April 24, 2008

BY EMAIL & BY COURIER

Ms. Kirsten Walli
Board Secretary
Ontario Energy Board
2300 Yonge St, Suite 2701
Toronto ON M4P 1E4

Ms. Walli:

Board File No. EB-2007-0905
Payment Amounts for Ontario Power Generation Inc.'s Prescribed Facilities
Evidence of Energy Probe – Exhibit M Tab 6

Attached please find two hard copies of the Evidence of Energy Probe Research Foundation (Energy Probe) in response to Procedural Order No. 2, issued March 20, 2008. An electronic version of this communication will be forwarded in PDF format.

Should you require additional information, please do not hesitate to contact me.

Yours truly,

David S. MacIntosh
Case Manager

cc. Barbara Reuber, Ontario Power Generation Inc. (By email)
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Energy Probe Research Foundation

Evidence for EB-2007-0905

ONTARIO POWER GENERATION INC.

Payment Amounts for Prescribed Facilities

EXHIBIT M TAB 6

Authored by

LAWRENCE P. SCHWARTZ PH.D

April 24, 2008

For

ENERGY PROBE RESEARCH FOUNDATION
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TORONTO, ONTARIO, M5S 2M6

EB-2007-0905

Exhibit M Tab 6

Ontario Power Generation Inc.

Payment Amounts for Prescribed Facilities

Evidence of Energy Probe Research Foundation

[1] My name is Lawrence Schwartz. I am an economist and consultant in matters of competition policy and regulation. I also teach finance at the Schulich School of Business, York University in Toronto on a part-time basis. Formerly a full-time Member of the federal Competition Tribunal, my professional experience also includes several years in corporate finance transactions with a major Canadian chartered bank and investment dealer. My curriculum vitae is attached.

[2] I have been asked by Energy Probe Research Foundation, an intervenor in this proceeding, to review and comment on the cost of capital and capital structure proposed by Ontario Power Generation ("OPG") in its Prefiled Evidence regarding Payment Amounts for OPG's Prescribed Facilities dated March 14, 2008 (the "Prefiled Evidence"). I have also been asked to review and comment on the Opinion on Capital Structure and Fair Return on Equity prepared for OPG by Kathleen C. McShane, Foster Associates, Inc. dated November 2007 (the "OPG Expert Opinion"). I have also been asked to provide my opinion on the appropriate cost of capital and capital structure for the Prescribed Facilities.

[3] I understand that the Prescribed Facilities and the payments to OPG thereon are to be established by the Ontario Energy Board (the "Board") as of April 1, 2008 and that the Prescribed Facilities are wholly-owned by OPG which has other assets and businesses that are not regulated by the Board.

Summary of OPG's Request for Payments

[4] According to the Prefiled Evidence[1], OPG is requesting approvals for, inter alia,

a. A revenue requirement (before potential mitigation) of $1,283 million for the regulated hydroelectric facilities and $5,152 million for the nuclear facilities for the period of April 1, 2008 through December 31, 2009 (the "test period")
b. A rate base forecast of $3,886 million and $3,870 million for the regulated hydroelectric facilities for the calendar years 2008 and 2009 respectively and $3,515 million and $3,484 million for the nuclear facilities for the calendar years 2008 and 2009 respectively
c. A deemed capital structure of 42.5 percent debt and 57.5 percent equity and a combined rate of return on rate base of 8.48 percent and 8.56 percent for 2008 and 2009 respectively, including a rate of return on equity ("ROE") of 10.5 percent.

[5] On OPG's forecasts of the rate base for 2008 (9-month) and 2009, the Prescribed Facilities would be deemed to have capital structures and costs thereon as follows:

Table 1: Summary of OPG Requested Cost of Capital

	2008 (9 months)		2009	
	Capital Structure	Cost of Capital	Capital Structure	Cost of Capital
	($millions)		($millions)	
Short-term debt	$189.3	$11.0	$189.3	$11.3
Long-term debt	$2,951.1	$124.6	$2,936.0	$173.8
Total debt	$3,140.4	$135.6	$3,125.3	$185.1
Equity	$4,248.9	$334.6 *	$4,228.4	$444.0 *
Total	$7,389.3	$470.2	$7,353.7	$629.1

* Cost of equity = 10.5% x 57.5% x Rate Base (2008 pro-rated)
Source: Ex.K1-T1-S1-Tables 1,2

[6] Based on its requested capital structure and ROE, OPG is requesting payments that cover its aggregate capital costs of $1,099.3 million for the test period.

[1] Ex. A1-T2-S2, pp.1-2

Summary of My Opinion and Recommendations

[7] On the basis of my review of the Prefiled Evidence and the OPG Expert Opinion, my principal findings and conclusions are as follows:

a. If the Prescribed Facilities are to maintain a certain capital structure over the test period then, to give effect to the stand-alone principle and to facilitate regulatory oversight, the Prescribed Facilities should be transferred to a wholly-owned subsidiary of OPG.

b. Combining information on cash flows and the costs of debt provided in the Prefiled Evidence with the ROE and capital structure proposed in the OPG Expert Opinion, the discounted present value of the Prescribed Facilities is approximately $5,461.7 million at the beginning of the test period. This is approximately 74 percent of OPG's estimate of the rate base for 2008.

c. While conventional finance theory can help regulators to identify the relevant issues and provide guidance in determining the proper ROE and capital structure, the various objectives of the Ontario Government as sole shareholder should also be considered. The equity-oriented capital structure recommended in the OPG Expert Opinion introduces agency costs that could be reduced by substituting additional debt for equity; a debt-oriented capital structure of 55 percent debt and 45 percent equity is preferred to the equity-oriented capital structure recommended in the OPG Expert Opinion.

d. In considering the capital structure, the Board should treat the implicit support of the Ontario Government for the debt of the Prescribed Facilities as a form of unmeasured equity that further reduces the need to adopt an equity-oriented capital structure.

e. The recommended 10.5 percent ROE is too high and should not be approved; based on the risk premium approach, the ROE is 7.64 percent.

f. The various reasons given in the OPG Expert Opinion for adding 50 basis points to the ROE for "financial flexibility" are unconvincing. Moreover, increasing the ROE in this way reduces the discounted present value of the

Prescribed Facilities even further below the book value of the rate base. Using an ROE of 7.64 percent and a capital structure of 42.5 percent debt and 57.5 percent equity values the Prescribed Facilities at approximately $7,364.0 million, which is approximately 99.5 percent of OPG's estimate of the rate base for 2008.

g. If, as the OPG Expert Opinion suggests, it is a goal of public utility regulation to allow the market value of the Prescribed Assets to exceed the book value of the rate base, a capital structure of 45 percent equity and 55 percent debt together with an ROE of 7.64 percent will produce an estimated market value of approximately $7,726.3 million, about 104 percent of the rate base in 2008. Substituting even more debt for equity would increase this premium.

<u>"Deemed Capital Structure" and the "Stand-Alone" Principle</u>

[8] OPG suggests that a cost of capital and capital structure be established for the Prescribed Facilities on a "stand-alone" basis, but it does not propose that the capital structure associated with those assets be segregated from the capital structure of OPG's other businesses. In OPG's view, the principal issue concerns cross-subsidy, which it avoids through its cost allocation procedures. In response to Energy Probe Interrogatory #20, OPG indicates that separate financial accounts for the Prescribed Facilities would not be required:

> Since April 1, 2005, OPG has taken several steps to separate the operational and financial reporting on its regulated and unregulated operations. This includes dedication of certain support groups to specific business units, separate tracking and reporting of costs and assets, preparing audited financial results for the regulated and unregulated business segments, and separating reporting relationships within the Hydroelectric business unit which has both regulated and unregulated plants. OPG has also adopted a comprehensive cost allocation methodology which was reviewed and endorsed by independent cost allocation experts, R.J. Rudden. R.J. Rudden found that the methodology used by OPG to distribute the corporate and centrally-held costs separates the costs between regulated and unregulated business units meets best practices and is consistent with cost allocation precedents established by the OEB. These changes were implemented in order to ensure there is no

> cross-subsidization. Given these steps, separate financial accounts are not necessary. [Ex. L-T6-S20, pp.1-2]

[9] The OPG 2007 Financial Results [Ex.A2-T1-S1, Appendix A] provides financial and operating information on OPG's regulated and non-regulated business segments. Presumably this information is retained in accounts that form the basis for the audited financial results referred to in OPG's response to the interrogatory. Indeed, it is not clear how OPG can report separate audited financial results for its regulated and unregulated business segments without keeping separate financial accounts for the former. In this respect, OPG's statement that separate financial accounts are not necessary appears at variance with its practice.

[10] It appears that the "deemed capital structure" for the Prescribed Facilities has no on-going significance for the operation and financing of those assets. Apparently, once the appropriate payments are approved, there would be no need to separate OPG's capital structure from that of the Prescribed Facilities and no need to maintain the deemed capital structure.

[11] The OPG Expert Opinion offers a different perspective. It addresses the need to maintain the approved capital structure of a regulated utility through dividend policy:

> The selection of the appropriate deemed capital structure for regulated operations is based in large part on an assessment of the stand-alone business risks of those operations and on the resulting stand-alone financial metrics for those operations. The latter is to ensure that the regulated operations could, on a stand-alone basis, access the capital markets on reasonable terms and conditions without being subsidized by the unregulated operations.
>
> If the deemed capital structure is to be in place for multiple years without review, e.g., during a PBR term, the proposed deemed ratio should be sustainable over that period. This is not usually an issue for an investor-owned utility that can seek equity infusions from its parent during that period to maintain the actual equity ratio close to the deemed level, but may be an issue for a publicly-owned utility facing material capital expenditures but access to equity only through management of dividend payments. [Ex. C2-T1-S1, pp.121-122]

[12] Energy Probe Interrogatory #19 pursued this issue:

> b) Suppose, in order to maintain the approved debt/equity ratio for the Prescribed Facilities, OPG paid a dividend. Apart from the reporting on OPG's financial statement, how would this dividend affect the activities and financial condition of the Prescribed Facilities? [Ex.L-T6-S19, p.1]

OPG's response makes it clear that maintenance of the approved capital structure for the Prescribed Facilities is not required:

> b) OPG's proposed revenue requirement is based on a deemed capital structure; therefore the debt equity ratio for the prescribed facilities would not change as a result of paying a dividend. Payment of the dividend to "maintain the approved debt/equity ratio" would result in the replacement of the "other long-term debt provision in OPG's proposed capital structure with new long-term debt. The cost of that debt would be forecast to be the same; therefore the activities and financial condition of the prescribed facilities would be unaffected. [Ex.L-T6-S19, p.2]

[13] The OPG Expert Opinion also notes that implementing a deemed capital structure requires matching the rate base and the capital structure. Where the rate base and capital structure are different, it would be necessary to "plug" the difference by adding either debt or "notional investments" to the accounts of the regulated business [Ex. C2-T1-S1, p.123]. Thus, the accounts of the Prescribed Facilities would contain items that are irrelevant to its operations yet would be included in the rate base and/or capital structure.[2]

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[2] As part of this discussion, the OPG Expert Opinion also states:

> "The use of a deemed capital structure requires matching the capital structure to the rate base. The rate base, in principle, in its entirety is intended to be a representation of the amount of investor-supplied capital required to provide utility service. Ratepayer provided funds that are used to finance utility assets represent no cost capital. No cost capital (e.g., deferred taxes) should be deducted from rate base (or included in capital structure at a 0 percent cost rate). [Ex. C2-T1-S1, p.123]

I am unclear as to what is meant by "ratepayer provided funds that are used to finance utility assets" as ratepayers pay for service. I disagree with the statement that deferred taxes are "no cost" capital; they are a form of equity and financial analysts generally include such in equity when computing debt/equity ratios. The relevant cost is the cost of equity.

[14] If a deemed capital structure is adopted solely for the purpose of establishing the requested initial payments, and if any subsequent change in the capital structure of the Prescribed Facilities is of no regulatory concern, then there will be no need for OPG to maintain that capital structure, and the "notional investments" and the "plug" are not problematic. However, if the on-going capital structure of the Prescribed Facilities is itself an objective of regulation, these distortions make it difficult for the regulator to determine whether the approved capital structure that is appropriate for those assets is being maintained.

[15] It is not entirely clear that OPG and the OPG Expert Opinion endorse the stand-alone principle. This principle would suggest that the Prescribed Facilities should be financed on terms and conditions established in financial markets, even if OPG could finance those assets on more favourable terms. However, in response to Energy Probe Interrogatory #21, OPG's complete response is:

> In principle, they should be financed on terms and conditions that are appropriate to those assets. When OPG borrows through OEFC, the terms and conditions for long term debt issues are established on a similar basis to those OPG would most likely be able to obtain in the public markets, other than the 10 year maximum term of the debt under the agreements with the OEFC. [Ex.L-T6-S21, p.1]

The OPG response is vague but appears to suggest that the Prescribed Facilities should be financed on terms and conditions available to OPG rather than on a stand-alone basis.

[16] If OPG can finance the Prescribed Facilities on more favourable terms than those assets could achieve in financial markets on a stand-alone basis, then it is subsidizing the financing of those assets. Alternately, if the Prescribed Facilities could be financed on a stand-alone basis on more favourable terms than OPG could obtain for those assets when commingled with its other assets and businesses, then the Prescribed Facilities are subsidizing the financing of OPG.

[17] For the reasons given in the OPG Expert Opinion, it is important for the Prescribed Facilities to be managed on a stand-alone basis, neither subsidizing the unregulated businesses of OPG nor being subsidized by them. In addition, if regulation requires the maintenance of the approved capital structure throughout the test period and if, more generally, regulation is concerned with all aspects of the regulated activities, it may be desirable for regulatory purposes that OPG transfer the Prescribed Facilities to a wholly-owned subsidiary on the basis of a valuation of those assets at an approved capital cost and capital structure. That subsidiary would borrow the amount sufficient to establish the approved capital structure and would use the funds to acquire the Prescribed Facilities from OPG at the value established for regulatory purposes. The balance of the funds required to complete the asset acquisition would come either from OPG's direct investment in the common shares of the subsidiary or its deemed investment therein. In either case, the subsidiary's initial capital structure would equal the capital structure approved by the regulator. The subsidiary would maintain the approved capital structure through its dividend policy.

[18] It appears that OPG does conduct certain business operations through subsidiaries, although these appear to be joint ventures [Ex.L-T6-S19, p.1]. Such arrangements are common in commercial corporate structures generally. In the electricity sector, it is worth noting that Nova Scotia Power Inc. is a wholly-owned subsidiary of Emera Inc., an investor-owned energy and services company. Nova Scotia Power is a fully-integrated electric utility providing generation, electric utility operating in a traditional regulated environment. The company supplies over 95 percent of the generation, transmission and distribution of electrical power to 478,000 customers in Nova Scotia. According to Emera's website,

> Nova Scotia Power is the financial foundation for Emera, providing solid earnings and substantial cash flows that fund dividends and growth investments. [http://www.emera.com/aboutus/companies_nspi.shtml]

<u>Valuation for Regulatory Purposes</u>

[19] The market value of an asset is established directly on the basis of trading in fair and open markets among arms' length participants. Asset values produced in such trading reflect the estimates of buyers' and sellers' expectations for future income from those assets. When assets are not traded, their fair market value can be estimated by discounting their expected future cash flows at the rate of return that assets of similar risk are expected to generate.

[20] Regulated public utilities are subject to rate-of-return regulation according to which investors are allowed, but not guaranteed, returns that are fair and reasonable and allow the utility to continue to finance in the capital market. Accordingly, the cash flow produced by the assets of a regulated utility depends on the cost of capital and capital structure approved by the regulator. The value of those assets for regulatory purposes is established by discounting the cash flows at the approved cost of capital and capital structure. The information on cash flows associated with the Prescribed Facilities provided in the Prefiled Evidence and the OPG Expert Opinion regarding cost of capital and capital structure permit an initial assessment of the value of those assets for regulatory purposes.

<u>Cash Flow from Assets</u>

[21] The relevant cash flows are the cash flows available to the debt and equity investors, referred to as "cash flow from assets"[3]. These consist of cash flows from operations, capital expenditure and changes in net working capital. The basic identity is that cash flow from assets equals the cash flows received by investors.[4]

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[3] The approach to analyzing cash flow follows Ross,S. et al., Fundamentals of Corporate Finance, 5th Canadian Edition, McGraw-Hill Ryerson, 2005, chapter 2,pp.31-35, and chapter 10. (hereinafter, "Ross et al.")

[4] While the general expectation is that cash flow from assets is positive, it need not be so; the firm might well access funds through capital markets. Thus, when cash flow from assets is negative, cash flows to

[22] Information on cash flow from assets of the Prescribed Facilities for the test period is found at various parts of the Prefiled Evidence:

a. *Cash flow from operations* of the Prescribed Facilities consists of earnings before interest and taxes ("EBIT") and the non-cash expenses in the test period and can be determined from the information found in OPG's Summary of Revenue Requirement. The only non-cash expense indicated therein is Depreciation and Amortization. The calculation of cash flow is as follows:

Table 2: Cash Flow from Operations

$millons	2008 (9 months)	2009	Test Period
Revenue Requirement	2753.6	3681.7	**6435.3**
Expenses			
OM&A	1,755.8	2,287.7	**4,043.5**
Fuel & GRC	305.6	448.2	**753.8**
Depreciation & Amort	324.6	452.5	**777.1**
Prop & Capital Taxes	22.9	30.7	**53.6**
Total Expenses	2,408.9	3,219.1	**5,628.0**
Other Revenues			
Bruce Lease	51.8	82.6	**134.4**
Other	73.8	84.0	**157.8**
Total Other Revenues	125.6	166.6	**292.2**
EBIT	470.3	629.2	**1099.5**
Income Tax	0.0	0.0	**0.0**
Cash flow from operations:			
EBIT	470.3	629.2	**1099.5**
add: Depreciation & Amort	324.6	452.5	**777.1**
	794.9	1081.7	**1876.6**

Source: Ex. K1-T1-S1, Tables 1,2

creditors and shareholders will also be negative, indicating that additional debt and/or shares have been issued to investors in amounts that exceed the interest and dividends paid to those investors.

Assuming OPG receives approval for its proposed revenue requirement, the test-period cash flow from operations is $1,876.6 million of which $777.1 million is from depreciation and amortization.[5]

b. *Capital expenditure* information for regulated hydroelectric and for nuclear is found in Ex. D of the Prefiled Evidence and, in response to Energy Probe Interrogatory #23, in Ex. L-T6-S23. In addition to the amounts shown there, it appears that $23.9 million of capital expenditure in respect of Prescribed Facilities by OPG's Corporate Groups ought to be included in the rate base.[6,7]. The budgeted capital expenditures in the test period are $1,064.5 million:

Table 3: Capital Expenditure

$millons	2008	2009	**TestPeriod**
Regulated Hydroelectric			
Niagara Plant	28.8	42.2	**71**
Niagara Tunnel	143.8	346.8	**490.6**
Other	2.0	6.6	**8.6**
Nuclear	139.5	330.9	**470.4**
Corporate Groups	14.0	9.9	**23.9**
Total Capital Expenditur	328.1	736.4	**1064.5**

Source: Ex.D1-T1-S1, Table 1; Ex.D2-T1-S1, Table 1
Ex. L-T6-S23, pp.2-3

Some of the nuclear-related capital expenditures in Ex. D2-T1-S1, Table 1 are subject to further approvals. For example, the expenditures of $153 million on Pickering B Refurbishment Project in 2009 depend on a decision of the OPG Board to proceed with one of the life extension options.

c. *Working capital* information is found in Ex. B of the Prefiled Evidence. OPG indicates that working capital levels are constant over the test period for regulated hydroelectric, while working capital in nuclear increases. These

[5] OPG has indicated that it will be updating its test-period revenue requirement to include $4.7 million arising from adding certain capital expenditures to the rate base that were erroneously excluded [Ex. L-T6-S17, p.2].
[6] See OPG response to Energy Probe Interrogatory #17 [Ex. L-T6-S17, pp.1-2]
[7] There is no indication how much of the 2008 amount is in the first quarter of 2008; accordingly, the entire amount has been allocated to the test period.

increases are financed from cash flow from operations or financial markets. As stated by OPG in response to Energy Probe Interrogatory #18, OPG has not adjusted the working capital component of the rate base for the removal of activity from January 1 through March 31, 2008[8]. On this basis, the change in working capital over the test period is $162.7 million:

Table 4: Changes in Working Capital

$millons	2008	2009	**TestPeriod**
Regulated Hydro	0.0	0.0	**0.0**
Nuclear	96.3	66.4	**162.7**
Total change	96.3	66.4	**162.7**

Source: Ex. B1-T1-S1, Tables 1,2

[23] On the basis of the above, the test-period cash flow from assets from the Prescribed Facilities is determined by deducting the cash required to fund capital expenditures and the changes in working capital from the cash provided by operations as follows:

Table 5: Cash Flow From Assets

$millons	2008	2009	**TestPeriod**
Operations	794.9	1,081.7	**1,876.6**
less: Change in working capital	-96.3	-66.4	**-162.7**
less: Capital expenditure	-326.1	-738.5	**-1,064.5**
Cash flow from assets	372.6	276.9	**649.4**

Thus, assuming OPG's requested revenue requirement is approved, the amount of $649.4 million is available to cover income taxes associated with the Prescribed Facilities and the costs of debt and equity capital provided by investors in the test period.

8 OPG response to Energy Probe Interrogatory #18 [Ex. L-T6-S18, p.1]

[24] The cash flow from assets is based on financial information that includes allocations of common costs that OPG has allocated to the Prescribed Facilities. OPG has determined these cost allocations by applying various allocation rules that have been reviewed by an independent expert and found to be reasonable. Nevertheless, all allocation rules are arbitrary in the sense that different rules that are equally reasonable can produce very different results. Considering that allocations of corporate and centrally-held costs in the Prefiled Evidence account for 10 percent-15 percent of the proposed revenue requirement[9], the rules of allocation that OPG has adopted clearly have a significant impact on that requirement. The determination of cash flow presented here assumes that any allocations of OPG corporate and centrally-held costs to the Prescribed Facilities are reasonable estimates of the costs that would be incurred if the same services were acquired externally.

[25] Note that even with the approved payments, $649.4 million cash flow from assets is approximately 59 percent of the aggregate payments OPG expects to make to investors in the test period.[10] This indicates that OPG will have to fund the balance of these payments through the issuance of securities in the capital market and/or reduce planned cash outlays.

<u>Test-Period Cost of Equity</u>

[26] The valuation of the Prescribed Facilities for regulatory purposes requires that the cash flow from assets be forecasted into the future and discounted to their present value at a cost of capital reflecting the approved capital structure and the approved component costs of debt and equity. The appropriate cost of capital will be the weighted average of those component costs with the weights thereon being the respective shares of debt and equity in the approved capital structure. The

[9] See OPG response to Energy Probe Interrogatory #16 [Ex. L-T6-S16, pp.1-2]
[10] The Prefiled Evidence indicates total payments to investors of $1,099.3 million in the test period. See para. 6, supra.

OPG Expert Opinion recommends a deemed capital structure consisting of 57.5 percent equity and 42.5 percent debt.

[27] As noted above, the OPG Expert Opinion recommends that the Board approve a 10.5 percent annual cost of equity. For the purposes of the initial valuation of the Prescribed Facilities' cash flow from assets, the recommended equity cost and capital structure are used.

[28] To compute the cost of capital for the Prescribed Facilities, the component capital costs must be expressed as a required return over the same time period as the cash flow from assets. For example, the OPG Expert Opinion on the cost of equity is 10.5 percent per annum, whereas the cash flows are determined over the 21-month test period. It is straightforward to convert a component annual cost to its test-period equivalent cost; the 10.5 percent per annum equity cost is equivalent to 19.092… percent for the test period.[11]

Test-Period Cost of Debt

[29] It is noteworthy that the OPG Expert Opinion recommends, and OPG accepts, that the Board approve a deemed capital structure for the Prescribed Facilities that reflects a "stand-alone" operation of those assets. This appears to mean that the component costs of debt and equity should reflect the yields required by the capital market only in respect of those assets, and not the yields required on OPG's outstanding or expected issues of securities. Accordingly, if, for any reason, OPG were able to borrow at lower yields, those yields would not necessarily be applicable to the debt associated with the Prescribed Facilities.

[30] The OPG Expert Opinion also states that a deemed capital structure should be adopted "because OPG has significant non-regulated operations whose business risks and cost of capital may be different from the risks and cost of capital of its regulated business" [Ex.C2-T1-S1, p.17].

[11] The calculation is: $1.105^{21/12} - 1 = 0.1909$ or 19.092.. percent

[31] In addition, it is important to determine the component cost of debt for the Prescribed Facilities on a market basis, rather than assume OPG's yields, to avoid a subsidy. This is in accordance with the OPG Expert Opinion that strongly recommends that cross-subsidies between OPG's regulated and non-regulated businesses be avoided [Ex.C2-T1-S1, p.52, 121-122].

[32] The OPG Expert Opinion makes no recommendation on the component cost of debt. However, the OPG Expert Opinion identifies 6 percent as the cost of long-term debt for an A-rated utility [Ex.C2-T1-S1, p.261, Schedule 31].

[33] In its Prefiled Evidence, OPG presents a variety of yields including yields on certain existing and planned long-term debt. The average unhedged interest rates on such debt outstanding in 2008 and 2009 are 5.65 percent and 6.47 percent respectively [Ex. C1-T2-S2, Tables 4b, 5b].

[34] The Prefiled Evidence also notes OPG's expectation that it will issue debt in 2008 and 2009 at a spread of 130 basis points over the 10-year Government of Canada bond yield as forecasted by Global Insight, an independent economic forecaster, in September 2007. On this basis, "OPG's forecast cost of long-term debt (prior to hedging) is between 5.48 percent and 6.58 percent for all project specific financing assigned to regulated operations, refinancing of new and maturing corporate issues, and other long-term debt provisions necessary to reconcile the debt component of OPG's regulated capital structure with the proposed rate base that the financing supports." [Ex. C1-T1-S2, p.4-5]

[35] The recommended 42.5 percent debt ratio includes both short-term and long-term debt. On this basis, OPG indicates a weighted cost of short-term and long-term debt of 5.76 percent for the 2008 calendar year [Ex. C1-T2-S1, Table 3]. Similarly, OPG indicates a weighted cost of debt of 5.92 percent for the calendar year 2009 [Ex. C1-T2-S1, Table 2].

[36] In order to rely on the information provided in the Prefiled Evidence and in the OPG Expert Opinion, the calculations below use the geometric average of OPG's indicated weighted-average costs of short- and long-term debt for 2008 and 2009, which equals 5.839.. percent.[12] Thus, the cost of debt for the Prescribed Facilities is 5.839.. percent per year over the test period. Expressed for test period as a whole, the equivalent cost of debt is 10.442.. percent.

Weighted Average Cost of Capital

[37] The Prefiled Evidence states that the combined rate of return (i.e. the weighted average cost of capital or "WACC") is 8.48 percent and 8.56 percent for 2008 and 2009 respectively, based on OPG's cost of debt for those years and the recommended cost of equity and capital structure in the OPG Expert Opinion[13]. The WACC, whether on an annual basis or on a test-period basis, is calculated in the same way and shown here (with rounding as shown), substituting the geometric average cost of debt:

Table 6: Cost of Capital (Nominal)

	Annual	Test Period
Tax rate	**0.00%**	0.00%
Cost of equity (nominal)	**10.50%**	19.092%
Equity share	**57.50%**	57.500%
Cost of debt (nominal)-pre-tax	**5.84%**	10.443%
Cost of debt (nominal)-after-tax	5.84%	10.443%
Debt share	42.50%	42.500%
WACC (nominal)	8.519%	15.416%

As indicated in the Prefiled Evidence, the Prescribed Facilities generate no income tax liabilities in the test period so that the pre-tax cost of debt equals the after-tax cost. Accordingly, the annual WACC is 8.519.. percent. When discounting test-period cash flow, the equivalent discount rate is 15.416.. percent.

[12] Determined as $(1.0576x1.0592)^{0.5} - 1 = 0.05839..$ or 5.839.. percent
[13] See para 4(c) supra.

[38] This WACC is a nominal discount rate in that the component capital costs include current inflationary expectations. The OPG Expert Opinion does not indicate how much of the debt and equity costs reflect these expectations, but OPG's response to Energy Probe Interrogatory #22 indicates a consensus inflation estimate of 2 percent per annum [Ex.L-T6-S22, p.1]. If the expected rate of inflation were 2.0 percent per annum (equivalent to 3.526.. percent over the test period), then the inflation-adjusted (or "real") WACC is calculated by adjusting the nominal costs of debt and equity for that inflation; for example, the nominal 10.5 percent annual ROE is 8.33.. percent in inflation-adjusted terms[14]. The WACC is then recalculated as follows (with rounding as shown):

Table 7: Cost of Capital (Inflation-adjusted)

	Annual	Test Period
Inflation rate	**2.00%**	3.53%
Tax rate	**0.00%**	0.00%
Cost of equity (real)	8.33%	15.036%
Equity share	57.50%	57.500%
Cost of debt (real)-pre-tax	3.76%	6.681%
Cost of debt (real)-after-tax	3.76%	6.681%
Debt share	42.50%	42.500%
WACC (real)	6.39%	11.4851%

Thus, when discounting inflation-adjusted cash flow in the test period, the appropriate discount rate is 11.485.. percent.

Discounted Present Value of Cash Flow

[39] The present value of cash flow depends on the choice of discount rate and the future cash flows. For this analysis, the chosen discount rate is the WACC that reflects the recommended costs of capital and capital structure in the OPG Expert

[14] The calculations use the formula for the exact real cost of debt and equity. If the inflation rate is *i*and the nominal cost is r_{nom}, then the real cost r_{real} is obtained as $(1 + r_{nom}) = (1 + r_{real})(1 + i)$.

Opinion. As shown above, based on the information in the Prefiled Evidence, the cash flow from assets of the Prescribed Facilities in the test period is $649.4 million in nominal terms.

[40] However, the Prefiled Evidence presents no information on the cash flows in future periods. Accordingly, it is necessary to make assumptions about the future cash flows. A base-case estimate of the value of the Prescribed Facilities can be made assuming the cash flow from assets remains constant in inflation-adjusted terms over all future test periods. Since the inflation-adjusted first-period cash flow is $627.28.. million, the cash flow stream to infinity constitutes a constant-dollar perpetuity, the discounted present value of which is obtained by dividing constant-dollar cash flow by the inflation-adjusted WACC:

$$V_0 = \frac{cashflow}{wacc} = \frac{\$627.28..}{0.11485..} = \$5{,}461.706..$$

This estimate may be confirmed by allowing nominal cash flow to grow at the expected rate of inflation and discounting at the nominal discount rate. Applying the constant-growth dividend formula yields the same estimated value:

$$V_0 = \frac{first\_period\_cashflow}{wacc - growth\_rate} = \frac{\$649.4}{0.15416.. - 0.03526..} = \$5{,}461.706..$$

where the growth rate of cash flow is the rate of expected inflation. These calculations both produce a present value of $5,461.706.. million for the assets associated with the Prescribed Facilities.

[41] Note that the base-case asset valuation of $5,461.7 million is approximately 74 percent of OPG's estimate of $7,401 million for the rate base for 2008.[15,16]

[15] See para. 4(b) supra.

[16] With a 3 percent per annum rate of expected inflation, the base-case asset value rises to $6,425.0.. million, approximately 87 percent of the rate base in 2008.

[42] The corresponding capital structure is obtained by applying the recommended debt and equity ratios to the calculated value of the assets:

Table 8: Capital Structure and Costs of Capital

	Capital Structure		Cost of Capital	
	$millions		$millions inflation-adj	$millions nominal
Debt	2,321.2	42.5%	155.079	160.547
Equity	3,140.5	57.5%	472.202	488.853
Total	5,461.7	100.0%	627.281	649.400

The resulting inflation-adjusted payments to debt and equity investors in the test period are calculated as: the asset value x recommended share of debt (equity) in the capital structure x real cost of debt (equity). The corresponding nominal payment adds the inflationary increase. As these real and nominal payments sum exactly to the cash flow from assets, this consistency supports the correctness of the computations above.

[43] Note that this calculation depends critically on the assumption made about the future taxable income generated by the Prescribed Facilities. As noted in the Prefiled Evidence, OPG expects that those assets would not generate a liability for income tax in the first test period due to tax-loss carry forwards [Ex. F3-T2-S1, p.12], and there is an indication that OPG has accumulated tax losses of $503.2 million to carry in forward against taxable income in subsequent periods [Ex. F3-T2-S1, Table 9]. The Prefiled Evidence does not indicate when OPG expects to pay income taxes in the future.

[44] However, if there were taxable income against which the interest expense could be deducted, the interest tax shields would be valuable and would increase the asset value; in effect, the after-tax cost of debt would be lower and the WACC would be lower, hence the present value of assets would be higher.

[45] The difference between the payments to creditors and the shareholder calculated by OPG[17] and the costs of debt and equity capital derived from the above valuation arises because OPG's payments are based on a different approach to valuing the rate base. Two explanations for this variance are possible.

[46] First, it is possible that the procedures used by OPG to forecast the rate base systematically over-estimate the asset value and hence the payments obtained using the component capital costs and capital structure recommended in the OPG Expert Opinion. OPG's forecast rate base is established using information in its 2007 audited financial statements in combination with various allocations, expected capital expenditures, asset retirements and depreciation [Ex.B1-T1-S1, p.1]. However, since the forecast rate base is determined on the basis of generally accepted accounting principles and, since those accounting principles generally record assets at their depreciated historical costs rather than estimated fair market values, it is more likely that the resulting forecasts for 2008 and 2009 would under-estimate rather than over-estimate the asset value obtained by discounting the cash flow from assets at the cost of capital based on the component costs of capital and capital structure recommended in the OPG Expert Opinion. On the other hand, the rate base also includes items based on allocations and reconciliations that make it difficult to know whether the rate base is systematically over- or under-estimated.

[47] Assuming the recommended capital structure is appropriate, an alternate explanation for the variance is that the recommended component cost of equity in the OPG Expert Opinion is too high. To illustrate, if that cost were 8.0 percent per annum (rather than 10.5 percent), the base-case asset value would be approximately $7,057.3 million.[18] It may also be that the 5.84 percent average component cost of debt inferred from the Prefiled Evidence is also too high. Before commenting on these component costs, it is appropriate to comment on the OPG Expert Opinion on capital structure.

[17] See para 6, supra.
[18] This higher asset value is 95 percent of the 2008 rate base.

Capital Structure Concerns

[48] The OPG Expert Opinion recommends an equity-oriented capital structure, largely on the basis of conventional finance theory. There are several reasons for adopting a capital structure that is debt-oriented.

Finance Theory and Capital Structure

[49] The OPG Expert Opinion observes that the overall cost of capital would not change with changes in capital structure, hence the value of the firm and its WACC do not change as debt is added to, or removed from, the capital structure. The value of the firm's assets (and, correspondingly, the market value of its debt and equity securities) depends on the firm's earnings, not on the way it is financed [Ex.C2-T1-S1-p.12]. The OPG Expert Opinion does not discuss why this is so. The reason for this invariance is that, in an efficient capital market in which investors and the firm face the same borrowing rate, investors can offset an undesired capital structure and produce any desired capital structure by borrowing on personal account (also referred to as "homemade leverage"). On this basis, the firm's adopted capital structure is an irrelevant consideration in establishing the market value of its assets.

[50] In the presence of corporate taxation with interest deductibility, however, there is a strong advantage to substituting debt for equity in the capital structure: the value of the firm increases because of the corporate tax savings that benefit shareholders, and its WACC declines. Shareholders cannot achieve this capital structure with homemade leverage because, in a world with corporate but not personal taxation, they do not have interest deductibility. The optimal corporate capital structure is therefore highly debt oriented, although as debt is added, the costs of financial distress eventually begin to outweigh the corporate tax savings.

[51] The OPG Expert Opinion notes that the advantage to shareholders of this high debt/equity ratio is offset by the presence of personal taxes on investment income when interest income is taxed more heavily than equity income [Ex.C2-T1-S1-p.13]. This concern would justify a more equity-oriented capital structure.

[52] However, concern with the impact of personal taxation should not be determinative of the appropriate capital structure in respect of the Prescribed Facilities. First, as noted above, OPG expects that those assets will not pay income tax in the first test period and indicates that this situation may prevail in the future due to accumulated tax loss carryforwards. If OPG does not have sufficient taxable income from which to deduct interest and reduce income taxes, a debt-oriented capital structure does not create interest tax shields that enhance the value for shareholders, personal taxation notwithstanding. Conventional finance theory predicts that there is no optimal capital structure in such circumstances.

[53] Second, the taxation of investors' interest income from corporate bonds in Canada is limited. Bond investors tend to be non-taxable institutions such as pension funds and/or individuals in low tax rates. Moreover, the tax treatment of interest income generally leads taxable individual investors to hold bonds in tax-deferred accounts such as RRSP's; the tax-free accounts announced in the recent federal budget will very likely be used by individual investors for holding bonds and other interest-bearing securities. On this basis, the choice of debt/equity ratio is largely unaffected by taxation of investment income at the personal level.

[54] Since, according to conventional finance theory, there is no optimal (i.e. value maximizing) capital structure in these circumstances, the equity-oriented capital structure recommended in the OPG Expert Opinion cannot be justified by that theory. There are, however, other reasons as suggested below for adopting a debt-oriented capital structure.

<u>Agency Costs of Equity</u>

[55] Agency costs are the costs of corporate governance that arise due to the separation of management and ownership. The typical problem addressed in finance is how to align management incentives to accord with the shareholders' interest in maximizing the value of their investment. Agency costs are well-recognized and can be addressed to some extent by compensating managers with shares or options to acquire shares. The premise is that this form of compensation aligns the incentives of managers with those of shareholders. The finance literature posits that the market for corporate control (i.e. the threat of takeover) is also a control on managers that leads them to maximize shareholder value.

[56] Since OPG is wholly-owned by the Ontario Government, these controls on agency costs are not available. More fundamentally, while OPG is incorporated under the Ontario Business Corporations Act and is expected to operate on a commercial basis, the Ontario Government does not seek to maximize the value of its investment in OPG. Rather, the Ontario Government owns OPG on behalf of all Ontario citizens and attempts to balance various different objectives in its decisions concerning OPG. These objectives certainly include efficiency and cost-effectiveness; other objectives relate to safety, environmental standards, avoiding excessive financial risk, stability of the power system and consumer impacts. The Ontario Government communicates its objectives to OPG through the Memorandum of Agreement and, where necessary, through special directives.

[57] Whereas a value-maximizing approach would indicate that there is no optimal capital structure for the Prescribed Facilities as long as it is not in a tax-paying position, a debt-oriented capital structure promotes objectives relating to efficiency and cost-effectiveness in ways that an equity-oriented capital structure does not.

[58] Indeed, it is precisely because the Ontario Government is not solely concerned with maximizing the value of its investment in OPG that other ways of achieving efficiency should be considered. From the viewpoint of agency cost theory, a debt-oriented capital structure and the corresponding shift from discretionary dividend payments to contractual and more demanding debt service commits managers to deploy cash flow to investments that promote efficiency and cost-effectiveness, especially when other methods of controlling agency costs are not available.

[59] Describing investor-owned utilities, Professor Gordon has observed:

> The capital structures employed by private electric power companies vary over some range with their objectives and their circumstances. A regulated company that is experiencing no difficulty in earning its allowed rate of return and is not being allowed to earn more than a fair rate of return will move to the most conservative capital structure that it can obtain. The reason is that the cost of a reduced debt ratio falls on consumers while the benefit accrues to the company's management and stockholders.[19]

In Professor Gordon's view, the reliance on equity comes at the expense of lower-cost debt, thus raising the utility's regulated cost of capital and allowed return and hence prices to consumers. Accordingly, it increases both shareholder profits and the discretion of management.

Government Support

[60] Allowing a debt-oriented capital structure is also desirable where there is unmeasured equity in the form of government support for corporate debt. The finance literature treats government guarantees as equity because, absent the guarantee, the firm would have to have more equity in order to issue debt on the same terms as if that debt were guaranteed. This increase in equity is effectively the value of the guarantee. The debt of the former Ontario Hydro was guaranteed by the Province of Ontario and Ontario Hydro paid the Province an annual fee for the guarantee. As the capital structure of Ontario Hydro was not regulated, the value of that guarantee was never explicitly recognized as part of the equity of Ontario Hydro.

[61] There is no explicit guarantee of the debt currently or prospectively associated with the Prescribed Facilities. However, the perception of support of the Ontario Government for the debt of OPG enables such debt to be issued on more favourable terms; consequently, the measured equity that the Board would use

[19] Gordon, M.J. "Comparative cost of financing Ontario Hydro as a crown corporation and a private corporation", in R. Daniels (ed.), Ontario Hydro at the Millennium: Has Monopoly's Moment Passed?, McGill-Queen's University Press, Montreal, 1996, p.238.

when determining the appropriate capital structure understates the true value of that equity and justifies approval of a higher measured debt/equity ratio.

[62] The OPG Expert Opinion observes that Standard and Poor's BBB+ rating of OPG is based on government ownership and implied government financial support. Without these "credit strengths", the rating would be only BBB- [Ex.C2-T1-S1, p.53, 83]. While noting Standard & Poor's observation that such government policies are subject to change, the OPG Expert Opinion nevertheless recognizes the existence of the implicit Provincial support for the debt associated with the Prescribed Facilities.

[63] The OPG Expert Opinion states that as a result of perceived government support, OPG's cost of debt is reduced and that this benefit to ratepayers is provided at no cost because OPG pays no debt fee to the Province for the ongoing financial support [Ex.C2-T1-S1, p.53-54]. Both assertions can be questioned.

[64] First, the cost of debt is lower because, as suggested above, the government support effectively increases the equity base of OPG in a way that is unmeasured on OPG's financial statements. In essence, the cost of debt is lower while the Province's effective equity investment is higher. Second, it is not accurate to say that there is no cost attached to the government support; more accurately, the cost is shared by all Ontario households who, as taxpayers, would pay for any additional government support should it become necessary. The observation that there is no explicit charge for this support avoids the central issue, i.e. that ratepayers are being subsidized by taxpayers.

[65] The "stand-alone" principle requires that the Prescribed Facilities be evaluated and financed at market rates generally applicable to such assets in order to avoid subsidy. If the perception of government support is influencing rates of return on securities related to the Prescribed Facilities, then appropriate allowance for the additional, but unmeasured, equity should be made when determining the appropriate capital structure.

[66] Energy Probe Interrogatory #21 asked:

> Is the debt associated with the Prescribed Facilities supported by any form of implicit guarantee of the Ontario Government? If so, what are the implications for the appropriate capital structure for those assets?

OPG's response denies that the Ontario Government provides any implicit guarantee:

> b) The Province of Ontario does not implicitly guarantee any of OPG's debt obligations. Both of the debt rating agencies who currently rate OPG's long and short term debt have indicated that they afford a positive measure to the ratings that recognizes the 100 percent government ownership as well as the fact that electricity generation is an essential service required by the residents and businesses of Ontario. With respect to the implications for the capital structure, the adherence to the stand-alone principle for the purpose of establishing an appropriate capital structure is a means of ensuring that OPG is fully self-supporting, and is allowed a return on capital that meets the three criteria of a fair return based on its business and risk profile (ability to attract capital on reasonable terms and conditions, maintenance of financial integrity and opportunity to earn a return commensurate with those available to companies of similar risk).

The response acknowledges, however, that government support is reflected in the ratings of OPG's obligations. It is noteworthy that OPG's response does not apply specifically to the debt associated with the Prescribed Facilities.

<u>Capital Structure of Peers</u>

[67] As the OPG Expert Opinion properly observes, there are no good peers in electricity generation in North America with which to compare capital structures. For example, TransAlta Utilities has an average debt ratio of 52.3 percent and an A(low) rating from DBRS. However, its capital structure is complicated by the presence of preferred shares.

[68] Analyzing a sample of U.S. utilities, the OPG Expert Opinion concludes:

> The results suggest that the industry average is an approximately 45 percent common equity ratio. However, the equity ratio cannot be considered independently of the ROEs that have been key to the achievement of the utilities' financial metrics. As indicated above, the achievement of the referenced coverage ratios was dependent on earned returns on equity in the 11-12 percent range. In deriving an appropriate common equity ratio for OPG at the proposed benchmark return on equity of 10.5 percent, which is premised on equating total risks of OPG's regulated operations to those of low business risk utilities in the A category, the deemed equity ratio will need to be higher than the industry average of 45 percent. The alternative is to set the capital structure at the industry standard, and to recognize OPG's higher business risks relative to the benchmark in the common equity return. [Ex.C-2-T1-S1, p.90-91]

[69] Thus, there is an indication in the OPG Expert Opinion that the capital structure among U.S. peers generally includes less equity and more debt than it recommends for the Prescribed Facilities. Apparently, the higher ROEs (11percent –12 percent) of these utilities compensate in some way for the lower equity share in the capital structure.

[70] An alternate interpretation is that the high ROEs results from the financial leverage due to the high debt ratios.

<u>Conclusions and Recommended Capital Structure</u>

[71] The OPG Expert Opinion recommends an equity-oriented capital structure of 42.5 percent debt and 57.5 percent equity. However, from a purely financial point of view, there is no unique value-maximizing capital structure because the Prescribed Facilities do not, and are not forecast to, generate tax liabilities; accordingly, adding debt to the capital structure will not generate interest tax shields that benefit shareholders.

[72] However, a capital structure is needed to address the agency costs that generally arise with too much equity. In light of the Ontario Government's various policy objectives and its deliberate decision not to maximize the value of its investment in OPG, a debt-oriented capital structure can promote efficiency and cost-effectiveness and complements the other ways in which the Ontario Government seeks to influence the management of OPG.

[73] As recognized by the rating agencies, the true value (as opposed to the book value) of equity will reflect the implied Provincial support. Accordingly, an approved capital structure based on the book value of equity underestimates the amount of equity available and the amount of debt that could be supported if the value of that support were measured and treated as equity.

[74] Finally, the limited evidence on peer capital structures is suggestive of higher debt ratios than that recommended in the OPG Expert Opinion. Accordingly, a capital structure for the Prescribed Facilities of at least 50 percent debt should be considered.

[75] Note that combining a 50 percent debt ratio with the cost of equity recommended in the OPG Expert Opinion results in a computed overall nominal cost of capital of 8.17 percent per annum (approximately 14.77 percent for the test-period) and the value of the Prescribed Facilities for regulatory purposes rises to approximately $5,776.9 million, ceteris paribus. This value is approximately 78 percent of OPG's forecast of the rate base for 2008.

[76] Adopting a debt ratio of 55 percent leads to a computed nominal overall cost of capital of approximately 7.94 percent per annum (approximately 14.34 percent for the test-period) and values the Prescribed Facilities at approximately $6,008 million, approximately 81% of the 2008 rate base.

[77] However, as the OPG Expert Opinion notes, when the firm increases its debt/equity ratio, the cost of equity rises even though the overall cost of capital is constant [Ex.C2-T1-S1, p.13]. It may be argued that, with a debt-oriented capital structure, the recommended 10.5 percent nominal ROE would, according to conventional finance theory, have to rise. This suggestion ignores the savings to shareholders (i.e. all Ontario citizens in their capacity as owners of the Prescribed Facilities) due to lower agency costs of equity. It further assumes that the recommended 10.5 percent cost of equity was appropriate to the recommended 42.5 percent debt ratio. As indicated below, that equity cost was too high to begin with.

[78] More fundamentally, however, the correct capital structure and required rate of return to "the shareholder" are not independent of the identity of that shareholder. While it is correct to say that, according to conventional finance theory, increases in the debt ratio will increase the cost of equity with the result that the cost of capital does not change, that theory is most directly relevant to value-maximizing firms operating in efficient capital markets. In that theory, capital structure and equity returns do not depend on "the happenstance of ownership" [Ex.C2-T1-S1, p.54] because all investors seek to maximize the value of their investments. However, in a world of government ownership, agency costs of equity, taxation and government financial support, attaining efficiency may well entail a departure from that theory.

[79] Contrary to the view expressed in the OPG Expert Opinion, the appropriate capital structure cannot be determined irrespective of the identity of the shareholder [Ex.C2-T1-S1, p.54]. The Ontario Government does not seek compensation for its investment in the Prescribed Facilities solely in the form of profits and dividends. Indeed, the fact that the Ontario Government is the sole shareholder, together with its various objectives other than value maximization and its perceived commitment to financial support (an implicit form of equity), means that agency costs of equity are likely to be significant. The proper application of the "stand-alone" principle requires that these features be taken into consideration and that, where observed yields reflect the ownership, the capital structure ought to be adjusted for use in valuation and cost of capital assessment. On these considerations, the appropriate capital structure is debt-oriented with 55 percent debt and 45 percent equity.

Component Cost of Equity

[80] There are reasons to believe that the OPG Expert Opinion regarding the component cost of equity is too high. The following sections review the methodology and results presented therein, present a different approach that follows conventional practice, and that supports a much lower ROE.

Methodology in General

[81] Stated generally, the approach taken in the OPG Expert Opinion is to recommend a capital structure and a cost of equity that, taken together, produce the profit necessary to sustain operations in light of their business and financial risks and requirements. One avenue is to determine the benchmark cost of equity, and then select a deemed capital structure that produces the appropriate profit level. The alternate approach is to set the deemed capital structure first, having regard to debt ratings and capital structure of peers in the industry, and then determine, and adjust if necessary, the benchmark cost of equity that will generate the appropriate profits. [Ex.C2-T1-S1, p.19]

[82] The OPG Expert Opinion uses the equity risk-premium approach and the discounted cash flow method of assessing the cost of equity and then makes adjustments resulting in a recommended equity cost of 10.5 percent per annum. In general terms, the OPG Expert Opinion uses methods that produce an equity cost that reflects prevailing conditions and return expectations in the capital market. However, OPG applies this market rate to the rate base valued at book value. If the book value of the rate base and/or the equity cost is too high, then the revenue requirement will be over-stated.

Equity Market Risk Premium Approach

[83] This approach estimates the excess return of equities over some measure of the risk-free rate, and adjusts that “risk premium” for relative risk. The expected cost of equity equals the adjusted risk premium plus the risk-free rate.

[84] The OPG Expert Opinion provides several estimates of the equity risk premium. The historic (arithmetic) average risk premium for Canadian equities is 5.5 percent for the period 1947-2006 [Ex.C2-T1-S1, p.29, Table 1]. For the period 1997-2006, the risk premium was 2.3 percent [Ex.C2-T1-S1, p.145, Table C-3].

[85] However, OPG Expert Opinion expects the future equity market return to be in the range 11.5 percent-12.25 percent, and yields on long-term Government of Canada bonds are expected to be 5 percent-5.25 percent. Accordingly, the OPG Expert Opinion estimates that current premium is in the range of 6.5 percent – 7.25 percent over the long-term government bond yield [Ex.C2-T1-S1, p.31].

[86] The OPG Expert Opinion then adjusts the equity market premium for relative risk of utilities in three ways, including adjustment by Canadian utility beta of 0.65-0.70. This particular calculation gives a benchmark utility equity risk premium of 4.25 percent-4.5 percent [Ex.C2-T1-S1, p.37]. When all such adjustments are averaged, the resulting benchmark premium is 4.75 percent. Adding the 5 percent yield on long-term government bonds produces a "bare bones" cost of equity of 9.25 percent-10.25 percent. Adding a further 50 basis points for "financial flexibility" results in an equity cost of between 9.75 percent and 10.75 percent. After adding consideration of the "comparable earnings test", the final estimate is 10.5 percent.

Comments on the Estimated Risk Premium

[87] There are, of course, different ways to compute the risk premium. The OPG Expert Opinion observes that the long-term bond yield is not risk-free being subject, inter alia, to scarcity premia, illiquidty risk and interest-rate risk [Ex. C2-T1-S1, p.131-132][20]. However, it also observes that that yield is superior to short-term rates because the latter have an "administered nature" [Ex.C2-T1-S1, p.24].

[88] Ross et al. provide information for the ten-year period ending April 2003. Over that period, the annual return on the S&P/TSX Composite Index averaged 7.68 percent and the 3-month Treasury bill yield (which is not an administered rate) averaged 4.72 percent[21]:

Table 9
Ten-year Returns Ending April 30, 2003

Fund	Annual Return	Beta
S&P/TSX Composite	7.68%	1.00
3-month Treasury Bills	4.72%	0.00
Altamira Equity	3.85%	0.98
Saxon Stock	11.61%	0.38

Source: Ross et al., Table 13.11, p. 388

On this basis, the equity risk premium was 2.96 percent over that period.

[20] Another shortcoming is the risk of unexpected changes in inflation.
[21] Ross et al., at p.388.

[89] This time period used likely results in an underestimate of the risk premium. Stock market returns in the following four years were generally high in relation to

Table 10: Equity Market Premium

	TSE 300 Dec close	Annual change	T-bill yield	Excess return
1994	4213.6			
1995	4713.5	11.9%	5.54%	6.3%
1996	5927	25.7%	2.85%	22.9%
1997	6699.4	13.0%	3.99%	9.0%
1998	6485.9	-3.2%	4.66%	-7.8%
1999	8413.8	29.7%	4.85%	24.9%
2000	8933.7	6.2%	5.49%	0.7%
2001	7688.4	-13.9%	1.95%	-15.9%
2002	6614.5	-14.0%	2.63%	-16.6%
2003	8220.9	24.3%	2.57%	21.7%
2004	9246.7	12.5%	2.47%	10.0%
2005	11272.3	21.9%	3.37%	18.5%
2006	12908.4	14.5%	4.16%	10.4%
2007	13833.1	7.2%	3.86%	3.3%
			Average=	6.7%

Source:
Bank of Canada Banking and Financial Statistics, March 2008
Table A2-Major Financial and Economic Indicators
col 24: Securities mid-market yield, Treasury bills 3-month
http://www.bankofcanada.ca/pdf/bfs.pdf

Toronto Stock Exchange

the 3-month Treasury Bill yield. The average equity premium 2004-2007 was 10.55 percent. Accordingly, the excess stock market return over the 3-month Treasury Bill averaged 6.7 percent during the period 1994-2007.

[90] Since the 3-month Treasury Bill yields 1.4 percent per annum currently (Monday March 24, 2008), and was 3.24 percent four weeks earlier[22], the expected equity market return using a 6.7 percent market risk premium would be in the range 8 percent-10 percent. This range is significantly below the equity return of 11.5 percent-12.25 percent expected by the OPG Expert Opinion and which forms the

[22] Canadian and US Money Market Yields, Financial Post-Reuters, http://www.financialpost.com/markets/market_data/money-yields-can_us.html

base for its equity market premium of 6.5 percent over the long-term government bond yield.

[91] As noted above, the OPG Expert Opinion relies on a forecast of equity market returns and deducts the long-term bond yield therefrom to obtain the premium. This approach is questionable, as it ignores the fact that Treasury bill yields are currently very low. An expected return on equities of 11.5 percent-12.25 percent is too high when Treasury bills are yielding 1-3 percent.

[92] Using the long-term average equity risk premium 1926-1994 of 7 percent, Giammarino et al. state in their 1995 text that, as a general matter, the preferred procedure is to add that premium to the prevailing Treasury bill yield.[23] Hence, the approach adopted here is to estimate the premium and then add it to the Treasury bill yield to obtain an estimate of equity market returns.

<u>The Relative Risk Adjustment</u>

[93] The 0.65-0.70 adjustment to the equity market risk premium is based on adjusted beta measures even though the OPG Expert Opinion expresses doubt about beta and the Capital Asset Pricing Model, and advocates using a measure of "total market risk". [Ex.C2-T1-S1, p.31]

[94] The apparent reliance on total market risk apparently stems from the OPG Expert Opinion's view that

> "investors are not perfectly diversified, do look at the risks of individual investments and require compensation for assuming company-specific or investment-specific risk. It also recognizes that, while investors can diversify their portfolios, the stand-alone utility to which the allowed return is applied cannot." [Ex.C2-T1-S1, p31-32]

[95] It is not clear how the OPG Expert Opinion reaches these conclusions. It is not necessary that investors be "perfectly diversified" in order that modern portfolio theory be useful. Similarly, it is not necessary that capital markets be perfectly

[23] Giammarino,R. et al., Funadmentals of Corporate Finance, First Canadian Edition, McGraw-Hill Ryerson, Toronto, 1996, p.215. On the basis of returns 1926-1994, they estimate the historical Canadian equity premium at 7 percent.

efficient in order for conventional theories of capital structure to be used as a guide in policy discussions or regulatory proceedings.

[96] In any case, large investors do indeed diversify directly and many small investors diversify through mutual funds, pension funds, and professional management of their portfolios. Portfolio theory demonstrates that risk-reduction is the rationale for the diversification of portfolios that is observed in capital markets. This theory implies that, even if investors act on their expectations of unique events that affect share prices of individual securities, they cannot expect to achieve long-term returns for bearing risks that their diversification eliminates. Indeed, portfolio diversification moderates the impact of a very large change in the price of one security on the portfolio return.

[97] The implication of this is that the value of a company as determined in the capital market does not reflect diversifiable risk. The public utility regulator seeks to determine an allowed rate of return that reflects the expected returns available in the market for companies of similar risk and will, therefore, properly set that return without regard to returns that are not available in the capital market.

[98] It is clear that some risks associated with the Prescribed Facilities are unique or specific risks, e.g. demographic risk, uranium price risk [Ex.C2-T1-S1-p.72]. Investors can eliminate the impact of such risks through portfolio diversification (even if the company cannot) and, accordingly, market returns will not compensate investors for bearing them.

[99] Using a 6.7 percent equity market risk premium and the 0.65 relative risk adjustment (the adjusted beta calculated by the OPG Expert Opinion), the appropriate risk premium for a benchmark Canadian utility is approximately 4.4 percent. Note that this is close to, but lower than, the 4.8 percent risk premium actually achieved by Canadian utilities over the period 1956-2006 [Ex.C2-T1-S1, p.38, Table 3].

[100] It is also within the range of risk-adjusted and DCF-based premiums in the range of 4.25 percent-4.5 percent adopted in the OPG Expert Opinion. However, it is significantly lower than the 5.0 percent-5.5 percent advocated therein on the basis of historic utility premia [Ex.C2-T1-S1, p.42, Table 4]. As noted above, the OPG Expert Opinion averages the three measures and adopts a risk premium of 4.75 percent.

[101] Using the adjusted risk premium of 4.4 percent noted above with a Treasury bill yield of 1.4 percent-3.24 percent (the yields seen recently) produces a cost of equity in the range 5.8 percent-7.64 percent.

"<u>Bare-Bones" Cost of Equity and Financial Flexibility</u>

[102] The OPG Expert Opinion adds the 4.75 percent risk premium to the risk-free return of 5 percent on long-term government bonds (even though acknowledging that it is not risk-free). This leads to the "bare-bones" cost of equity in the range 9.25 percent-10.25 percent for an average of 9.75 percent.

[103] To this bare-bones equity cost, the OPG Expert Opinion adds 50 basis points for financial flexibility and a further adjustment for the comparable earnings test. The resulting estimated equity cost is 10.5 percent.

[104] The indicated reasons for adding 50 basis points for financial flexibility are (i) compensation for flotation costs (ii) a cushion for unanticipated capital market conditions and (iii) the "fairness" principle [Ex.C2-T1-S1, p.44]. The reasons given in the OPG Expert Opinion for this adjustment are not convincing.

[105] First, OPG will not be issuing common stock, and accordingly will not incur flotation costs. Even if it did issue common stock to the public, it would not do so every year. At best, there is an argument for allowing recovery of flotation costs in the test period in which the equity is to be issued and the costs incurred.

[106] It is also to be noted that a significant component of the flotation cost of an equity issue is the stock price decline that frequently follows the announcement of the issue.[24] This stock price decline is generally not observed on issues of debt; indeed, announcements of debt issues appear to increase the stock price. Accordingly, the only flotation costs on debt issues are the dealer discount and/or commissions and other costs (e.g. legal) of bringing the debt to market. In the case of OPG, such costs would be far less than 50 basis points per annum of the equity base.

[107] Second, there is no need for a "cushion" in the cost of equity for unanticipated capital market events. Indeed, it is the function of equity itself to provide a cushion for such events and this equity is already provided for in the equity base associated with the Prescribed Facilities. If there are other reasons for a "cushion", then it is incumbent on advocates thereof to present them.

[108] Third, as to the "fairness" principle, it is far from clear why earning a bare-bones cost of capital is unfair or to whom such a return is unfair. According to the OPG Expert Opinion [Ex.C2-T1-S1, p.45], the bare-bones return would, in theory, if earned on book value, suffice to equate that value with the market value. If this is the goal of public utility regulation, then no further compensation in the allowed return is required.

[109] However, the OPG Expert Opinion indicates that this is the wrong goal: fairness requires that a utility maintain a slight premium to book value so as not only to recover actual financing costs but also to be in a position to issue new equity without impairing the degree of financial integrity that would be anticipated under competition [Ex.C2-T1-S1, p.42].

[24] I have documented, measured and compared these announcement effects for fully-marketed and bought-deal stock issues. "Bought Deals: The Devil that You Know", Canadian Investment Review, Spring, 1994, pp.21-26.

[110] These assertions are highly problematic. First, as stated above, OPG will not be issuing new equity. Second, there is no evidence, or reason to believe, that firms in a competitive industry achieve long-run returns for their investors that exceed the cost of capital for firms in that industry.

[111] In any case, the reasoning in the OPG Expert Opinion is incorrect. Increasing the cost of equity to provide for "financial flexibility" raises the WACC used to discount the cash flows to their estimated fair market value. However, as shown above, the discounted value of the cash flow moves inversely with the discount rate: a higher discount rate <u>lowers</u> the discounted value. If it is a regulatory goal to equate the market value of the rate base with its book value, then an ROE <u>less</u> than 10.5 percent is required to increase the estimated market value toward book value given the recommended capital structure.

[112] To illustrate, the base-case present value of the cash flow from assets generated by the Prescribed Facilities (approximately $5,461.7 million) is, as shown above, approximately 74 percent of OPG's estimate of the book value ($7,401 million for 2008) when discounted at the overall cost of capital based on the capital structure and 10.5 percent cost of equity recommended in the OPG Expert Opinion.

[113] Maintaining the recommended capital structure together with the "bare-bones" equity cost of 7.64 percent per annum determined above (equivalent to approximately 13.75 percent for the test period) produces a discounted present value for the Prescribed Facilities of $7,364.0 million, approximately 99.5 percent of the 2008 rate base.

[114] The equity-oriented capital structure recommended in the OPG Expert Opinion introduces agency costs that could be reduced by introducing additional debt; a debt-oriented capital structure of 55 percent debt and 45 percent equity is preferred.

[115] An annual equity cost of 7.64 percent and a debt-oriented capital structure of 55 percent debt and 45 percent equity raises the present value of the Prescribed Facilities to approximately $7,726.3 million, which is approximately 104 percent of OPG's estimate of the rate base for 2008.

[116] Thus, reducing, rather than increasing, the cost of equity will raise the estimated market value toward book value. This is because, as long as the cash flows have not changed, there is an inverse relationship between the discounted value and the discount rate.

[117] Hence, the reasons given in the OPG Expert Opinion for allowing a 50-basis point increase in the cost of equity are mistaken. No allowance should be made, even if the Board has done so in the past.

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OVERVIEW

Broad-based background in competition law and policy, economics and finance, bringing in-depth knowledge of theory and research to bear on litigation and strategic public policy issues:

- 25 years of business and professional experience
- Member, Competition Tribunal, 1998-2003
- 10 years teaching in MBA and undergraduate finance and economics
- Author of reviewed articles and studies in competition policy, finance, and corporate governance
- Active participant in volunteer organizations in business and not-for-profit sectors

AREAS OF PROFESSIONAL INTEREST & EXPERTISE

- Competition Policy, Trade and Regulated Industries
- Damages Quantification in Commercial Litigation
- Finance, Financial Markets and Regulation
- Statistical and Quantitative Research

HIGHLIGHTS OF PROFESSIONAL EXPERIENCE

<u>Expert Appearances and Support</u>

- **Expert witness in B-Filer v. Bank of Nova Scotia, 2006:** provided research, expert opinions and testimony regarding refusal-to-supply, Competition Act, s.75; applied "hypothetical monopolist" test in Competition Bureau abuse-of-dominance guidelines to market definition and assessed anti-competitive effects in upstream and downstream markets; identified "cellophane fallacy" in opposing expert's approach (counsel: Michael Osborne, Affleck, Green Orr, Toronto)

- **Expert economic adviser, YPG acquisition of Verizon Canada, 2004:** provided research on product and geographic market determination for submission to Competition Bureau in situation of high market shares and technological change in a network-product industry (counsel: Brian Facey, Blake Cassels & Graydon, Toronto)

- **Expert economic adviser, Financial Services Commission (Ontario) v. Transamerica Life –** prepared report on structure and regulation of variable annuities industry, 1998 (counsel: Paul. Bates, Lerner & Co.)

- **Expert witness in Canadian Bankers Association v. Minister of Finance (Canada), 1997:** provided expert testimony and report regarding the attributes of extendible bond yields and their impact on the calculation of interest owed to banks on defaulted Canada Student Loans (counsel: Brian Crane, Gowlings, Ottawa)

- **Expert economic adviser to Energy Probe,** ADR hearing at Ontario Energy Board on allowed rate of return to Consumers Gas, 1996/7. (E.B.R.O. 490)

- Unilever v. Proctor & Gamble, 1997 – valuation of change in market value of patentee due to patent infringement

- Warner Music v. Director of Competition and Research-refusal to deal, 1996

- U.S. tobacco litigation – allegations of price-fixing, 1998

- Canadian International Trade Tribunal SIMA s.76 re: gypsum board, 1997 (counsel: Riyaz Dattu, McCarthy Tetrault, Toronto)

- Orange County – securities fraud allegations 1977

- **Full-Time Lay Member, Competition Tribunal, 1998-2003:** adjudicated litigated and consent cases relating to mergers, predatory pricing and related matters under the Competition Act, in energy, retailing, and manufacturing
    - Evaluated evidence on market shares, demand and supply substitution, entry barriers, and efficiencies to establish market power and substantial lessening of competition in mergers
    - Applied "avoidable cost test" in predatory pricing under s.78, 79 of the Competition Act, focusing on sunk costs
    - Analyzed economic and financial reports and questioned expert witnesses
    - Evaluated remedial orders and drafted decisions

<u>Related Experience</u>

- **Advised** clients including Investment Funds Institute of Canada (mutual fund regulatory fees), Canadian Bankers Association (review of bank and trust legislation), bank-owned investment dealers (changes to "connected issuer" rules), Finance Canada (regulation of inter-dealer screen brokers), Office of the Superintendent of Financial Institutions (regulation of securities activities of chartered banks), Ontario Securities Commission (statistical analysis of "bought-deal" underwritings), and Ontario Ministry of Financial Institutions

- **Counseled** and participated in World Bank missions to Uganda, Tanzania and Pakistan: *evaluated* opportunities for stock exchange operations, *advised* central bank on financial sector policy; *recommended* and *obtained* agreement for key reforms to securities law and regulation

- **Conducted** research and prepared reports re: deregulation of entry and ownership rules in Ontario securities industry and implications for regulating holding companies and affiliates; *co-authored* proposals to re-structure consumer protection, leading to establishment of Canadian Investor Protection Fund

RECENT POSITIONS

Director/staff economist, Law & Economics Consulting Group, 2004-06/1996-98
Member, Competition Tribunal, 1998-2003
Principal, Lawrence P. Schwartz, Ph.D. Consulting Economist, 1990-1996
Previous positions in banking and finance

TEACHING EXPERIENCE

Schulich School of Business, York University, 1995-present

- MBA and undergraduate courses in introductory and second-level finance, management of financial institutions, and international financial management
- Appointed Adjunct Professor of Business, 1998-2003

Department of Economics, University of Toronto, 1992-1994

- Undergraduate courses in economic analysis of property, contract, tort law

EDUCATION

Ph.D., Wharton School, University of Pennsylvania, 1973-77
Program in Public Policy Analysis
Areas of study: microeconomics, econometrics, public finance, urban economics

B.A., University of Toronto, 1971
Areas of study: psychology, applied mathematics, urban studies

PROFESSIONAL AND COMMUNITY ACTIVITIES AND INTERESTS

Member, Law and Economics Committee, Competition Law Section, Canadian Bar Association
Member, Consumer Advisory Council, Technical Standards and Safety Authority, Ontario, 1997-2005
Member, Education/Human Resources Working Group, Toronto Financial Services Alliance, 2003-04

Member, Financial Services Advisory Committee, Consumers' Association of Canada, 1996-98
Director and volunteer vice president, Senior Care, Toronto, 1982-96
    Recipient of Volunteer of the Year Award for 1992
    Recipient of the Jack and Marie Freedman Award for 1994

REVIEWED RESEARCH AND PUBLICATIONS

"The Hypothetical Monopolist Approach Reconsidered-Part II", *Canadian Competition Record*, Summer, 2007

"The Hypothetical Monopolist Approach Reconsidered-Part I", *Canadian Competition Record*, Fall, 2005

"Price Standard or Efficiency Standard: Comments on the Hillsdown Decision", *Canadian Competition Record*, 1992

"Cost-Benefit Analysis in Canadian Securities Regulation", commissioned by the *Task Force to Modernize Securities Legislation in Canada*, August 31, 2006

"Do Institutional and Controlling Shareholders Increase Corporate Value?", with J.G. MacIntosh, in *Corporate Decision-Making in Canada*, R.J. Daniels and R. Morck (eds.), Industry Canada Research Series, University of Calgary Press, 1995

"Bought Deals: The Devil that You Know", *Canadian Investment Review*, Spring 1994, pp.21-26

"Improving Federal Deposit Insurance", *School of Public Policy, Queen's University*, Discussion Paper 93-01, April 1993

Courchene,T. with J. Todd and L. Schwartz, "The Future of the Ontario Securities Industry", *C.D. Howe Research Institute*, Observation 29, 1986

INVITED SPEECHES AND PRESENTATIONS

Various lectures on securities regulation and competition law to University of Toronto Faculty of Law (Professor MacIntosh) and Osgoode Hall Law School (Professor Roberts)

"The Hypothetical Monopolist Approach: Does the Government Always Win?", presented at the annual meeting of the Canadian Law and Economics Association, September 22, 2005

Discussant, Competition in Financial Services, C.D. Howe Conference on Competition in Regulated Industries, November 6, 2006, Toronto

Presentation to the Senate Standing Committee on Banking, Trade and Commerce, April, 2004 re: Bill C-249 to amend the efficiency defence for mergers

“Fundamental Economic Concepts for Competition Law”, Competition Law Section, Canadian Bar Association Annual Conference, 2001, 2002

“Cost-Benefit Analysis in Mutual Fund Regulation”, presentation to Infonex conference on “Managing Mutual Funds”, Toronto, April 4, 2006

“Mutual Fund Governance under Policy NI 81-107”, invited panel discussant at Investment Funds Institute of Canada Annual Conference, Toronto, October, 2005

“The Touchy Nature of Market Timing”, presentation to Infonex conference on “Managing Mutual Funds”, Toronto, April 5, 2005

Presentation to Senate Standing Committee on Banking, Trade and Commerce re: “The Canadian Approach to Mutual Fund Governance”, May, 1998

“The Governance of Canadian Mutual Funds”, presentation to Insight Conference on Mutual Fund Regulation, November 25, 1997, Toronto

“Lessons from the Integration of Banking and Securities”, presentation to The Canadian Institute Conference on Banking and Insurance, Toronto, September 12, 1992

“Federal Financial Institutions Reform: Its Impact on the Securities Industry”, presentation to the Insight Conference on Financial Services Reform, Toronto April,1992