance may not be indicative of future – i.e. not forward looking<br>• Not specific to utilities |
| Bloomberg historical 30-Year A-rated Utility Bond Yield | • Historical relationship between corporate utility bond yields and utility authorized equity returns.<br>• Less subject to governmental monetary policy and broad macroeconomic trends.<br>• Appropriate investment horizon of 30 years<br>• Data available for both U.S. and Canadian Bond Yields<br>• Derived from frequently updated fair value curve Specific to utilities | • Requires a Bloomberg subscription<br>• Stringent data protection requirements<br>• Not forward looking<br>• Utility bond yields are not always a good predictor of utility equity returns – no equity market input |

| INPUTS | ADVANTAGES | DISADVANTAGES |
|---|---|---|
| Moody's 30-year Baa or A-rated utility bond yield | • Historical relationship between corporate utility bond yields and utility authorized equity returns<br>• Less subject to governmental monetary policy and broad macroeconomic trends.<br>• Appropriate investment horizon of 30 years<br>• Specific to utilities<br>• Widely available for nominal cost – does not require an expensive subscription | • Not forward looking<br>• Utility bond yields are not always a good predictor of utility equity returns – no equity market input<br>• Heavily weighted towards U.S. utilities |
| Coefficient for Change in Bond Yields of 0.75 | • Easily administered<br>• Regulatory transparency | • Overstates impact of historic interest rate fluctuations on utility equity returns, and may change over time<br>• Not supported by regression of utility allowed equity returns and government or corporate bond yields |
| Coefficient for Change in Bond Yields of 0.50 | • Easily administered<br>• Regulatory transparency<br>• Supported by regression of utility allowed equity returns and government or corporate bond yields | • Bond yields, alone, cannot fully explain movements in equity markets |
| Prescriptive and equal weighting of DCF, CAPM and Risk Premium Approach | • Provides a prescriptive approach to recalculating ROE each year<br>• Specific to utilities and equities<br>• Based on actual equity calculation using commonly applied methods and inputs<br>• Eliminates the controversy around ROE inputs (i.e. risk premium, beta, growth rates) | • More difficult to administer<br>• Inputs can be viewed as subjective and require subscriptions to data services<br>• Data limited to publicly-traded, investor-owned utilities followed by analysts |
| Weighting of U.S. RRA Index and Canadian Litigated Returns | • Moderately easy to administer<br>• Provides some regulatory transparency<br>• Specific to utilities and incorporates measures of allowed returns on equity (i.e. equity market inputs)<br>• When weighted with Utility bond yields, provides assurance that divergence in equity market from bond market will be at least partially accounted for in the formula result. | • Commissions reluctant to use decisions from other commission in their ROE determinations<br>• Requires reliance on U.S. data<br>• Requires subscription to SNL to develop index, i.e. data is not widely available<br>• Requires Canadian ROE Decision research |

| INPUTS | ADVANTAGES | DISADVANTAGES |
|---|---|---|
| Deadband | • If set properly will avoid frequent and temporary adjustments to ROE - reduces volatility in earnings and rates<br>• Facilitates regulatory expediency by less frequent changes to ROE. | • If not set appropriately may be too sensitive to changes in inputs requiring frequent ROE updates; or conversely be too unresponsive to market inputs |
| Ceiling and Floors | • Provides certainty that the formula returns will not result in unusually high or low ROE estimates. | • Transfers a portion of market risk from ratepayer to shareholder |
| Trigger Mechanism | • Provides certainty that significant movements in ROE will be reviewed and the formula's ability to adequately track returns will be reassessed. | • May not adequately address the period for which the formula should be reviewed, i.e. may require review when not needed and not trigger a review when it is needed.<br>• Trigger mechanisms are often set improperly, i.e. changes in ROE do not necessarily translate to ROEs that are inappropriately low or high. |
| Specified Review Period | • Provides certainty that ROE will be reviewed/ rebased if necessary, and the formula's ability to adequately track returns will be reassessed. | • May not adequately address the period for which the formula should be reviewed, i.e. may require review when not needed and not trigger a review when it is needed. |