

**IN THE MATTER OF** the *Electrical Power Control Act, 1994* (the “EPCA”) and the *Public Utilities Act, R.S.N. 1990, Chapter P-47* (the “Act”) and their subordinate regulations; and

**IN THE MATTER OF** an Application by Newfoundland and Labrador Hydro (“Hydro”) for approvals of: (1) Under Section 70 of the Act, changes in the rates to be charged for the Supply of power and energy to its Retail Customer, Newfoundland Power, its Rural Customers and its Industrial Customers; (2) Under Section 71 of the Act, its Rules and Regulations applicable to the supply of electricity to its Rural Customers; (3) Under Section 71 of the Act, the contracts setting out the terms and conditions applicable to the supply of electricity to its Industrial Customers; and (4) Under Section 41 of the Act, its 2002 Capital Budget.

**WRITTEN EVIDENCE**

**OF**

**MICHAEL J. VILBERT**

**FOR**

**ABITIBI CONSOLIDATED INC. (GRAND FALLS)  
ABITIBI CONSOLIDATED INC. (STEPHENVILLE)  
CORNER BROOK PULP AND PAPER LIMITED  
NORTH ATLANTIC PETROLEUM LIMITED**

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## Table of Contents

I.	INTRODUCTION AND SUMMARY .....	1
II.	THE CURRENT ENVIRONMENT .....	10
A.	THE CHANGE FROM INTEREST COVERAGE TO THE RATE OF RETURN ON RATE BASE MODEL .....	11
B.	ABSENCE OF PURE PLAYS .....	12
III.	ECONOMIC RISK-RETURN PRINCIPLES .....	14
A.	RELEVANCE OF THE COST OF CAPITAL .....	14
B.	OVERALL COST OF CAPITAL AS THE CORRECT STARTING POINT .....	16
	1. Debt and the Overall Cost of Capital .....	19
	2. Many Minimum-Cost Capital Structures .....	20
	3. Debt's Effect on the Cost of Equity .....	23
	4. The Effect of the Debt Guarantee .....	28
	5. Overall Cost of Capital and the Revenue Requirement .....	31
	6. Recommendation .....	39
IV.	HYDRO'S COST OF CAPITAL .....	42
A.	CALCULATIONS FOR REGULATORY USE .....	42
B.	OTHER COMMENTS .....	44
C.	CONCLUSIONS .....	46

WRITTEN EVIDENCE OF  
MICHAEL J. VILBERT

1 **I. INTRODUCTION AND SUMMARY**

2

3 **Q1. Please state your name and address for the record.**

4 A1. My name is Michael J. Vilbert. My business address is The Brattle Group, 44 Brattle Street,  
5 Cambridge, MA 02138, USA.

6

7 **Q2. Please summarize your background and experience.**

8 A2. I am a Principal of The Brattle Group, (“Brattle”), an economic, environmental and management  
9 consulting firm with offices in Cambridge, Washington, and London.

10 My work concentrates on financial and regulatory economics. I hold a B.S. from the U.S.  
11 Air Force Academy and a Ph.D. in finance from the Wharton School of Business at The  
12 University of Pennsylvania. Appendix A to this written evidence is a more complete description  
13 of my professional qualifications.

14

15 **Q3. What is the purpose of your written evidence in this proceeding?**

16 A3. I have been asked by the Industrial Customers of Newfoundland and Labrador Hydro (“Hydro”  
17 or the “Company”) to comment on aspects of the testimonies of Kathleen C. McShane and  
18 Douglas G. Hall in regard to the application of the rate of return on rate base methodology for  
19 determining the revenue requirement for Hydro.

20

21 **Q4. Please summarize any parts of your background and experience that are particularly**

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MICHAEL J. VILBERT

1       **relevant to your evidence on these matters.**

2   A4.   Brattle’s specialties include financial economics, regulatory economics, and the gas and electric  
3       industries.

4               I have worked in the areas of cost of capital, investment risk and related matters for many  
5       industries, regulated and unregulated alike, in many forums. I testified before the Alberta Energy  
6       and Utilities Board (“AEUB”) on behalf of TransAlta Utilities in 1999, and I have filed written  
7       evidence before the U.S. Federal Energy Regulatory Commission (“FERC”), the Canadian  
8       National Energy Board (“NEB”) and before the AEUB in 2000.

9

10   **Q5.   Please summarize your analysis starting with an overview of how you approached the**  
11       **task.**

12   A5.   Rates for Newfoundland and Labrador Hydro (“Hydro” or “Company”) in this proceeding are  
13       to be determined by reference to the “rate of return on rate base” methodology instead of the  
14       “interest coverage” model that has been used in the past. The proper application of this model  
15       raises new issues for the Board of Commissioners of Public Utilities “(the Board)” to address.  
16       Many of these issues need not be the subject of a determination by the Board in this proceeding,  
17       since Hydro is requesting that rates be set based upon a three percent return on equity. Generally  
18       speaking, that rate is so low in relation to returns normally granted in proceedings of this type that  
19       the Board may assume the rate not to be excessive, and, hence, the Board is relieved from  
20       determining an appropriate rate in this proceeding. When the issue comes before the Board under

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MICHAEL J. VILBERT

1 the new methodology, the Board must determine the appropriate return on the equity component  
2 of the rate base and the appropriate amount of debt and equity in the capital structure. Under the  
3 interest coverage model these issues were much less important than in the rate of return model.  
4 Both the rate of return on equity and the capital structure are potentially contentious issues  
5 because they each affect the revenues of the Company and the tolls paid by ratepayers. In  
6 addition, the Board is being asked to decide whether Hydro should move to a capital structure  
7 that would enable the Company to achieve an investment grade bond rating on a stand-alone  
8 basis.

9 Since the question of the appropriate rate of return is not put in issue in the present  
10 application, in my evidence I do not provide an specific estimate of the return on equity, but rather  
11 I present an approach that insures the consistency of the recommended return on equity and the  
12 recommended amount of equity in the capital structure.

13 Most importantly however, I show that the total amount of the capital charges in Hydro's  
14 revenue requirement will decrease as the amount of equity in the capital structure increases. In  
15 other words, rates should decrease as equity is added to Hydro's capital structure. This result  
16 seems counterintuitive precisely because the analysis by cost of capital witnesses and intervenors  
17 frequently fails to maintain an appropriate relationship between capital structure and the return on  
18 equity, and because of the tax effects resulting from Hydro's status as a Crown Corporation.

19 Exhibit No. MJV-1 shows the after-tax weighted-average cost of capital ("ATWACC")

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MICHAEL J. VILBERT

1 inherent in the return on equity recommendations by Ms. McShane.<sup>1</sup> Note that she makes no  
2 adjustment in the return on equity in going from 15.27 percent to 25 percent equity and only a  
3 slight adjustment in going to a capital structure with 40 percent equity. As can be seen in column  
4 [7] of the exhibit, the Implied ATWACC increases with the increase in equity. This is equivalent  
5 to believing that the Company is becoming more risky as equity is added to the capital structure.  
6

7 **Q6. Please briefly describe how the ATWACC for a sample should be estimated.**

8 A6. The first step is to select a sample of comparable risk companies and estimate the sample  
9 companies' return on equity using the standard cost of capital estimation techniques such as the  
10 discounted cash flow method or the risk positioning method. This is exactly what Ms. McShane  
11 has done with her samples. The ATWACC requires estimates of the market value weights of the  
12 sample companies' capital structures so the second step is to estimate these market values. For  
13 equity, the market value is simply the market price of the stock times the number of shares  
14 outstanding. Currently, the market values of debt and preferred equity are very close to their  
15 book values in the U.S. and Canada, so using the book values as an estimate of the market values  
16 is reasonable. Three other parameters are needed: the income tax rate, the market return on debt,  
17 and the market return on preferred equity. The market return on debt can be easily estimated by

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<sup>1</sup> Exhibit No. MJV-2 uses a representative tax rate of 40 percent for 2002. For 2000 the median tax rate for those Canadian Utilities in Ms. McShane's sample who reported a tax rate was 42.2%. According to the Budget Update from the Canadian Department of Finance (January 2001) the federal corporate tax rate will be reduced in steps until 2004. The corporate tax rate was reduced by 1% on January 1, 2001 and an additional 2% reduction will occur in each of the following three years.

WRITTEN EVIDENCE OF  
MICHAEL J. VILBERT

1 using each sample company's bond rating and selecting the current yield on an index of  
2 comparably rated bonds. The return on preferred can be estimated in an manner analogous to  
3 that of debt. The income tax rate should be the marginal income tax rate for the company whose  
4 ATWACC is being estimated. In the case of a Crown Corporation, a representative tax rate is  
5 substituted. The last step is to calculate the weighted average for each sample company of its  
6 return on equity, return on preferred equity and return on debt. Note that the return on equity is  
7 already after-tax, but the return on debt must be multiplied by (1 minus the tax rate) to get the  
8 after-tax return. Preferred stock should be treated like equity or like debt if its dividend payments  
9 are tax deductible. A simplified numerical example of the ATWACC calculation is illustrated in  
10 Exhibit No. MJV-6.

11  
12 **Q7. What is your recommendation to the Board for the determination of a fair rate of return**  
13 **for Hydro's assets?**

14 A7. I recommend that the Board rely upon an approach that estimates the required overall return on  
15 capital rather than focusing more narrowly on the required return on equity. Rate of return on rate  
16 base regulation normally focuses on the components of the overall cost of capital, and in particular,  
17 on what the "right" cost of equity and capital structure should be. The regulatory decisions on the  
18 return on equity and the capital structure may often be made separately without an explicit  
19 recognition of their inherent connection. However, modern finance theory (and well managed  
20 unregulated companies) focus instead on overall returns. This focus recognizes that you cannot

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MICHAEL J. VILBERT

1 change capital structure without also changing the cost of equity, because use of additional debt  
2 imposes additional risk on shareholders. The approach I recommend relies on estimating the  
3 overall after-tax weighted-average cost of capital for sample companies instead of estimating the  
4 return on equity and the appropriate capital structure separately.

5 Even though Hydro pays no corporate income taxes, the benchmark sample companies  
6 used by cost of capital witnesses do; therefore, an appropriate opportunity cost of capital for  
7 evaluation is the ATWACC. This has important implications for the revenue requirement of  
8 Hydro. Although the ATWACC is constant across a broad middle range of capital structures for  
9 investor owned utilities as well as for Hydro, the before-tax weighted-average cost of capital for  
10 Hydro is not. This will be discussed in more detail below, but it means that the capital structure  
11 affects Hydro's capital charges. Specifically, the revenue requirement is higher, for higher levels  
12 of debt in Hydro's capital structure.

13 If the ATWACC approach is adopted, I believe the Board will find that it simplifies its  
14 decisions going forward. In particular, this simplification of the traditional cost of capital  
15 procedures would allow the Board to avoid the contentious issue of capital structure and focus  
16 instead on the total amount of capital charges to be paid by ratepayers and to be received by  
17 Hydro with or without the Provincial debt guarantee. For Hydro the capital charges are the sum  
18 of the return on equity, the payment for interest and the debt guarantee fee.

19  
20 **Q8. Please describe further the simplification that you propose?**

21 **A8.** In my view, regulatory boards, regulated companies, and their customers all would benefit if the



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MICHAEL J. VILBERT

1 procedures of rate regulation also adopted this insight in a careful and explicit way. The best and  
2 simplest way to set the rate of a return for a business is to focus on the overall after-tax weighted-  
3 average cost of capital. *The overall after-tax cost of capital of a line of business is constant*  
4 *within a broad middle range of capital structures, because any net tax advantage to use of*  
5 *debt is offset by other costs.* Thus, to find the correct rate of return for a part of a business,  
6 simply average the overall after-tax costs of capital of a sample of publicly traded firms in that line  
7 of business or of relevant benchmark groups if an ideal sample is unavailable.

8 This involves some changes from the way the rate of return on rate base method has  
9 traditionally been applied, but it is important to note that both the ATWACC method and the  
10 traditional method arrive at exactly the same answer if applied correctly, since both rely on the  
11 same underlying financial principles. It also will bring the Board's deliberations on rate of return  
12 issues into the form used in unregulated businesses.

13 Of course, the Board may also want to relate the recommended approach to the  
14 traditional way of addressing rate of return issues. My evidence provides comparisons of the  
15 results using both approaches. However, I believe the Board will find the approach used in the  
16 unregulated sector more useful in the future, even if it does require an investment of the Board's  
17 time and attention now to analyze my recommendations and to evolve procedures in this direction.  
18 Moreover, in addition to its superior conceptual foundation, the overall cost of capital approach  
19 has some practical advantages over the return on equity approach.

20  
21 **Q9. What are those?**

WRITTEN EVIDENCE OF  
MICHAEL J. VILBERT

1 A9. First, in many cases regulatory boards today need to estimate the cost of capital without having  
2 access to a good sample of companies in the line of business in question. This is certainly true in  
3 the case of regulated Canadian electric generation and distribution companies. Crown  
4 Corporations do not have market information to evaluate, so cost of capital witnesses must rely  
5 on benchmark samples and make judgments regarding the relative risk of the Crown Corporation  
6 and the benchmark samples. When a good sample of pure plays<sup>2</sup> is not available, a focus on the  
7 overall return greatly simplifies the task of arriving at a reliable answer from benchmark groups  
8 that are not of precisely comparable risk. This is because it reports the evidence from all of the  
9 benchmark groups on a comparable basis, on the overall cost of capital, (as opposed to individual  
10 cost of equity estimates that may differ not because of differences in the underlying risk of the lines  
11 of business of the different sample groups, but because of differences only in average capital  
12 structure).

13           Second, cost of capital witnesses and regulatory boards may not fully recognize the  
14 necessary change in the return on equity for a change in the capital structure. The impact of a  
15 given percentage change in the equity ratio differs materially as the equity ratio decreases. As  
16 shown in Exhibit No. MJV-2, for example, the required return on equity drops a lot more in going  
17 from a 15 percent to a 20 percent equity share than it does going from 20 percent to 25 percent.  
18 A focus on ATWACC insures the consistency of the return on equity and the change in risk from  
19 changes in financial leverage.

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<sup>2</sup> Pure play is an investment term relating to companies whose revenues are concentrated in one line of business.

WRITTEN EVIDENCE OF  
MICHAEL J. VILBERT

1           In short, the ATWACC approach is more in accord with the modern understanding of  
2           how capital markets work, reduces the chance of mistakes, and saves regulatory resources. The  
3           change in the regulatory model in Newfoundland from the interest rate coverage to rate of return  
4           on rate base model makes this an ideal time to adopt the ATWACC approach.

5  
6 **Q10. How is the rest of your evidence organized?**

7 A10. *Section II* addresses the setting in which this proceeding takes place, the absence of a sample of  
8           pure play companies with market information, and the implications for the Board, the Company,  
9           and its rate payers. *Section III* sets forth the relevant underlying economic principles used to  
10          establish the line-of-business cost of capital and capital structure. This starts with a discussion of  
11          the appropriate standard for the rate of return investors should expect to earn on the rate base.  
12          It also lays out the basis of my recommendations and how they correspond to more traditional  
13          ways rate regulation has approached the rate of return. Appendix B provides additional details  
14          on the capital structure principles. It also discusses the effect of capital structure on Hydro's  
15          revenue requirement, and shows that revenue requirement will decrease as equity is added to the  
16          capital structure. *Section IV* demonstrates the calculation of Hydro's capital charges with  
17          reference to the ATWACC and the necessary adjustment for the embedded cost of debt. It then  
18          shows that there is no need for the financing flexibility adjustment recommended by Ms. McShane.  
19          Lastly it lists my conclusions.

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1 **II. THE CURRENT ENVIRONMENT**

2

3 **Q11. Why do you start your evidence with a discussion of the current setting?**

4 A11. This proceeding marks the transition from establishing prospective rates for Hydro by use of the  
5 interest coverage model that has been used in the past to the rate of return on rate base regulatory  
6 methodology going forward. In addition to determining the appropriate rate base, the rate of  
7 return method requires estimating two other parameters: the appropriate rate of return on equity  
8 and the capital structure to which it applies. It is critical to recognize that the appropriate return  
9 on equity depends not only on the business risk of the corporation but also on the capital structure.  
10 The use of increasing amounts of debt, increases the financial leverage and the hence, the financial  
11 risk of equity; therefore, the appropriate return on equity must recognize both the business risk and  
12 the financial risk of the company. Please refer to Section I of Appendix B for a more detailed  
13 explanation of business and financial risk.

14 Newfoundland and Labrador Hydro is a Crown Corporation whose current 2002  
15 forecast capital structure consists of 83.18 percent debt, 15.27 percent equity, and 1.55 percent  
16 liabilities for future employee benefits.<sup>3</sup> Hydro's debt is guaranteed by the Province of  
17 Newfoundland ("Newfoundland" or "Province"). Both Ms. McShane and Mr. Hall recommend  
18 a substantial increase in the amount of equity in Hydro's capital structure with a long-term goal  
19 that Hydro be able to achieve an investment grade bond rating without the need to rely upon a

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<sup>3</sup> See the Written Evidence of Kathleen C. McShane, p. 55, Table 5.

WRITTEN EVIDENCE OF  
MICHAEL J. VILBERT

1 debt guarantee by the Province. If these recommendations should be adopted, the required return  
2 on equity with respect to the amount of financial leverage in the Company's capital structure will  
3 be an important issue to resolve.

4  
5 **A. THE CHANGE FROM INTEREST COVERAGE TO THE RATE OF RETURN ON**  
6 **RATE BASE MODEL**

7  
8 **Q12.** What is the significance of the change from the interest coverage to the rate of return model for  
9 estimating Hydro's revenue requirement?

10 **A12.** In the interest coverage model, the focus was on insuring that the Company's revenues were large  
11 enough to cover all of its costs including its interest expense plus an additional margin of revenue  
12 to insure payment of interest in case of unexpected events. The rate of return regulatory model  
13 has a somewhat different aim; the concentration is on providing a rate of return on equity that  
14 compensates investors for the risk of the investment. Of course, providing sufficient interest  
15 expense coverage is part of the rate of return model, but it does not end there. In the future, the  
16 Board will have to determine the risk of the Company's equity as well as have to estimate the  
17 returns available on investments of comparable risk in order to determine the appropriate return  
18 on Hydro's equity.

19  
20 **Q13. Why is Hydro's capital structure and suggested changes to the structure relevant for this**  
21 **proceeding?**

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MICHAEL J. VILBERT

1 A13. The overall cost of capital depends primarily on the business the firm is in, while the costs of the  
2 debt and equity components depend not only on the business risk but also on the distribution of  
3 revenues between debt and equity. Were it not for taxes and the costs associated with excessive  
4 debt, a firm's overall cost of capital would be constant, completely independent of the capital  
5 structure, (*i.e.*, the debt-equity ratio) the firm happened to choose. Thus, if a company increases  
6 the percentage of equity in its capital structure with no other change in business risk, the  
7 company's ATWACC would not change, but the required return on equity would decrease. As  
8 a company's percentage of equity increases, the shareholders' exposure to financial risk declines.  
9 Consequently, if Hydro increases its percentage of equity, the return on equity will fall. This is a  
10 well established financial principle, and it is discussed in detail in Section II of Appendix B.

11

12 **B. ABSENCE OF PURE PLAYS**

13

14 **Q14. Are there any unusual data problems that affect estimates of the cost of capital for**  
15 **Hydro?**

16 A14. The most fundamental difficulty is the lack of a sufficient sample of companies that are pure plays  
17 in the Canadian electric business. It is even more difficult to find a sample of pure play companies  
18 with market value information whose situation is comparable to that of Hydro as a Crown  
19 Corporation. The inevitable uncertainty in any one company's estimated cost of capital requires  
20 use of a sample of companies if a reliable cost of capital "signal" is to be distinguished from the  
21 "noise" of stock market movements.

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MICHAEL J. VILBERT

1 Ms. McShane deals with this problem by selecting several samples including Canadian  
2 investor owned electric companies, U.S. gas local distribution companies (“gas LDCs”), and U.S.  
3 electric companies. Clearly, none of these samples is exactly comparable to the situation of  
4 Hydro, but all are good benchmarks. However, in her analysis, she makes no explicit adjustment  
5 for the differences in the capital structures of her sample companies either within the samples or  
6 in the application of her recommended return on equity to the capital structure of Hydro. Insuring  
7 this consistency between capital structure and return on equity is one of the advantages of the  
8 ATWACC method.

9  
10 **Q15. Why are samples of investor owned utilities relevant benchmarks to evaluate the**  
11 **required return on Hydro’s equity?**

12 A15. The Company’s equity investment has an opportunity cost of capital that must be evaluated in the  
13 application of the rate of return model. The requirement is to provide an expected return on  
14 Hydro’s equity equal to the expected return on comparable risk investments. The relevant  
15 benchmarks for determining the risk and the return on comparable risk investments is the capital  
16 markets of Canada and the U.S. This means that companies that are traded in these capital  
17 markets and with operations concentrated in industries comparable to the regulated electric  
18 industry should be selected as sample benchmarks to compare to Hydro. It seems reasonable  
19 to me that the overall ATWACC estimated for these sample companies is an appropriate starting  
20 point to determine the relative risk and return for Hydro.

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1 **III. ECONOMIC RISK-RETURN PRINCIPLES**

2

3 **Q16. Please turn to your discussion of the determinants of the cost of capital and capital**  
4 **structure. How is this section organized?**

5 A16. The section contains several parts. It first gives an overview of the relevance of the cost of capital  
6 in rate regulation. It then explores the determinants of the overall after-tax cost of capital, which  
7 is both the correct starting point conceptually and the quantity that ultimately determines the  
8 revenue requirement. This discussion necessarily considers the effect of alternative capital  
9 structures. It relates these principles to ratemaking practice.

10

11 **A. RELEVANCE OF THE COST OF CAPITAL**

12

13 **Q17. What is the relevance of the cost of capital in rate regulation?**

14 A17. Rate levels that give investors a fair opportunity to earn the cost of capital on average on the assets  
15 their money buys for the regulated company are the lowest levels that compensate investors for  
16 the risks they bear. Over the long run, an expected return on those assets above the cost of  
17 capital makes customers overpay for service. At the same time, an expected return on those  
18 assets below the cost of capital shortchanges investors. It is in this sense that an expected (i.e.,  
19 average) rate of return on the rate base equal to the cost of capital is a “fair return.”

20

21 In the long run, an expected return on the rate base that is below the cost of capital denies  
the company the ability to attract capital, to maintain its financial integrity, and to expect a return



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MICHAEL J. VILBERT

1 commensurate with that on other enterprises attended by corresponding risks and uncertainties.  
2 More important for ratepayers, however, are the economic issues an inadequate return raises for  
3 them. In the short run, deviations of the expected rate of return on regulated company assets from  
4 the cost of capital create a “zero-sum game” — investors gain if ratepayers are overcharged, and  
5 ratepayers gain if investors are shortchanged. In the long run, however, inadequate returns are  
6 likely to cost ratepayers — and society generally — far more than is gained in the short run.  
7 Inadequate returns lead to inadequate or overly risk-averse investment, whether for maintenance  
8 or for new plant and equipment. The costs of an undercapitalized industry can be far greater than  
9 the gains from short-run shortfalls from the cost of capital. Moreover, in capital-intensive  
10 industries (such as electric utilities), systems that take a long time to decay cannot be fixed  
11 overnight. Thus, it is in the ratepayers’ interest not only to make sure the return investors  
12 expect on regulated company assets does not exceed the cost of capital, but also to make sure  
13 that it does not fall short of the cost of capital.

14 Of course, the cost of capital cannot be estimated with perfect certainty, and other aspects  
15 of the way the revenue requirement is set may mean investors expect to earn more or less than  
16 the cost of capital even if the allowed rate of return equals the cost of capital exactly, which may  
17 require additional adjustments by a regulator. However, a regulator that on average sets rates so  
18 investors expect to earn the cost of capital on regulated company assets treats both customers and  
19 investors fairly, and acts in the long-run interests of *both* groups.

20  
21 **Q18. What is the relationship between the cost of capital and the allowed rate of return?**

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MICHAEL J. VILBERT

1 A18. The cost of capital is determined *in the marketplace*, in competition with other investments of  
2 varying degrees of risk. In effect, the cost of capital is a bill that investors tender to regulated  
3 companies and their boards for payment: “We’ll give you capital if you in turn give us a fair  
4 opportunity to earn this rate of return on average on the assets purchased with our capital. This  
5 is a fair price to pay us because this is the average rate of return we could expect elsewhere for  
6 your level of risk.”

7           The allowed rate of return on equity is determined *by regulatory boards*, as part of their  
8 effort to “pay the bill” tendered by investors. Boards succeed in their part of “paying the bill”  
9 when they establish regulatory procedures that provide the regulated company with a fair (i.e., a  
10 statistically unbiased) opportunity to earn a rate of return equal to the cost of capital. In most  
11 cases, this involves setting the allowed rate of return equal to the cost of capital on its regulated  
12 investments.

13

14 **B. OVERALL COST OF CAPITAL AS THE CORRECT STARTING POINT**

15

16 **Q19. Why is the overall after-tax cost of capital the correct starting point conceptually?**

17 A19. It is common to think of the weighted-average cost of capital as the final result of a “bottom up”  
18 analysis of its component costs of debt and preferred and common equity. From a *causation*  
19 standpoint, however, the overall cost of capital is the most basic quantity, not the component costs  
20 and their corresponding capital structure. The overall cost of capital depends chiefly on the  
21 business the firm is in, while the costs of the debt and equity components depend not only on the

WRITTEN EVIDENCE OF  
MICHAEL J. VILBERT

1 business, but also on how the proceeds of that business happen to be split between debt and  
2 equity. In fact, Section I of Appendix B shows that were it not for taxes and the costs associated  
3 with excessive debt, a firm's overall cost of capital would be constant, completely independent  
4 of the capital structure (i.e., the debt-equity ratio) the firm happened to choose. Therefore, the  
5 correct conceptual starting point for the cost of capital of a line of business is the overall cost of  
6 capital, not the equity and debt components of that overall cost.

7  
8 **Q20. What determines the overall cost of capital?**

9 A20. The overall cost of capital depends primarily on "business risk" as defined in corporate finance.  
10 Business risk is the risk that investors would bear if they owned shares in an all-common-equity-  
11 financed company in this particular line of business.<sup>4</sup> Note that this is not the same as many  
12 business peoples' definition of risk, as "things that can go wrong," in two important respects.  
13 First, this definition focuses on the variability of possible rates of return around the mean value,  
14 not on "bad" events. Second, this definition focuses on the part of total variability that cannot be  
15 eliminated in a well diversified portfolio, since only risks that cannot be eliminated by  
16 diversification affect the cost of capital.<sup>5</sup>

17 Business risk depends on the non-diversifiable variability of a company's operating cash  
18 flows (i.e., cash flows to all investors, debt holders and equity holders combined). Operating cash

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<sup>4</sup> See, for example, Richard A. Brealey and Stewart C. Myers, *Principles of Corporate Finance*, 6<sup>th</sup> edition, Irwin/McGraw-Hill, 2000, at 228-232.

<sup>5</sup> See, for example, Brealey and Myers, *op. cit.*, Chapter 8.

WRITTEN EVIDENCE OF  
MICHAEL J. VILBERT

1 flows are the net result of uncertain revenues minus uncertain operating costs (i.e., costs not  
2 including interest). All else equal, business risk grows as revenues grow *more* uncertain or as  
3 costs grow *less* uncertain, since certain costs are *fixed* costs and uncertain costs are *variable*  
4 costs. Appendix B, Section II contains an example of how the relative certainty of costs affects  
5 business risk.

6 A company with a high proportion of fixed costs will have high “operating leverage,”  
7 which creates more business risk.<sup>6</sup> This is important not only because it helps explain the level of  
8 business risk (and hence the level of the overall cost of capital), but also because operating  
9 leverage’s impact on business risk is analogous to debt’s impact on financial risk (as discussed  
10 below).

11  
12 **Q21. Based on these considerations, how do you believe the Board should determine the cost**  
13 **of capital?**

14 A21. These principles mean, in my view, that the Board should at least make explicit use of the  
15 constancy of the after-tax weighted-average cost of capital over a broad middle range of capital  
16 structures. Hydro is forecast to be largely debt financed in 2002, but both Mr. Hall and Ms.  
17 McShane recommend significant increases in Hydro’s equity component. Using the ATWACC  
18 method will improve the likelihood of accurately estimating the cost of equity that goes with a given  
19 capital structure. The procedures to follow to set Hydro’s capital charges using the ATWACC

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<sup>6</sup> See, for example, Brealey and Myers, *op. cit.*, at 240-241.

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1 method are discussed in Section IV, Part A, below.

2

3 **Q22. Please summarize the capital structure principles and implications discussed in detail in**  
4 **Appendix B.**

5 A22. I review the main points in the following parts of this section. Even though the Company pays no  
6 corporate income taxes, these principles are important to understand because they provide the  
7 foundation to understand the effect of debt and taxes on the overall cost of capital for taxable  
8 companies and the effect of financial leverage on the cost of equity. As a standard, it seems  
9 reasonable to measure Hydro's opportunity cost of capital in relation to the risk and return of  
10 publicly traded, taxable corporations.

11

12 **1. Debt and the Overall Cost of Capital**

13

14 **Q23. How does debt affect the overall cost of capital?**

15 A23. Debt affects the overall cost of capital in opposing ways, depending on how much debt the  
16 company issues. The overall cost of capital depends primarily on the firm's business risk. In  
17 addition, most financial economists maintain that the use of modest amounts of debt reduces the  
18 overall cost of capital to a degree, because interest is tax-deductible to the corporation. All else  
19 equal, use of debt increases the total pool of money available for distribution to investors.  
20 However, the amount of the cost of capital reduction due to interest tax shields and even whether  
21 it happens at all is the subject of academic research, in part because other things do not stay equal

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1 as debt is added.

2

3 **2. Many Minimum-Cost Capital Structures**

4

5 **Q24. What is the actual effect of debt on the overall after-tax cost of capital?**

6 A24. The above summary and the detailed discussion in Appendix B should make a fundamental point  
7 clear: *There is no magic in financial leverage.* Even the best argument for debt's having an  
8 advantage, i.e., the corporate tax shield on interest, must be qualified by the personal tax  
9 disadvantage to debt. This is especially true in Canada, since Canadian equity holders have a  
10 bigger personal tax advantage over bondholders than in countries such as the U.S., that taxes  
11 dividend income fully at both the corporate and personal levels. Moreover, there are non-interest  
12 costs associated with debt, such as the risk of financial distress and the loss of flexibility. Use of  
13 some debt adds value to the firm, in most industries, but too much reduces value. There is a  
14 broad band in the middle where the precise level of debt has little impact.

15

16 **Q25. Is there other support for this view?**

17 A25. Yes, in both corporate behavior and the academic literature. Actual corporate behavior confirms  
18 that debt carries no magic. For example, firms in the same industry often have a wide range of  
19 capital structures. Moreover, the most profitable firms often have the least debt, even though the

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1 debt tax shield should be most valuable to such firms.<sup>7</sup> If debt were as valuable as the above  
2 theories that consider only corporate and personal tax effects suggest, there is a lot of financially  
3 stupid behavior by what profitability levels suggest are the industry's best managers. Also, a  
4 recent study that analyzed over 2000 firms for 28 years (1965-1992 inclusive) concluded, "Our  
5 tests thus produce no indication that debt has net tax benefits."<sup>8</sup>

6 These conclusions about corporate behavior also are borne out in the academic literature.  
7 For example, Professor Stewart C. Myers made it the topic of his Presidential Address to the  
8 American Finance Association.<sup>9</sup> The poor performance of tax-based explanations for capital  
9 structure led him to propose an entirely different theory.<sup>10</sup> Research by others confirms that  
10 competitive firms do not behave as if there is a material net advantage to debt.<sup>11</sup>

11  
12 **Q26. What significance does this finding have for ratemaking?**

13 A26. This finding has important implications for regulated companies and the boards that regulate them.

14 If there is no magic in leverage, then there is no magic formula to get a minimum-cost capital

---

<sup>7</sup> See, for example, Carl Kester, "Capital and Ownership Structure: A Comparison of United States and Japanese Manufacturing Concerns," *Financial Management*, Vol. 15:5-16, (Spring, 1986), which finds that in both countries low debt ratios are associated with high profitability.

<sup>8</sup> Eugene F. Fama and Kenneth R. French, "Taxes, Financing Decisions and Firm Value," *The Journal of Finance*, 53, No. 3 (June 1998), 819-843, at page 841.

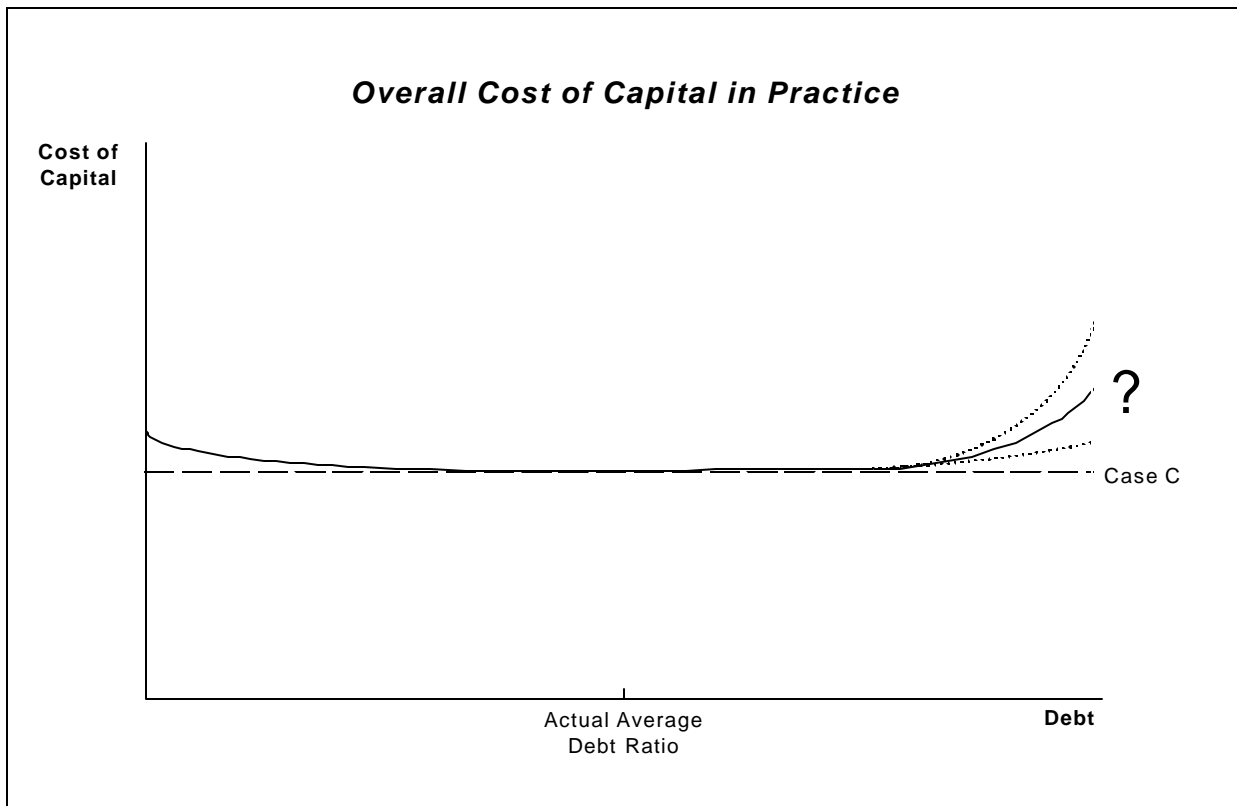
<sup>9</sup> Stewart C. Myers, "The Capital Structure Puzzle," *The Journal of Finance*, 39: 575-592 (1984).

<sup>10</sup> *Ibid.* See also, Stewart C. Myers, "Still Searching for Optimal Capital Structure," *Are the Distinctions Between Debt and Equity Disappearing?*, R.W. Kopke, and E. S. Rosengren, eds., Federal Reserve Bank of Boston. (1989).

<sup>11</sup> See Appendix B, Section II, Part G for additional literature citations.

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1 structure, because there is no single minimum cost capital structure. Instead, there is a broad  
2 middle range of capital structures where the benefits of greater corporate tax deductions as the  
3 debt ratio increases are offset by personal tax effects, a greater risk of financial distress and other  
4 costs of debt.



**Figure 1**

5 This is depicted in Figure 1.<sup>12</sup> There is some net tax advantage to debt initially, but it  
6 erodes as the debt ratio grows. In practice, firms in a given industry exhibit a wide range of debt  
7 ratios, which implies the minimum-cost range is broad and flat. At very high debt ratios, the

---

<sup>12</sup> "Case C" is described in Appendix B. It represents the case when (1) the personal tax disadvantage of debt fully offsets its corporate tax advantage, and (2) there are no costs to use of excessive debt.



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1 overall after-tax cost of capital begins to climb, and firms very deep in financial distress cannot  
2 raise equity at all because all of the new money would go to increase the value of other, senior  
3 securities. Just where the cost of capital begins to turn up and how fast it does so are not well  
4 defined.

5  
6 **Q27. What determines where the “broad middle range” lies?**

7 A27. Where the middle range lies depends primarily on the business risk of the firm or activity in  
8 question. Firms with more business risk can support less debt at a given cost, all else equal.  
9 Business risk depends on factors such as uncertainty in demand and the capital intensity of the  
10 production process (which affects operating leverage). Other firms in the same industry are the  
11 best single indication of the business risk level that these factors produce for the line of business  
12 in question. Therefore, the best evidence on the location of the minimum-cost range of capital  
13 structures for a line of business will come from the observed range of a (non-distressed) sample  
14 of firms in that line of business. Within that minimum-cost range, the after-tax weighted-average  
15 cost of capital is effectively constant.

16  
17 **3. Debt’s Effect on the Cost of Equity**

18  
19 **Q28. If debt is cheaper than equity, how can the overall after-tax cost of capital stay constant**  
20 **as debt is added?**

21 A28. It is incorrect to think of the cost of equity as unchanging, or as no more sensitive than the cost of

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1 debt, in response to capital structure changes. Debt has first claim on a firm's operating earnings,  
2 so uncertainty in operating earnings is borne by equity in most circumstances. Yet all else equal,  
3 higher debt ratios are associated with lower bond ratings and higher required interest rates. This  
4 makes sense, because a company's bondholders are exposed to more risk if, for example, the  
5 company issues 60 percent debt than if it only issues 40 percent debt. Note also that this growth  
6 in the cost of debt occurs despite the fact that the equity is available to safeguard the debt's claims  
7 on operating earnings. Intuitively, if the cost of debt goes up despite its senior claim, the cost of  
8 equity must go up at an even faster rate.

9  
10 **Q29. Why does the cost of equity increase if more debt is added to the capital structure?**

11 A29. Debt increases the volatility of equity returns, and hence their risk. The cost of capital increases  
12 with risk because investors demand a higher expected rate of return when they are faced with a  
13 greater possibility of loss. The extra volatility due to debt is known as "financial risk," which adds  
14 to the business risk the equity holders would bear if the firm had no debt at all. Business risk  
15 depends on the variability of a company's operating cash flows to investors. As noted above,  
16 more operating leverage means more risk. Financial leverage works in exactly the same way.  
17 Interest payments are a fixed cost, which magnify the variability of equity cash flows. In effect,  
18 use of debt loads the entire variability in operating earnings on the smaller equity asset base,  
19 magnifying the risks to the earnings on the equity subset of assets and increasing the cost of equity  
20 at an ever-increasing rate as debt is added. The market risk of the equity reflects the sum of its  
21 business and financial risk.

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1 **Q30. Can you illustrate these points?**

2 A30. Yes. Appendix B, Section II contains a numerical example (Table B-3) that illustrates these  
3 effects. A shortened version of that table is reproduced here as Table 1. The table ignores taxes  
4 and the non-tax costs of debt, so the interest rate is not affected by the amount of debt the  
5 company uses. Panel A of the table shows four alternative balance sheets for the same company.  
6 All three balance sheets have \$10,000 in assets, one consisting entirely of equity, one with 25  
7 percent debt financing, one with 50 percent debt, and one with 75 percent debt. Panel B is an  
8 abbreviated income statement. The operating earnings are expected to be \$1,000. Interest at 8  
9 percent takes up from \$0 to \$600 of these earnings, leaving the remainder as income for equity.

10

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**Table 1**  
**Summary of Table B-3's Example of Financial Risk**

		<b>Capital Structure</b>										
		<i>All Equity</i>	<i>25 Percent Debt</i>	<i>50 Percent Debt</i>	<i>75 Percent Debt</i>							
<b>Panel A: Balance Sheet</b>												
Equity		\$10,000	\$7,500	\$5,000	\$2,500							
Debt		0	2,500	5,000	7,500							
<b>Panel B: Income Statement (Expected Values of Operating Earnings &amp; Income Only)</b>												
Operating Earnings		\$1,000	\$1,000	\$1,000	\$1,000							
Interest		<u>0</u>	<u>200</u>	<u>400</u>	<u>600</u>							
Income		1,000	800	600	400							
<b>Panel C: Rate of Return of Equity (Percent) (Includes Table B-3's High &amp; Low Values)</b>												
High		15.0	17.3	22.0	36.0							
Expected		10.0	10.7	12.0	16.0							
Low		5.0	4.0	2.0	-4.0							
<b>Panel D: Overall Expected Rate of Return (Percent)</b>												
	<b>Cost</b>	<b>Wt.</b>	<b>Prod.</b>	<b>Cost</b>	<b>Wt.</b>	<b>Prod.</b>	<b>Cost</b>	<b>Wt.</b>	<b>Prod.</b>	<b>Cost</b>	<b>Wt.</b>	<b>Prod.</b>
Equity	10.0	1.0	10.0	10.7	0.75	8.0	12.0	0.5	6.0	16.0	0.25	4.0
Debt	0.0	0.0	0.0	8.0	0.25	2.0	8.0	0.5	4.0	8.0	0.75	6.0
Overall			10.0			10.0			10.0			10.0

The illustration assumes that the implied 10 percent rate of return on total assets equals the cost of capital that reflects the business risk of this company. The amount of money left for equity goes down as interest expense rises, but so too does the amount of equity. The result is

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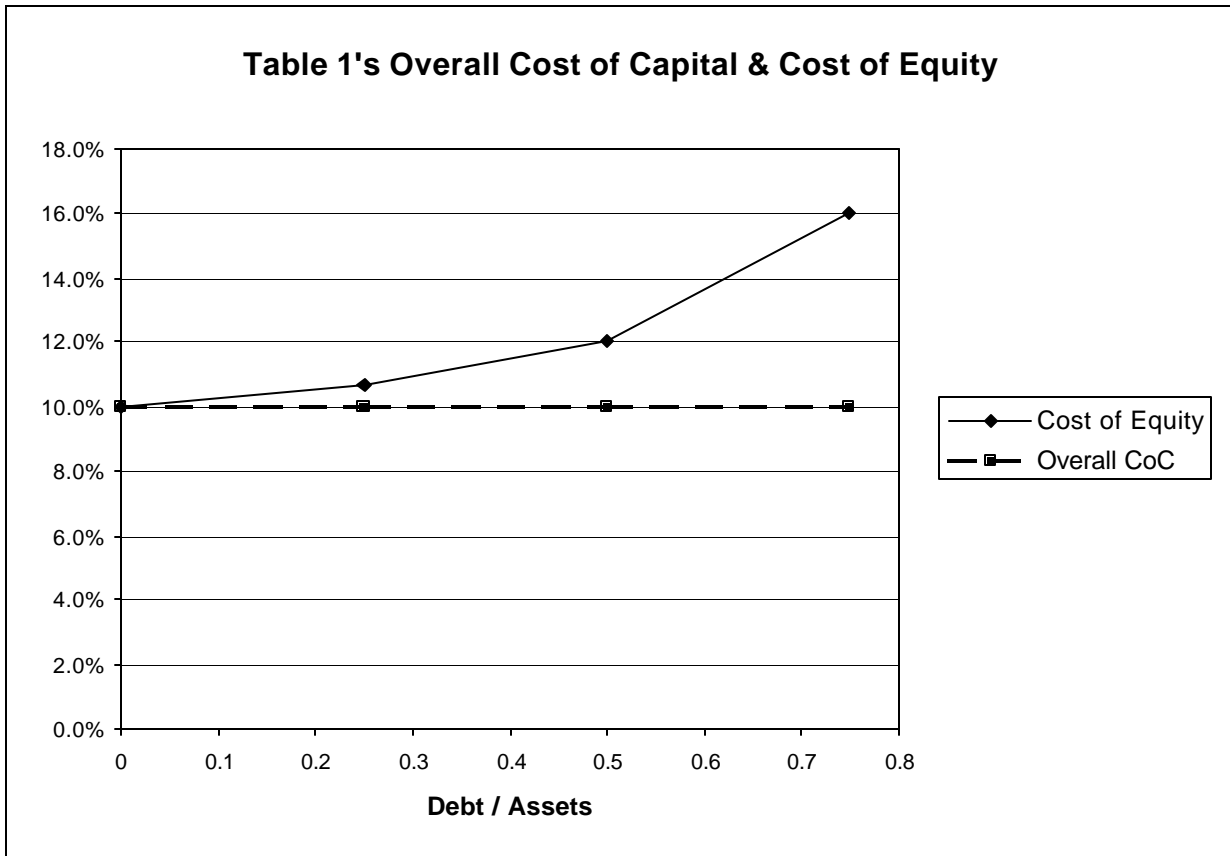
1 an increasing expected rate of return on equity, shown in Panel C. Panel C also shows the impact  
2 on the equity rate of return if operating earnings are \$500 more (“High”) or less (“Low”) than the  
3 expected \$1,000. The more debt, the bigger the fluctuation in the actual equity rate of return  
4 from a given dollar fluctuation in operating earnings. Thus, with no debt, the fluctuation in the  
5 equity rate of return is plus or minus 5 percent (since \$500 in operating earnings equals 5 percent  
6 of a \$10,000 equity investment). With 75 percent debt, the fluctuation in equity return is plus or  
7 minus 20 percent (since \$500 in operating earnings equals 20 percent of a \$2,500 equity  
8 investment).

9 The greater risk, measured as variability in the equity rate of return, as the debt ratio  
10 increases requires a higher expected value (i.e., a higher cost of equity capital) as compensation.  
11 Moreover, risk and the required return on equity go up at an increasing rate as debt is added.  
12 Moving from 0 percent debt to 25 percent debt increases the cost of equity from 10 percent to  
13 10.7 percent, a 0.7 percentage point change; but moving from 50 percent debt to 75 percent  
14 debt increases the cost of equity from 12 percent to 16 percent, a 4.0 percentage point change.  
15 Yet as Panel D shows, the overall expected rate of return on assets, which determines the amount  
16 customers pay, does not change at all; it is always 10.0 percent.

17 Figure 2 plots the overall cost of capital and the cost of equity from Table 1. The  
18 increasing rate at which the cost of equity climbs as debt is added is readily apparent, despite the  
19 fact that the overall cost of capital does not change at all.

20

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**Figure 2**

1

2           **4.       The Effect of the Debt Guarantee**

3

4 **Q31.   What is the effect on the overall after-tax weighted-average cost of capital for Hydro**  
5 **of the Provincial Government's debt guarantee?**

6 A31.   The debt guarantee provided by the Province has no effect on the ATWACC for Hydro because  
7 Hydro is paying a debt guarantee premium that compensates the Government for the credit risk  
8 to taxpayers of providing the guarantee. The debt guarantee allows Hydro to have more debt  
9 in its capital structure without increasing its ATWACC due to the costs of financial distress, but

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1           it does not change the ATWACC, because the business risk of the Company is unchanged. In  
2           other words, it allow the Company to have debt ratios farther to the right in Figure 1 and still  
3           remain on the flat portion of the curve.

4  
5   **Q32. Is it your evidence that the debt guarantee is of no value?**

6   A32. No. The debt guarantee is valuable. It dramatically reduces the risk (and costs) of financial  
7           distress and allows Hydro to finance its operations with more debt than it could otherwise without  
8           increasing its overall cost of capital. The debt guarantee allows higher debt levels for Hydro  
9           before the ATWACC would increase, and also reduces the level of the costs of financial distress  
10          at all debt levels.

11  
12   **Q33. Please describe the costs of financial distress in more detail.**

13   A33. Financial distress occurs when promises to creditors are broken or honored with difficulty. Of  
14          course, the ultimate in financial distress is bankruptcy, but skirting the edge of bankruptcy  
15          increases the costs to the company.<sup>13</sup> For example, suppliers of services and goods may demand  
16          payment before delivery, creditors may impose higher interest rates on borrowing, and  
17          management time is spent dealing the problems of insuring that business is not disrupted by the  
18          financial crisis instead of devoting attention to improving the operation of the firm. The debt  
19          guarantee minimizes these costs for Hydro. The costs of financial distress are discussed more

---

<sup>13</sup> For an additional discussion of the costs of financial distress, see Brealey and Myers, *op. cit.*, at 510-518.

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1 fully in Section I, Part F of Appendix B.

2  
3 **Q34. Do you have a comment regarding the recommendations of Ms. McShane and Mr. Hall**  
4 **that Hydro move to a capital structure that would allow it to achieve an investment grade**  
5 **bond rating on a stand-alone basis?**

6 A34. Yes. The Provincial debt guarantee allows Hydro to maintain an investment grade debt rating and  
7 to access the capital markets at nearly any time. Deciding to change the operations of Hydro in  
8 such a way that Hydro can achieve an investment grade bond rating on a stand-alone basis is a  
9 matter of policy for the Board, the Provincial Government and Hydro to decide.

10 Hydro's level of equity can only be increased in one of two ways: an infusion of equity  
11 capital by the shareholders or an increase in retained earnings. To my knowledge, the  
12 Government has not announced an intention to invest additional equity in Hydro, so the increase  
13 in equity will have to come from increased retained earnings. The proposal to pay a \$70 million  
14 dividend in 2002 from regulated earnings will decrease the amount of retained earnings in the  
15 regulated ratebase and is inconsistent with the recommendation to increase the level of equity in  
16 Hydro's capital structure.

17 Whatever decision is made regarding the appropriate capital structure for Hydro, it is  
18 important to realize that Hydro's ATWACC will be unaffected by this decision. Barring other  
19 changes in the business environment of the Company such as the deregulation of the electric  
20 industry in the Province, the total business risk of the Company will remain the same. Changes  
21 in capital structure would change the allocation of the total risk between debt and equity holders,



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1 and most importantly, the capital structure decision would affect the capital charges portion of the  
2 revenue requirement. Specifically, decreasing the equity percentage will increase the capital  
3 charges. This observation is explained in the next section.

4  
5 **Q35. If it were determined that ratepayers provided the equity of Hydro would that change**  
6 **the opportunity cost of capital for the equity?**

7 A35. No, but if it is shown that ratepayers have provided the equity, that equity would be equivalent  
8 to the “no cost” capital. Any return on the capital provided by ratepayers would provide the  
9 required opportunity cost of capital, because the ratepayers would be charging themselves for  
10 use of their own capital.

11  
12 **5. Overall Cost of Capital and the Revenue Requirement**

13  
14 **Q36. How does capital structure affect the revenue requirement?**

15 A36. For an investor-owned utility (“IOU”), the capital charges part of the revenue requirement is  
16 based on the sum of after-tax net income, taxes, and interest expense. The IOU’s capital charges  
17 are related to its cost of capital through the so-called before-tax weighted average cost of capital  
18 (“BTWACC”), which is simply the after-tax weighted-average cost of capital divided by (one  
19 minus the tax rate). Intuitively, grossing-up<sup>14</sup> the debt component of the ATWACC gives the

---

<sup>14</sup> “Grossing-up” is a term that means to increase the after-tax return on a source of capital to its before-  
(continued...)

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1 IOU the exact amount of interest to pay its debt holders, and grossing-up the after-tax equity  
2 return provides the IOU with enough revenue to pay corporate income taxes and provide the  
3 after-tax return on equity. (See Appendix B for a mathematical demonstration.) Because the  
4 ATWACC is constant as capital structure changes within the broad, minimum-cost range for an  
5 IOU, so too is the BTWACC, and hence the revenue requirement. Although the ATWACC for  
6 Hydro remains constant with changes in capital structure, the BTWACC does not because of its  
7 tax-exempt status for equity income.

8 For Hydro, the debt component of the ATWACC still needs to be grossed-up as the  
9 Crown Corporation must collect the full amount of interest from its customers. On the other  
10 hand, because a Crown Corporation pays no corporate income taxes, there is no need to add  
11 income taxes to the revenue requirement. Put differently, the equity component of the ATWACC  
12 need not and should not be grossed-up. As a result, a Crown Corporation's BTWACC appears  
13 to be the same as the regulatory weighted-average cost of capital ("WACC") for an IOU.<sup>15</sup>  
14 However, for a Crown Corporation it is really the before-tax WACC and should be compared  
15 with the IOU's BTWACC. As shown in the Figure 3, a Crown Corporation's BTWACC,  
16 which determines its capital charges, is always below that of the taxable IOU's. The lower  
17 revenue requirement reflects the Crown's income tax exemption. All else equal, the comparative

---

<sup>14</sup> (...continued)  
tax cost.

<sup>15</sup> Note that the WACC is the weighted-average of the *after-tax* cost of equity and the *before-tax* cost of debt as contrasted with the ATWACC which is based upon the after-tax cost of both debt and equity.

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1 advantage of a Crown Corporation lies in its tax exempt status and allows it to provide service  
2 at a lower rate than a comparable IOU.

3 Exhibit No. MJV-3 shows the relationship between Hydro's BTWACC and its capital  
4 structure for a constant ATWACC. The 5.89 percent ATWACC used is the one implied by Ms.  
5 McShane's recommended 11.25 percent return on equity at 15.27 percent equity in the capital  
6 structure. (No endorsement of that value is implied by its use in the exhibit.) Note that even  
7 though the ATWACC remains constant, the BTWACC drops steadily as the equity ratio  
8 increases.

9

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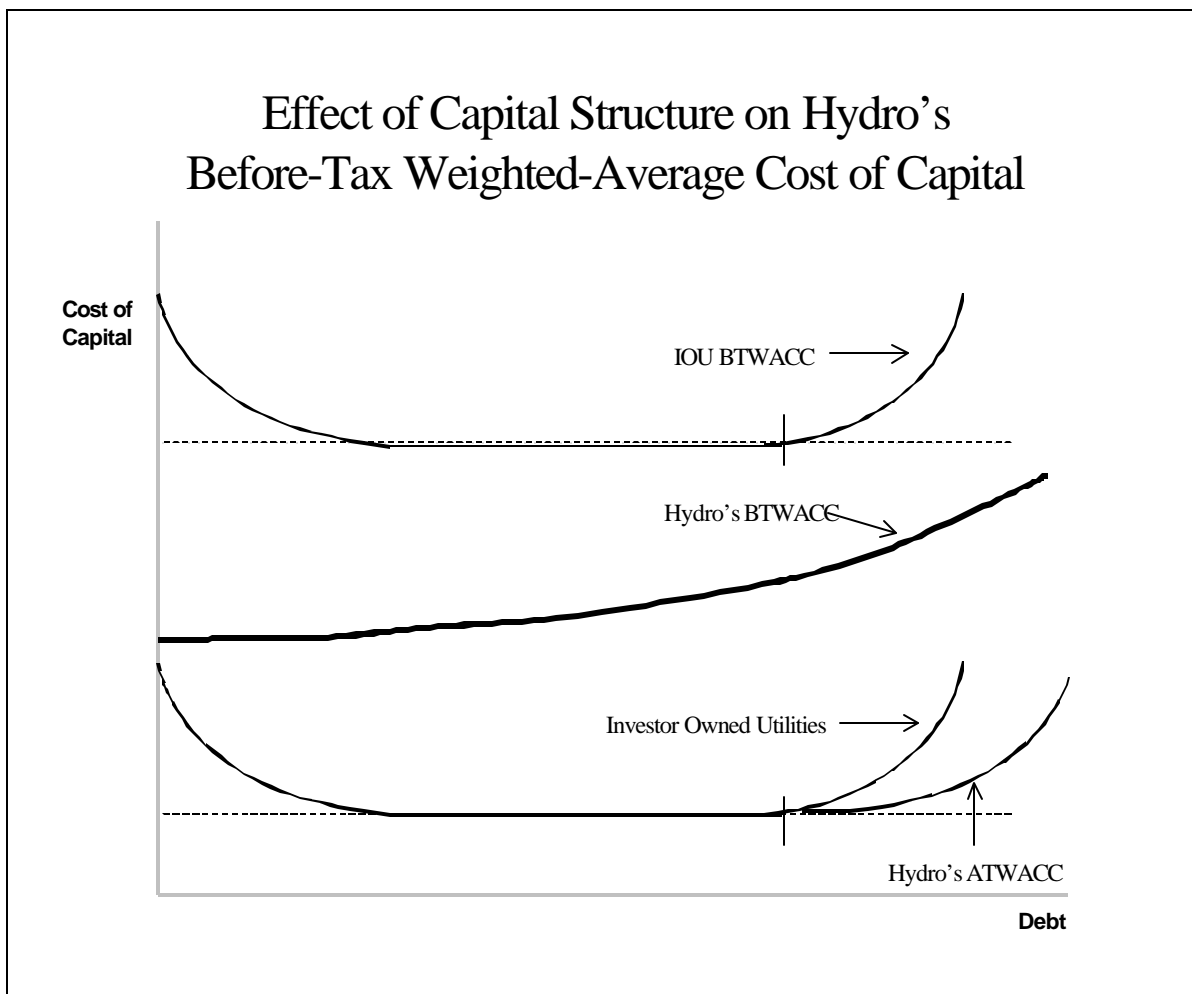


Figure 3

1

2 **Q37. Does this mean that Hydro's capital charges in its revenue requirement increase as debt**  
3 **is added to the capital structure?**

4 A37. Yes. It may seem counter intuitive to believe that the revenue requirement increases by replacing  
5 "expensive" equity with "cheap" debt, but debt has no tax advantage for Hydro, whereas equity

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MICHAEL J. VILBERT

1 does. This advantage is more valuable when the Company has a large amount of equity in its  
2 capital structure. It makes sense for a Crown Corporation to use equity financing for which it has  
3 a comparative advantage as opposed to using debt financing for which it is at a comparative  
4 disadvantage with IOUs. As the Company increases its use of debt, it gradually loses its tax  
5 advantage over the IOUs. That is why Hydro's BTWACC gets closer to an IOU's BTWACC  
6 from below as the debt ratio increases.

7 Exhibit No. MJV-4 shows the decrease in the dollar amount of capital charges for Hydro  
8 as the amount of equity in the capital structure increases. For demonstration purposes, this exhibit  
9 again uses the ATWACC of 5.89 percent implied by Ms. McShane's recommendation and the  
10 forecast ratebase for Hydro. Assuming that an ATWACC of 5.89 percent is a correct estimate  
11 of the required overall return, it is important to note that the return on equity in Exhibit No. MJV-  
12 4 provides the appropriate risk-adjusted return for the financial leverage and the Company's  
13 overall business risk for each of the capital structures displayed.

14  
15 **Q38. If the ATWACC is constant, why does capital structure seem to matter in actual**  
16 **regulatory decisions for investor owned utilities?**

17 A38. There are two common reasons. First, witnesses may not give regulatory boards a clear record  
18 on just how fast the cost of equity changes with capital structure, leading to decisions that fail to  
19 recognize the fact. In the words of Professor Myers,<sup>16</sup>

---

<sup>16</sup> Stewart C. Myers, "Capital Structure and the Cost of Capital for Regulated Companies," prepared for  
(continued...)

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1           In my experience regulators pay capital structure both too much and too little  
2           attention. They pay too much attention to the overall financing mix and to  
3           financing tactics, and too little to the relationship between financial leverage and  
4           the cost of equity capital. A fixed overall cost of capital means that the cost of  
5           *equity* and the fair rate of return to equity increase with the debt-to-equity ratio.  
6           Therefore, differences in leverage have to be accounted for when estimating  
7           equity costs or comparing equity returns. Rates charged customers depend on  
8           the *overall* cost of capital which does not change materially as capital structure  
9           shifts. A company that attempts to lower its overall cost of capital by using more  
10          “low-cost” debt will increase the financial risk borne by stockholders and drive  
11          up the cost of equity. This is not just theory. It is consistent with how  
12          unregulated companies actually behave.... Regulators should be...relaxed about  
13          debt ratios, provided they are in a reasonable range, and focus their efforts  
14          elsewhere. (Emphases in the original.)  
15

16          Second, these principles refer to current, market costs of capital, calculated at current market  
17          capital structures.<sup>17</sup> Ratemaking typically focuses on embedded rather than current market  
18          interest rates. To accommodate that difference, simply adjust the revenue requirement by an  
19          amount equal to the difference between the company’s embedded interest expense and what that  
20          interest expense would be after-tax at current market interest rates. Appendix B shows how this  
21          should be done.

22  
23      **Q39. Are you aware of any regulatory bodies that have adopted the ATWACC approach to**  
24      **setting an allowed rate of return?**

25      A39. Yes. The AEUB has taken a significant “official” step in this direction, at least, and there are

---

<sup>16</sup> (...continued)  
The New York Energy Utilities Collaborative, December 4, 1992, pages 1-2.

<sup>17</sup> See, for example, Brealey and Myers, *op. cit.*, at 543-546.

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1 other cases in which the principles are in use in the proceedings but which have not been officially  
2 adopted by regulators. In its adoption of the principle of the ATWACC, the AEUB decided to  
3 calculate the ATWACC based upon book value instead of market value weights. This is  
4 economically incorrect. The reason for the AEUB's decision and the explanation of their error  
5 in application is discussed more fully in Appendix B, Section IV.

6  
7 **Q40. Why use the market-value capital structure to calculate the ATWACC for companies**  
8 **regulated on a book-value rate base?**

9 A40. Use of book value weights would be economically incorrect. The cost of capital is determined  
10 in the market for regulated and unregulated firms alike. Shareholders of regulated companies will  
11 be unhappy if the market value of their shares falls, even if the book value is constant. They will  
12 be indifferent to a fall in book value as long as the market value is unaffected. In this they are no  
13 different from any other group of shareholders.

14  
15 **Q41. Is use of market-value weights to calculate ATWACC for rate-regulated companies**  
16 **circular, or does it lock in an excessive return?**

17 A41. No, to both questions. The true beta depends on the market value of the firm's leverage, again  
18 for regulated firms just as much as for unregulated firms. That means the measured beta of a  
19 sample will be lower when its market-to-book ratio is above one than when its market-to-book  
20 ratio equals one, all else equal. (Of course, in practice all else is almost never equal.) The result  
21 is that the ATWACC using market-value weights is the best estimate of the true ATWACC of

WRITTEN EVIDENCE OF  
MICHAEL J. VILBERT

1 the regulated company, regardless of whether the regulated company's market-to-book ratio is  
2 above or below one. With a market-to-book ratio over one, use of book-value weights can lead  
3 to a potentially serious underestimate of the company's true cost of capital.

4 Brealey and Myers, *op. cit.*, makes the same point. For example, at p. 551 the authors  
5 caution, "You cannot increase the debt ratio without creating financial risk for stockholders and  
6 thereby increasing  $r_E$ , the expected rate of return they demand from the firm's common stock."  
7 Which debt ratio do they mean? At pages 543-544 they give an example to show how to  
8 calculate the ATWACC. They provide the book- and market-value balance sheets and do the  
9 calculation using the market values. Then they say at page 544,

10 Why did we show the book-value balance sheet? Only so you could draw a big X  
11 through it. Do so now. When estimating the weighted-average cost of capital, you are  
12 not interested in past investments but in current values and expectations for the future.  
13 [The example company]'s true debt ratio is not 50 percent, the book ratio, but 40  
14 percent, because its assets are worth \$125 million [versus a book \$100 million]. The  
15 cost of equity ... is the expected rate of return from purchase from stock at \$7.50 per  
16 share [the market value]. You can't buy shares in [the company] for \$5 [the book value]  
17 anymore.  
18

19 Professors Brealey and Myers are very familiar with the institutions of ratemaking. If an  
20 exception were needed to a point they make this dramatically, to say that book values should be  
21 used instead of market values to calculate ATWACC for companies regulated on book value,  
22 it would have been discovered and included by the sixth edition of the textbook. No such  
23 exception is included because none is warranted. ATWACC for *all* companies should be  
24 calculated with market-value weights.

25 Appendix B explores issues raised by the AEUB decision in additional depth.



WRITTEN EVIDENCE OF  
MICHAEL J. VILBERT

1           **6. Recommendation**

2  
3   **Q42. How do you recommend the Board make use of the foregoing information?**

4   A42. In my view, the Board should at least make explicit use of the constancy of the after-tax  
5       weighted-average cost of capital over a broad middle range of capital structures in order to  
6       determine the appropriate return on equity. This will improve the likelihood of accurately  
7       estimating the cost of equity that goes with a given capital structure.

8           Going further and relying primarily on ATWACC to set the rate of return would simplify  
9       the future regulatory process, since the cost of equity implicit in a given after-tax weighted-  
10      average cost of capital is automatically consistent with whatever capital structure is used to  
11      calculate it. This will take debates over imputed capital structure out of the regulatory process  
12      such as Ms. McShane’s concern that “ratepayers will effectively be asked to pay for a return on  
13      equity which does not exist,”<sup>18</sup> or conversely that they not pay for equity that has been added  
14      since the last rate case.

15           Once a focus on the overall cost of capital is adopted, the analysis can stop with the  
16      average value for a comparable-risk sample, without trying to determine the “right” capital  
17      structure and the precise value of the cost of equity that goes with it. It also prevents some  
18      common mistakes, such as the failure to consider differences among the sample companies’  
19      capital structures or between the sample’s average capital structure and the one used for

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<sup>18</sup> See, Ms. McShane’s evidence, p. 25.

WRITTEN EVIDENCE OF  
MICHAEL J. VILBERT

1 ratemaking. Of course, the capital charges must still be adjusted for the difference between the  
2 embedded cost of debt and the after-tax market cost of debt, as described in Section IV.

3  
4 **Q43. Please summarize the difference between your second recommendation and the**  
5 **traditional approach.**

6 A43. The traditional approach views the estimation of the cost of equity and adoption of an approved  
7 capital structure as largely independent topics. But the above discussion shows the two are  
8 heavily interrelated, since a major determinant of the cost of equity in the sample companies is the  
9 degree of financial risk associated with the particular level of debt each company has. Analyzing  
10 the ATWACCs of the various sample companies automatically takes this into account. Once the  
11 market ATWACC for the line of business in question has been determined, the steps necessary  
12 to reflect the difference between the market and embedded cost of debt and to adjust for taxes  
13 are readily implemented. Appendix B contains an extended discussion relating ATWACC-based  
14 regulation to the traditional approach.

15  
16 **Q44. But has not a decision on the right capital structure been an integral part of the**  
17 **regulatory process to this point?**

18 A44. Yes, my understanding is that it has. But it appears to me that regulatory boards in Canada may  
19 have used regulatory determinations of capital structure with a constant cost of equity as a means  
20 to arrive at the right overall return. I strongly endorse the idea that the goal should be the right  
21 overall return, but I recommend a more explicit analysis of the interaction between capital

WRITTEN EVIDENCE OF  
MICHAEL J. VILBERT

1 structure and cost of equity. For example, the impact of a given percentage change in the equity  
2 ratio differs materially as the equity ratio increases. As shown in Table 1 and Figure 2, the risk  
3 of common equity goes up a lot more in going from a 50 percent to a 75 percent debt ratio (i.e.,  
4 from 50 percent to 25 percent equity) than in going from a 0 percent to a 25 percent debt ratio  
5 (i.e., from 100 percent to 75 percent equity). A direct focus on ATWACC avoids this problem  
6 entirely.

7 Adoption of this recommendation carries other benefits as well. Given the absence of  
8 pure plays and the changes in the economic environment Hydro faces, it is likely that cost of  
9 capital experts will have to rely on several (imperfect) benchmark samples for some time. But  
10 these benchmark sample groups will reflect a variety of corporate forms and regulatory mandates.  
11 If the Board does not rely on ATWACC to insure an automatically consistent interpretation of  
12 the cost of equity and capital structure evidence from the varying sample groups, it will be hard  
13 to identify the underlying business risk differences of the various groups, and debates on the right  
14 combination of capital structure and cost of capital are likely to get more contentious. All of this  
15 extra debate (and the associated expenditure of resources) is economically unnecessary and can  
16 be avoided by adoption of the after-tax weighted-average cost of capital as a regulatory  
17 standard.

18 In short, the ATWACC approach is more in accord with the modern understanding of  
19 how capital markets work, reduces the chance of mistakes, and saves regulatory resources.

20

WRITTEN EVIDENCE OF  
MICHAEL J. VILBERT

1 **IV. HYDRO'S COST OF CAPITAL**

2

3 **Q45. How is the section of the evidence organized?**

4 A45. It begins with a discussion of how to translate the after-tax weighted-average cost of capital  
5 results into a cost of equity for regulatory comparisons. It then discusses Ms. McShane's  
6 recommendation to add 50 basis points to the cost of equity for "financing flexibility," and finally,  
7 it summarizes my conclusions.

8

9 **A. CALCULATIONS FOR REGULATORY USE**

10

11 **Q46. How do you translate the after-tax weighted-average cost of capital results into a cost**  
12 **of equity for regulatory comparisons?**

13 A46. Once an estimate of the overall after-tax weighted-average cost of capital of say, X%, has been  
14 determined by the Board, Hydro's capital structure is used to compute the corresponding return  
15 on equity. The estimated ATWACC is illustrated in Exhibit No. MJV-1 for various  
16 recommendations of Ms. McShane.<sup>19</sup> Exhibit No. MJV-2 shows how the cost of equity changes  
17 with the level of equity for a constant ATWACC.

18 Determining the capital charges for Hydro will require three steps. First, estimate the

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<sup>19</sup> I believe it is only possible to estimate the overall cost of capital to the nearest ¼ percentage point. However, given such an estimate, I do think it makes sense to calculate regulatory values to implement a finding to as many decimal places as regulators require.

WRITTEN EVIDENCE OF  
MICHAEL J. VILBERT

1       ATWACC of comparable risk companies, using standard cost of capital estimation techniques  
2       such as the risk premium method or the discounted cash flow method. Second, calculate the  
3       required return on equity for Hydro's capital structure and after-tax market cost of debt that  
4       yields the ATWACC from the first step. Third, determine the capital charges for Hydro as the  
5       return on equity times the equity percentage of the rate base plus the embedded cost of debt  
6       times the debt percentage of the rate base. Note that in step three, the embedded costs of debt  
7       are recovered whereas in step two, the market cost of debt is used with the market determined  
8       ATWACC from step one to determine the market cost of equity for Hydro at the regulatory  
9       capital structure.

10               Exhibit No. MJV-5 illustrates these calculations, again using the ATWACC derived from  
11       Ms. McShane's recommendations. The calculation starts with the ATWACC and adjusts it for  
12       the difference in embedded cost of debt and the after-tax market costs of debt. Recall that the  
13       ATWACC is estimated using the market costs of debt and equity, but regulatory procedures  
14       allow recovery of the embedded cost of debt. In this case, Hydro's current embedded cost of  
15       debt of 8.35 percent is approximately equal to its market cost of debt plus the guarantee fee,<sup>20</sup>  
16       but this is often not the case. The adjustment factor recognizes that the ATWACC is based upon  
17       the after-tax cost of debt whereas the capital charges for Hydro must recover the pretax cost  
18       Hydro's debt. This adjustment is calculated as the debt percentage times the difference in the  
19       embedded cost of debt and the after-tax market cost of debt. Note that even though the

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<sup>20</sup> Hydro's market cost of debt consists of the sum of the current yield on BBB rated bonds and the guarantee fee paid to the Provincial Government.

WRITTEN EVIDENCE OF  
MICHAEL J. VILBERT

1 embedded cost of debt before tax is equal to the market cost of debt, the adjustment is based  
2 upon the difference in the embedded (pre-tax) cost of debt and the after-tax market cost of debt.  
3 The result of 8.66 percent is the same as the 8.66 percent BTWACC in row one of Exhibit No.  
4 MJV-4, but this is based upon Ms. McShane's recommendation of an 11.25 percent return on  
5 equity, not the requested three percent return. The BTWACC corresponding to the 3 percent  
6 requested by the company is 7.40 percent. This adjustment procedure would generate the  
7 correct BTWACC for any capital structure selected from Exhibit No. MJV-4, as well as for any  
8 ATWACC the Board determined to be correct for Hydro.

9  
10 **B. OTHER COMMENTS**

11  
12 **Q47. Ms. McShane recommends a 50 basis point addition to the return on equity for what she**  
13 **calls "financing flexibility."<sup>21</sup> Do you agree with the need for such an addition to the**  
14 **recommended return on equity?**

15 A47. Not in this case. I agree that the direct costs of issuing new equity should be recovered from  
16 ratepayers just as they are for debt issuance costs. However, as Ms. McShane notes, Hydro is  
17 a Crown Corporation and does not raise capital in public equity markets, so it will have no equity  
18 issuance costs.

19  

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<sup>21</sup> See McShane, pp. 42-44,

WRITTEN EVIDENCE OF  
MICHAEL J. VILBERT

1 **Q48. What about Ms. McShane’s other arguments for the need for financing flexibility such**  
2 **as the need for a margin for unanticipated capital market conditions and what she calls**  
3 **the “fairness” principle? Do they justify the 50 basis point addition?**

4 A48. No. Hydro will not be issuing equity so unanticipated market conditions will not be a factor. As  
5 I understand her evidence, the fairness principle that Ms. McShane has in mind is one that says  
6 that regulators should not target a market value to book value ratio for the companies they  
7 regulation. I agree. To guard against the potential circularity of regulating on the basis of a target  
8 market to book value, she properly estimates the cost of capital based upon market value  
9 information. Finally, she mentions the importance of the financing flexibility adjustment because  
10 the recommended return on equity will be applied to a book value rate base. This is true, but  
11 insuring the consistency between the return on equity and the capital structure is at the heart of  
12 the ATWACC method. None of her reasons justifies the adding 50 basis points to the estimated  
13 cost of equity.

14

15 **Q49. Above you mention that the ATWACC method addresses Ms. McShane’s concern**  
16 **about applying a return on equity estimated on market value information to a book value**  
17 **ratebase. Please explain how the ATWACC method does this.**

18 A49. The cost of equity estimated for each of the sample companies is a function of the company’s  
19 business risk and its financial risk. Sample companies are generally selected so that they have  
20 approximately the same business risk, but they often have very different market value capital  
21 structures. The ATWACC method estimates the overall cost of capital, which takes into

WRITTEN EVIDENCE OF  
MICHAEL J. VILBERT

1 consideration both the business risk and the financial risk of the sample companies. Once the  
2 appropriate ATWACC for the target company is determined, applying it to the company's book  
3 value capital structure insures that the return on equity is consistent with the degree of financial  
4 leverage of the book value capital structure.

5  
6 **Q50. Do you have any other comments on Ms. McShane's Evidence?**

7 A50. Yes. The calculation of interest coverage ratio on page 54 appears to be inconsistent with the  
8 expectation that Hydro would be able to issue debt without the debt guarantee at a capital  
9 structure with 40 percent equity. Specifically, she includes the debt guarantee premium in the  
10 Hydro's embedded cost of debt in her example, but her evidence suggests that Hydro would  
11 have no need for a debt guarantee at a 40 percent equity ratio. One reason to increase the equity  
12 in the capital structure was to allow Hydro to achieve an investment grade bond rating on a stand-  
13 alone basis. Without the debt guarantee premium, the interest coverage would be higher than she  
14 calculates. The coverage ratio would be about 1.88 which is substantially higher than the 1.58  
15 average for Government owned group of electric companies.

16  
17 **C. CONCLUSIONS**

18  
19 **Q51. Please summarize your conclusions.**

20 A51. My evidence reaches the following conclusions:

21 1) As the capital structure of Hydro changes over time, it is important to adjust the return on



WRITTEN EVIDENCE OF  
MICHAEL J. VILBERT

1 equity as well. It is a mistake to fail to recognize the changes in financial risk from changes in  
2 capital structure. This error is apparent in the filings of the company and in Ms. McShane's  
3 evidence as demonstrated in Exhibit No. MJV-1.

4 2) The relevant benchmark after-tax weighted-average cost of capital for Hydro is constant, but  
5 Hydro's before-tax weighted-average cost of capital is not. (See Exhibit No. MJV-3)  
6 Specifically, Hydro's capital charges in its revenue requirement will decrease with the addition  
7 of equity to the capital structure (See Exhibit No. MJV-4) if the decrease in financial risk is  
8 properly recognized. (See Exhibit No. MJV-2)

9 3) The adjustment to the estimated ATWACC for the recovery of the embedded cost of debt  
10 can be calculated simply in order to determine the revenue requirement for Hydro. The  
11 adjustment is the difference between the embedded cost of debt and the after-tax market cost  
12 of debt times the debt percentage of the capital structure, as demonstrated in Exhibit No. MJV-5.

13  
14 4) Once the appropriate BTWACC has been determined, the capital charges in the revenue  
15 requirement can be calculated by multiplying the BTWACC times the ratebase.

16  
17 **Q52. Does this conclude your evidence?**

18 A52. Yes, it does.