

**NORTHWEST TERRITORIES POWER
CORPORATION**

Rebuttal Testimony

of

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TABLE OF CONTENTS

	<u>Page No.</u>
INTRODUCTION	1
PURPOSE OF TESTIMONY	1
TREATMENT AND COST OF SINKING FUND DEBENTURES	2
CAPITAL STRUCTURE	13
TREATMENT AND COST OF CAPITAL LEASE	20
FAIR RETURN ON EQUITY	25

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
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REBUTTAL TESTIMONY OF KATHLEEN C. McSHANE
ON BEHALF OF
NORTHWEST TERRITORIES POWER CORPORATION

INTRODUCTION

My name is Kathleen C. McShane and my business address is 4550 Montgomery Avenue, Suite 350N, Bethesda, Maryland 20814. I am President of Foster Associates, Inc., an economic consulting firm. My qualifications have already been provided with my direct testimony (General Rate Application 2006/07 and 2007/08, Phase I, Appendix B).

PURPOSE OF TESTIMONY

The purpose of this testimony is to respond to the testimony of Drs. Lawrence Kryzanowski and Gordon S. Roberts on behalf of Hydro Communities (Hay River, Yellowknife, Fort Smith) as follows:

1. Treatment and Cost of Sinking Fund Debentures
2. Capital Structure
3. Treatment and Cost of the Capital Lease
4. Fair Return on Equity

27 **TREATMENT AND COST OF SINKING FUND DEBENTURES**

28

29 Q. Drs. Kryzanowski and Roberts recommend that the Board approve an embedded
30 cost of debt of 8.29% for 2006/2007 and 8.31% for 2007/2008 instead of the
31 embedded debt costs of 10.53% and 10.93% proposed by NTPC. Are these
32 recommendations reasonable?

33

34 A. No. The recommendation made by Drs. Kryzanowski and Roberts, which arises
35 from their proposed treatment of the Corporation's sinking fund debentures,
36 would not allow NTPC to earn a fair and reasonable return on the capital that has
37 been invested to provide service to ratepayers.

38

39 Q. Please summarize the approach that the Corporation uses to calculate its
40 embedded cost of debt and the interest expense to be recovered in the revenue
41 requirement.

42

43 A. NTPC calculates its embedded cost of debt as:

44

$$\frac{\text{Interest on Outstanding Debt Plus Amortization of} \\ \text{Financing Costs less Forecast Sinking Fund Earnings}}{\text{Gross Proceeds of Debt Issues less Unamortized Debt} \\ \text{Financing Costs less Sinking Funds}}$$

45

46 The gross proceeds of the debt are weighted by the number of days outstanding
47 during the test year; the unamortized debt financing costs and sinking funds are
48 calculated using the mid-year convention (average of beginning of year and end
49 of year balances).

50

51 Q. How do Drs. Kryzanowski and Roberts recommend that the cost of debt be
52 calculated?

53

54 A. They recommend that the cost of debt be calculated as the total interest expense
55 on the outstanding principal of the debt plus the annual amortization of financing
56 costs divided by the weighted average balance of the outstanding principal of the
57 debt. Using this approach, the interest expense on the outstanding principal
58 balance is not offset by the sinking fund earnings nor is the outstanding debt
59 principal offset by the balance in the sinking funds. Their recommended costs of
60 debt for the two test years are 8.29% and 8.31% respectively.¹

61

62 Q. Please explain why NTPC's methodology for calculating the embedded cost of
63 debt is appropriate.

64

65 A. It is the methodology that allows NTPC both to recover the interest expense that it
66 incurs and to earn a fair and reasonable return on the equity component of its total
67 utility debt and equity capitalization, where the utility debt and equity is financing
68 both the rate base and the sinking fund assets. If instead, the embedded cost of
69 debt is calculated as proposed by Drs. Kryzanowski and Roberts, the Corporation
70 will under-recover its actual interest expense and thus under-earn the allowed
71 return on its equity capitalization if interest rates (and thus the earnings on the
72 sinking fund) are lower than the coupon rate on the sinking fund debt. The
73 opposite is also true: the Corporation will over-earn the allowed return on its
74 utility equity capitalization if interest rates (and thus the earnings on the sinking
75 fund) are higher than the coupon rate on the sinking fund. The methodology
76 proposed by Drs. Kryzanowski and Roberts puts the utility's return on equity at
77 risk for the impact of unanticipated changes in interest rates on sinking fund
78 earnings, a risk for which the utility has never been compensated.

79

¹ The calculation of the embedded costs in footnote 71 of Drs. Kryzanowski and Roberts' testimony fails to subtract the unamortized debt issuance costs from the gross proceeds of the outstanding debt. If their proposed methodology were to be used to calculate the cost of debt, the embedded cost should be calculated as interest expense plus amortization of debt issuance costs divided by the weighted average balance of the outstanding debt less the unamortized portion of debt issuance costs. The resulting embedded costs for the two test years would be 8.39% and 8.41%.

80 Q. Drs. Kryzanowski and Roberts contend that NTPC’s method of calculating the
81 cost of debt is inequitable by its construction, because it levers up the embedded
82 cost of debt more when the rate of return earned by the sinking fund is less than
83 the promised yield (coupon rate) on the debt than when the rate of return earned
84 by the sinking fund is more than the promised yield. Are they correct?

85

86 A. No. This contention is erroneous because it is based on two simplistic
87 assumptions that are not borne out in reality. The first assumption made is that
88 the principal of the outstanding debt is calculated using a simple mid-year
89 convention. The second simplistic assumption is that, for a sinking fund issue, the
90 sinking fund contribution is made at the end of the year. Under these two
91 simplistic assumptions, if a portion of a debt issue is retired at the end of the year
92 or put in a sinking fund at the end of the year, the calculation of the embedded
93 cost of debt will always be higher than the coupon rate and will rise each year
94 over the life of the issue. Rebuttal Schedule 1 provides two illustrative examples
95 of the embedded cost for a ten-year bond using the simple mid-year convention.
96 In the first example, the bond is systematically retired over its life, with
97 retirements occurring at the end of the year.² The second example shows the
98 embedded costs for a debt issue with a sinking fund under the assumption that
99 contributions are made to the fund at the end of the year (and thus, during the
100 year, the sinking fund earns a return only on the contribution made at the prior
101 year-end). The two examples show that the calculated embedded cost in both
102 cases is identical and, as indicated above, always above the coupon rate on the
103 debt.

104

105 However, even in these simplistic examples, the application of the calculated
106 embedded cost to the average principal outstanding during the year will yield
107 exactly the amount of interest expense that will be incurred each year. The
108 “explosion” (the term used by Drs. Kryzanowski and Roberts) in the embedded

² According to the evidence of Drs. Kryzanowski and Roberts, a provision that requires the issuer to retire principal amounts before maturity would be typical of a sinking fund issue (p. 94).

109 debt cost as the debt issue reaches maturity is simply an arithmetic artifact that
110 arises from using a simple mid-year convention for calculating the outstanding
111 debt when a portion of the debt is retired or put in a sinking fund at the end of the
112 year. When the internal rate of return on the debt issue is calculated (that is, its
113 effective cost over the life of the loan), it is exactly 10.0% in both examples.

114

115 Q. Under the simplistic assumptions of (1) a simple mid-year convention for the
116 outstanding principal amount of the debt and (2) all contributions to the sinking
117 fund made at year end, what cost of debt should be used to test whether the
118 construction of the embedded cost of debt for a sinking fund issue is equitable?

119

120 A. The proper test of whether the embedded cost methodology is equitable (i.e.,
121 whether the impact of returns on the sinking fund above or below the coupon rate
122 on the debt issue is symmetric) is in relation to the embedded debt cost as
123 calculated when the fund earns a return equal to the coupon rate, not the coupon
124 rate itself. Rebuttal Schedule 2 demonstrates that the increase in the embedded
125 cost of debt if the return on the sinking fund is 2% below the coupon rate is
126 exactly the same as the decrease in the embedded cost if the return on the sinking
127 fund is 2% below the coupon rate in each and every year.

128

129 Q. Does NTPC calculate the amount of the principal outstanding for each of its debt
130 issues using the simple mid-year convention?

131

132 A. No. It uses the daily weighted average outstanding for each of the issues.

133

134 Q. Does NTPC make its sinking fund contributions at the end of the year?

135

136 A. No, it makes them on the anniversary of the date of each of the sinking fund
137 debentures in February, March, May, June and October. Thus, the sinking fund
138 contributions are made throughout the year.

139

140 Q. What is the implication of the actual pattern of NTPC's contributions to the
141 sinking funds?

142

143 A. The implication is that, for purposes of calculating the embedded cost of debt, the
144 balance in the sinking funds should be based on the forecast weighted average
145 balance of the funds, consistent with the Corporation's calculation of its debt
146 principal balances. Rebuttal Schedule 3 demonstrates that, when it is assumed
147 that sinking fund contributions are made, on average, at mid-year, the embedded
148 cost of debt for an issue with a coupon of 10% will always be 10% when the
149 sinking fund earns 10%. If the sinking fund earns 2% higher than 10% or 2%
150 lower than 10%, the resulting embedded costs will be symmetric around the 10%
151 coupon rate. Rebuttal Schedule 3 demonstrates that this is the case.

152

153 Q. Does NTPC currently use a weighted average balance for the sinking funds when
154 calculating the embedded cost of debt?

155

156 A. No, they use the simple mid-year convention.

157

158 Q. What do you recommend?

159

160 A. I recommend that NTPC adopt the same weighted average methodology for
161 calculating the test year sinking fund balances as it uses for calculating the
162 outstanding principal balances. Adoption of this modification to the current
163 approach will eliminate arithmetic anomalies that are associated with using a
164 simple mid-year average when calculating the embedded debt cost.

165

166 Q. In response to BR-HC.7, Drs. Kryzanowski and Roberts refer to their calculated
167 2005/2006 embedded cost for the 11% sinking fund debenture issued in 1989 of
168 215.57% and say that it "would give the appearance of being usurious." Is the
169 embedded cost so calculated meaningful?

170

171 A. No. The calculated rate is primarily a function of the fact that (1) the specific
172 debt issue is very close to maturity and thus the amount of the net proceeds (the
173 denominator of the formula) is very small since the sinking fund was virtually
174 fully funded in 2005/2006; (2) the projected earnings on the related sinking fund
175 reflect the fact that the issue is to be retired shortly and thus the related
176 investments have been immunized, i.e., their duration is similar to the remaining
177 term to maturity of the debt; and (3) interest rates happen to be at a relatively low
178 level at present compared to 1989 when the 11.0% issue was made. What is
179 important is not the calculated embedded cost but the cost of the loan over its life
180 (based on the net present value of the interest and sinking fund contributions),
181 which is expected to be approximately 12%. The difference in the coupon rate
182 and the effective cost reflects the significant decline in interest rates since 1989,
183 over which the Corporation had no control. At the time of the March 1989
184 sinking fund debenture issue, the prevailing yield on long-term B++ rated utility
185 debt³ was approximately 11.8%. Despite the significant decline in interest rates
186 since the time of issue, the effective cost of the March 1989 sinking fund
187 debenture has not turned out to be significantly higher than the long-term yields
188 that were available to utility issuers rated B++ at the time.

189
190 Q. Drs. Kryzanowski and Roberts then claim that NTPC did not follow “best
191 practices” when they issued the sinking fund issues, suggesting that the
192 Corporation could have issued debt with less stringent sinking fund features.
193 Please comment on this claim.

194
195 A. This claim assumes that terms and conditions that might have been available to
196 firms with a reasonable track record and with whom investors were familiar (e.g.
197 whose debt was issued into the public market) would also have been available to
198 NTPC. This claim is without basis. At the time the sinking fund debentures were
199 issued (1989-1998), NTPC was a virtually unknown quantity from a

³ A B++ rating by the Canadian Bond Rating Service (purchased by Standard & Poor’s in 2000) was equivalent to a BBB+ rating by Standard & Poor’s, a BBB(High) rating by DBRS, or a Baa1 rating by Moody’s.

200 creditworthiness perspective, and was issuing relatively small amounts of debt,
201 and thus there would have been very few potential investors for NTPC long-term
202 debt. While its debt carried a guarantee from the Government of the Northwest
203 Territories (GNWT), neither NTPC nor the government itself had a credit rating.
204 In fact, the GNWT has only had a credit rating from Moody's since February
205 2005. NTPC had no access to the public markets at the time of its sinking fund
206 issues; its only potential sources of long-term financing were private placements
207 with banks or insurance companies. Consequently, the terms and conditions for a
208 long-term bond issue for NTPC during the 1989-1998 timeframe would have been
209 more stringent than those available to issuers with greater market standing.
210 Without the sinking fund provisions, it is unquestionable that the costs of the
211 various issues would have been higher. It is also dubious that, at least for the
212 earliest issue, NTPC would have even been able to negotiate a long-term debt
213 issue without a sinking fund.

214

215 In this context, it also bears noting that Drs. Kryzanowski and Roberts' contention
216 that NTPC borrows with the implicit guarantee of the federal government (NTPC-
217 HC.3) is patently incorrect. If this were the case, NTPC would have been able to
218 issue debt that reflecting the Federal Government's cost of borrowing. This
219 unambiguously has not been the case.

220

221 Moreover, the implication that NTPC did not actively seek to obtain the most
222 cost-effective long-term financing available on behalf of ratepayers is
223 unwarranted. Further, each of the sinking fund issues that was issued by NTPC
224 while under Board regulation was subject to Board review and approval. From
225 the perspective of regulatory fairness alone, it would be unreasonable to revisit
226 the terms and conditions of bonds that were issued up to 17 years ago.

227

228 Q. Drs. Kryzanowski and Roberts also allege that the Corporation followed an
229 imprudent investment policy when investing the sinking funds because, until the

230 proclamation of Bill 9, the funds were invested according to the Financial
231 Administration Act (FAA). Do you have any comments?

232

233 A. Yes. First, I find it perplexing that Drs. Kryzanowski and Roberts would consider
234 that following the law somehow constitutes imprudence. Second, the investments
235 allowed under the FAA prior to Bill 9 were substantively the same as those in
236 which the sinking funds of other government-owned electric utilities continue to
237 be invested, as indicated in Rebuttal Schedule 4. None of these entities invest the
238 sinking funds designed to retire debt securities in equities, as NTPC has been
239 permitted to do under the provisions of Bill 9.

240

241 Q. Would the fact that, prior to Bill 9, the Corporation did not have the ability to
242 invest the sinking fund contributions in the same range of investments as today
243 have a significant impact on the current embedded cost of the sinking fund debt
244 issues?

245

246 A. No. The sinking fund balances would be approximately the same today,
247 irrespective of the past earnings on the funds. The contributions to the funds are
248 adjusted each year to take into account changes in the expected level of earnings
249 in order to ensure the balance in the fund will equal the principal amount to be
250 retired at maturity. These contributions are made from the Corporation's cash
251 flows and do not form part of the revenue requirement.

252

253 Q. Drs. Kryzanowski and Roberts claim that the Corporation's forecast sinking fund
254 earnings for the test years are low and inconsistent with your forecasts of long-
255 term Canada bond yields. Are these claims true?

256

257 A. No. As discussed in the rebuttal evidence of the Corporation, the level of the
258 forecast returns on the sinking funds is in part a function of the timing of the
259 forecasts, i.e., they reflect the outlook for returns on the sinking fund investments
260 at the time the Corporation prepared its budget. More importantly, the forecast

261 returns on the sinking funds are not returns for 30-year Canada bonds. They
262 represent a return on a portfolio of sinking fund assets that is of considerably
263 shorter duration than 30 years, specifically in recognition of the retirement of the
264 March 1989 sinking fund debenture in March 2009 and two of the other sinking
265 fund debentures in 2011 and 2012.

266

267 Q. Drs. Kryzanowski and Roberts point to a decision of the Public Utilities Board of
268 Alberta in support of their recommended cost of debt calculation. Do you believe
269 the referenced decision should govern the calculation of the embedded cost of
270 debt for NTPC?

271

272 A. No. The decision of the Public Utilities Board of Alberta, which was issued
273 almost 20 years ago (1989), is, to my knowledge, the only decision of that
274 regulator to deal with sinking funds. The issue arose in the context of a
275 proceeding whose purpose was to determine the price at which TransAlta, Alberta
276 Power and Edmonton Power would sell electricity to the Alberta Electric
277 Marketing Agency. The decision related to the cost of debt of Edmonton Power,
278 the only one of the three utilities that had sinking fund debt. The Public Utilities
279 Board did not regulate the retail rates of Edmonton Power; the retail rates were
280 regulated by the City of Edmonton. Further, the appropriate treatment of the
281 sinking funds was only raised in the proceeding because Edmonton Power was
282 proposing to deduct from its interest expense only the required level of sinking
283 fund earnings, not the full amount of the forecast earnings (which, at the time,
284 were in excess of the required level).

285

286 In my view, if this Board is going to look to the cost of debt methodology
287 followed by other regulators, it should look to those jurisdictions where sinking
288 fund debt and sinking fund assets are a common feature of the utilities'
289 operations. There are four jurisdictions in Canada (other than the Northwest
290 Territories) with Crown utilities regulated on a rate base/rate of return basis and
291 whose capital structures include sinking fund debt (with offsetting sinking fund

292 assets). The utilities and the jurisdictions are: BC Hydro (British Columbia
293 Utilities Commission), NB Power Transmission Corporation (New Brunswick
294 Board of Commissioners of Public Utilities), Hydro Québec Distribution and
295 TransÉnergie (Régie de l'Énergie de Québec), and Newfoundland and Labrador
296 Hydro (Newfoundland and Labrador Board of Commissioners of Public
297 Utilities).⁴ All four of these utilities calculate their embedded cost of debt using
298 the same methodology as NTPC. In three of these jurisdictions (British
299 Columbia, Québec, and Newfoundland and Labrador), the propriety of the
300 embedded cost of debt calculation has not been questioned. In New Brunswick,
301 the methodology was explicitly reviewed by the regulator in 2003 and found to be
302 appropriate.⁵

303

304 Q. Drs. Kryzanowski and Roberts claim that NTPC's calculation of the embedded
305 cost of debt is contrary to the Board's Decision 1-91 (response to NTPC-HC.25).
306 Do you believe that to be the case?

307

308 A. No. The Board stated in Decision 1-91 that the cost of debt should be calculated
309 as "the sum of the annual debt cost and the amortization of offering discount,
310 underwriting discount and related expenses for each long term debt issue, divided
311 by the average net proceeds for each long term debt issue." (p.40) Two matters
312 should be noted. First, the decision does not define "annual debt cost" or "average
313 net proceeds" for the purposes of this calculation. In this GRA, NTPC has used
314 the debt balance net of sinking funds as the "average net proceeds" of its debt, and
315 the interest expense net of all sinking funds earnings as its "annual debt cost".
316 This would appear to be a reasonable interpretation of the Board Decision cited.
317 Second, it is important to note that there were no sinking funds at the time of
318 Decision 1-91. Thus, there was no reason for the Board to specifically mention

⁴ NTPC provided documentation from the relevant regulatory documents for BC Hydro and Newfoundland and Labrador Hydro in response to BR-NTPC.17.

⁵ New Brunswick Board of Commissioners of Public Utilities, Decision in the matter of an Application dated June 21, 2002 by New Brunswick Power Corporation in connection with an Open Access Tariff, March 13, 2003, p. 12.

319 sinking funds in its description of the calculation of the embedded cost of debt,
320 because they were not relevant. There were also no sinking funds at the time of
321 the subsequent GRA (1993/94). The exclusion of the sinking funds in the
322 calculation of the embedded cost of debt in the 1995/1998 GRA was an oversight
323 on the part of the Corporation, which arose because there were no existing sinking
324 funds when the GRA was being prepared. The first sinking fund contribution was
325 not made until March 1995. However, their inclusion would have had no material
326 impact on the calculated embedded cost of debt, during those test years because
327 the sinking funds were small relative to the outstanding debt. The proper
328 principles for estimating the embedded cost of debt in the presence of sinking
329 funds were utilized by the Corporation in its 2001/2003 GRA filing and accepted
330 as part of the negotiated settlement approved by the Board in Decision 1-2002
331 (dated February 15, 2002).

332

333 Q. Drs. Kryzanowski and Roberts are proposing that for the two test years, if the
334 Board does not accept their embedded cost of debt methodology, the Corporation
335 should bear 100% of any shortfall between the actual investment returns on the
336 sinking funds and a benchmark return that reflects its potential universe of
337 securities and share with ratepayers any returns above the benchmark. What do
338 you think of that proposal?

339

340 A. It is inappropriate from several perspectives. First, it is asymmetrical. It is not
341 reasonable to impose 100% of the downside risk on NTPC but require it to share
342 the upside with ratepayers. Second, Drs. Kryzanowski and Roberts want to
343 compare the earnings on the total sinking funds, including the portion immunized
344 in anticipation of the retirement of the March 1989 issue in 2009, to a benchmark
345 that reflects the potential universe of securities (including equities). Such a
346 benchmark would be unreasonable. It would not be prudent for the Corporation
347 to have the immunized sinking funds invested in equities, which the “benchmark”
348 as described appears to envision. Third, in principle, the comparison of the actual
349 returns on the sinking funds to a benchmark (assuming one could be found that

350 would be agreeable to all parties) appears to be an unwieldy proposal which, as
351 described by Drs. Kryzanowski and Roberts, could produce perverse results.

352

353 **CAPITAL STRUCTURE**

354

355 Q. Drs. Kryzanowski and Roberts are proposing a hypothetical capital structure
356 containing 42% common equity. Do you believe this is appropriate?

357

358 A. No. I see no reason why the Board should deviate from its past practice of setting
359 the allowed return on the basis of the actual capital structure forecast by NTPC
360 unless the actual capital structure is unreasonable. There is no evidence proffered
361 by Drs. Kryzanowski and Roberts that would suggest that the actual test year
362 capital structure ratios of NTPC, which Drs Kryzanowski and Roberts agree is a
363 higher risk utility, are unreasonable.

364

365 Q. Drs. Kryzanowski and Roberts use the allowed common equity ratios of a number
366 of Canadian utilities in support of their recommendation. They conclude that
367 based on the average of the allowed equity ratios of this group, an allowed
368 common equity ratio of 38% for an average risk utility would be generous. Do
369 you agree?

370

371 A. No. First, the sample of Canadian utilities selected by Drs. Kryzanowski and
372 Roberts is unnecessarily narrow. It overlooks the allowed common equity ratios
373 for a number of Canadian electric utilities, all of which have ratings in the A
374 category, and all of which would suggest that an appropriate allowed common
375 equity ratio for an average risk integrated electric utility would be higher than
376 38%. For example, the most recent allowed common equity ratio for
377 Newfoundland Power (a distribution utility with a comprehensive slate of deferral
378 accounts) was 44.5%⁶; the allowed common equity ratio of Maritime Electric
379 (also a distribution utility) is 42.7% (with an allowed return on equity of 10.25%).

⁶ With a cap of 45% and any “excess” common equity treated as preferred shares.

380 The allowed common equity ratio for all of the distribution utilities in Ontario
381 was recently set at 40%.⁷ As I indicated in my direct testimony, electricity
382 distribution utilities face less business risk than integrated electric utilities like
383 NTPC. All other things equal, the higher business risks of an integrated electric
384 utility compared to a distribution (or “wires” utility) warrants a higher common
385 equity ratio.

386

387 Second, with respect to the companies that were considered by Drs. Kryzanowski
388 and Roberts, the allowed equity ratio of TransCanada PipeLines shown in
389 Schedule 3.5 as 36% will be raised to 40% as the result of a February 2007
390 negotiated settlement. Nova Scotia Power, shown at a common equity ratio of
391 37.5%, has been authorized by a prior regulatory decision to raise its ratemaking
392 equity ratio to 40%. In addition, its allowed capital structure contains 9%
393 preferred equity shares, which are given 70% equity treatment by DBRS.

394

395 Third, two of the utilities included in Drs. Kryzanowski and Roberts’ Schedule
396 3.5 – FortisBC and Pacific Northern Gas – also have incremental equity risk
397 premiums associated with their allowed return on equity (relative to the
398 benchmark utility), so their common equity ratios alone are not a complete
399 representation of the total compensation to the shareholder.

400

401 Thus, the information used by Drs. Kryzanowski and Roberts does not provide a
402 full representation of the risk compensation afforded the average risk Canadian
403 utility.

404

405 Q. Drs. Kryzanowski and Roberts then use the allowed common equity ratio for
406 ATCO Pipelines of 42% as a benchmark for NTPC, because it represents an
407 example of a higher risk utility drawn from the group of eleven utilities for which
408 the Alberta Energy and Utilities Board (EUB) set allowed common equity ratios

⁷ Ontario Energy Board, *Report of the Board on Cost of Capital and 2nd Generation Incentive Regulation for Ontario’s Electricity Distributors*, December 20, 2006.

409 in their Generic Cost of Capital Decision 2004-052 (“Generic Decision”), July
410 2004). Is this example relevant?

411

412 A. Yes, it is relevant, but the decision of one regulator for one utility can not be
413 interpreted as conclusive evidence of the appropriate capital structure for NTPC.
414 Moreover, both of the major debt rating agencies in Canada consider the common
415 equity ratios and equity returns be too low. Subsequent to the Generic Decision,
416 DBRS commented on the low allowed deemed common equity ratios and the
417 allowed equity returns of the ATCO utilities. DBRS referred to the low deemed
418 equity and returns as a “challenge” for the ATCO Utilities and stated:

419

420 While ATCO’s diversified operations, coupled with the Company’s
421 prudent management approach, provide a level of earnings stability,
422 additional challenges over the medium term include the relatively low
423 approved returns on equity (ROE) and deemed equity for the regulated
424 businesses, continuing regulatory risk and lag and ATCO’s merchant
425 power exposure in Alberta. (DBRS, *Credit Rating Report: ATCO Ltd.*,
426 December 29, 2004)
427

428 Like DBRS, Standard and Poor’s (S&P) has made references to the low level of
429 equity ratios allowed in the EUB’s Generic Decision for the Alberta utilities. For
430 example, S&P commented on the thin equity layers (and the low equity returns)
431 allowed the ATCO group of utilities after the EUB decision, stating,

432

433 The regulatory regime, although comparable with other provinces in
434 Canada, typically approves less generous returns on thinner equity layers
435 than those approved for ATCO’s global peers. Approved returns for
436 ATCO’s regulated businesses are 9.6% on equity layers varying from
437 33%-43% of total capital. (S&P, *Research Update: ATCO Group of
438 Companies ‘A’ Ratings Affirmed; Outlook Stable*, November 9, 2004)
439

440 Q. Drs. Kryzanowski and Roberts also use the range of common equity ratios
441 established in past decisions of this Board from 1997 to the present as an
442 additional benchmark. Please comment.

443

444 A. While common equity ratios approved by this Board either by way of negotiated
445 settlement or as a result of a full hearing are relevant, it is also necessary to
446 consider the context. For each of the ten test years⁸ for which a decision has been
447 rendered since the Board began regulating NTPC, the approved common equity
448 ratio has reflected NTPC's forecast actual capital structure. The approved
449 common equity ratio has averaged 45% since the 1989/1990 test year. While the
450 approved common equity ratios for the most recent five test periods have been
451 below the average, the lower ratios reflect (1) the initial assumption of the lease
452 related to the Snare Cascades hydro-electric generating station in 1994 and (2)
453 transitional impacts on NTPC's capital structure when Nunavut Power was
454 created (and NTPC assumed 100% of the capital lease). The fact that the actual
455 common equity ratios which were adopted for ratemaking purposes in the last five
456 test periods were lower than average should not be interpreted as an indicator that
457 the appropriate common equity has been declining; they are largely attributable to
458 two very specific events that temporarily increased the actual debt ratio.

459

460 Q. Drs. Kryzanowski and Roberts state that consideration of the non-taxable status of
461 NTPC in assessing the reasonableness of the capital structure violates the stand-
462 alone principle. Is that true?

463

464 A. No. The stand-alone principle means that the capital structure and return should
465 be set on the basis of NTPC's own business and financial risks, not on those of its
466 parent. However, if NTPC were to be rated by a debt rating agency on the basis
467 of its stand-alone risks, the rating agencies would not ignore the fact that its
468 coverage ratios have been lower than those of taxable utilities.

469

470 Both the EUB and the Canadian Radio-Television and Telecommunications
471 Commission (CRTC) have taken the taxability status of regulated firms into
472 account when setting allowed common equity ratios. In the Generic Decision, the

⁸ Drs. Kryzanowski and Roberts' Schedule 3.6 left out Decision 2-94 for the 1993/1994 test year in which the Board approved a common equity ratio of 46%.

473 EUB set the allowed common equity ratios for EPCOR and ENMAX two
474 percentage points higher than those of taxable electricity distributors (39% versus
475 37%) to allow them to account for their higher volatility in earnings. It also set the
476 allowed common equity ratio of AltaLink two percentage points higher than that
477 of a taxable transmission utility to maintain the same interest coverage as if it had
478 been allowed a full income tax allowance. The CRTC recognized the non-taxable
479 status of AGT Limited (now Telus) in the initial years following privatization by
480 allowing a higher common equity ratio than those of taxable but similar business
481 risk telephone companies.⁹

482

483 Q. Drs. Kryzanowski and Roberts believe the argument that the income tax
484 allowance enhances coverage is flawed because it represents an overly simplistic
485 view of financial markets and debt ratings. They point to a number of utilities
486 with similar coverage ratios but different bond ratings in support of their position.
487 Does the fact that a number of utilities have similar interest coverage ratios but
488 different debt ratings support their position?

489

490 A. No. If two utilities have similar coverage ratios but different levels of business
491 risk, the utility with the higher business risk will tend to have a lower debt rating.
492 The comparison among utilities offered by Drs. Kryzanowski and Roberts
493 demonstrates that to be the case. In addition, the ratios they provide are only for a
494 single year. Debt rating agencies look at trends in ratios (both historic and
495 forecast) in determining debt ratings.

496

497 Q. In response to NTPC-HC.4, Drs. Kryzanowski and Roberts point to the recent
498 upgrades of certain government-owned utilities by DBRS in support of their
499 contention that the debt rating agencies do not share concerns about the taxability
500 status. Do the upgrades support that conclusion?

501

⁹ Telecom Decision CRTC 92-9, AGT Limited, May 26, 1992.

502 A. Only one government-owned utility with its own debt rating, Enersource in
 503 Ontario, has had its long-term debt upgraded by DBRS within the past two years.
 504 Nevertheless all of the Ontario utilities, including the government-owned utilities,
 505 are taxable. They make payments in-lieu-of taxes to the Provincial government
 506 which are determined in the identical manner to the requirements of the Canada
 507 Revenue Agency. The recent pre-tax interest coverage ratios for the government-
 508 owned Ontario electricity utilities that have their own DBRS debt rating are
 509 shown in the table below. The indicated coverage ratios are well in excess of the
 510 coverage ratios implied by Drs. Kryzanowski and Roberts' recommendations on
 511 capital structure and return on equity.

512 **Table 1**

	Current DBRS Rating	EBIT Coverage for Year Ending:	
Enersource	A	2004	2.13x
Hydro One	A(high)	2005	3.34x
Hydro Ottawa	A(low)	2005	2.68x
Toronto Hydro	A	2005	2.72x
Veridian	A	2005	3.06x
Average			2.76x

513
 514 Source: DBRS
 515

516 Q. Drs. Kryzanowski and Roberts, in response to BR-HC.2, claim that their
 517 recommendations on capital structure and return on equity would result in interest
 518 coverage ratios of 1.93x and 1.98x for the two test years respectively and
 519 conclude that these are reasonable. Are these ratios correct?

520
 521 A. No. First, the ratios do not recognize that the witnesses' recommended recovery
 522 of interest expense on the long-term debt is below the actual interest expense that
 523 NTPC will incur (\$8.058 million recommended versus \$9.106 million¹⁰ in actual
 524 forecast interest expense in 2007/2008). Second, their interest coverage ratios
 525 simply ignore the interest on the capital lease, which makes up close to 11% of
 526 NTPC's forecast capital structure in 2007/2008. Merely including Drs.

¹⁰ \$9.106 million = Interest Expense of \$10.755 million less Interest Revenue of \$1.649 million.

527 Kryzanowski and Roberts' proposed return on the capital lease in the interest
528 coverage calculation¹¹, the interest coverage ratio for 2007/2008 falls from 1.98x
529 to 1.62x based on their recommended return on rate base (\$15,965). The actual
530 interest coverage for the regulated operations – assuming that NTPC would
531 continue to pay to Dogrib Power Corporation (DPC) the forecast amount called
532 for under the lease – would only be 1.43x.

533

534 Q. Drs. Kryzanowski and Roberts claim that the interest coverage produced by their
535 recommendation is reasonable relative to those of BC Hydro, Manitoba Hydro
536 and Hydro Québec. Are Drs. Kryzanowski and Roberts' comparisons relevant?

537

538 A. No. All three of the utilities have debt ratings that are simply a flow-through of
539 the Provincial government ratings. Further, neither BC Hydro nor Manitoba
540 Hydro is charged with operating as a commercial enterprise; neither maintains a
541 capital structure that reflects its own stand-alone business risks. Consequently,
542 the coverage ratios of these utilities provide no insight into how the capital
543 markets would view them on a stand-alone basis.

544

545 Q. Does the Corporation operate with a target capital structure?

546

547 A. Yes. The Corporation's target common equity ratio has been a range of 45-50%
548 since that range was adopted in 1995. The target capital structure was established
549 as a result of a directive of the Board in Decision 2-94, in which the Board
550 directed NTPC "to review the capital structure in light of the Board's comments
551 and to propose an appropriate capital structure consistent with NTPC's business
552 risks at the time of its next GRA." The required study was performed, the
553 recommended long-term target range of common equity ratios of 45-50% was
554 adopted by the Corporation, and the study was filed with the Board in the 1995/98
555 GRA. The forecast common equity ratios fall within the long-term capital

¹¹ That is, with no consideration of the fact that NTPC's actual interest/capital lease costs are higher than the amounts included in Drs. Kryzanowski and Roberts' recommendations.

556 structure targets. There has been no evidence offered by Drs. Kryzanowski and
557 Roberts to support departure from the long-term target range.

558

559 **TREATMENT AND COST OF CAPITAL LEASE**

560

561 Q. Drs. Kryzanowski and Roberts claim that the treatment of the capital lease as if it
562 were 100% debt understates the actual equity ratio of NTPC. Are they correct?

563

564 A. No. Under the provisions of the Dogrib Power Project Agreement, NTPC (the
565 regulated utility) is to make payments for the lease of Snare Cascades hydro-
566 electric generating station owned by the Dogrib Power Corporation (or DPC).
567 The payments to DPC are comprised of interest on the debt that DPC raised to
568 finance the construction of the hydro-electric generating station, a return on
569 DPC's equity in the project, depreciation and amortization expense and an amount
570 for the operations and maintenance expenses of Dogrib Power. The agreement
571 calls for the return on the equity of DPC to be equal to the return on equity that
572 NTPC is allowed by the Board less 0.25%.

573

574 From the perspective of NTPC, the payments NTPC is required to make to DPC
575 under the lease are fixed obligations that must be made to DPC and represent
576 100% debt to NTPC. The equity return component of the lease payments relates
577 to the equity of DPC. NTPC gains no equity benefit from the provisions of the
578 Agreement. The fact that the Agreement calls for NTPC to compensate DPC for
579 the latter's equity position in the project has no bearing on the regulated equity of
580 NTPC.

581

582 Q. Do you agree with Drs. Kryzanowski and Roberts that the rate imputed as the cost
583 of the lease is too high?

584

585 A. No. The rate imputed as the cost of the lease reflects the weighted average cost of
586 capital of DPC, where the debt component is the weighted average cost of DPC's

587 debt financing. DPC’s cost of debt financing, in turn, represents the actual cost of
588 borrowing from NWT Energy Corporation under a loan agreement between the
589 two parties. To provide the debt financing to DPC, NWT Energy Corporation
590 issued three series of debentures as follows:

591

592

Table 2

Date of Issue	Amount of Issue	Due Date	Coupon Rate
May 1995	\$8 million	May 1, 2025	10.00%
October 1995	\$8 million	October 1, 2025	9.75%
September 1996	\$9 million	September 1, 2026	9.11%

593

594

595 The weighted average cost of the debt that was issued by NWT Energy and loaned
596 to DPC was 9.6%. None of these issues is a sinking fund debenture. The 9.6%
597 average cost of debt incurred by DPC is the same 9.6% rate that is included in the
598 calculation of the capital cost of the lease that is part of NTPC’s revenue
599 requirement. Drs. Kryzanowski and Roberts speculate in their evidence that the
600 cost of debt included in the lease may be a weighted average embedded cost of all
601 of the outstanding debt of the Corporation at the time. That is not correct. The
602 cost of debt in the lease payments is the weighted average actual cost of debt
603 specifically issued by NWT Energy and loaned to DPC to finance the construction
604 and ownership of its Snare Cascades hydro-electric generating station. This debt
605 is not part of the regulated capital structure of NTPC, and is not included in the
606 GRA. As the cost of debt as provided for in the Agreement between DPC and
607 NTPC reflects actual debt issues of NWT Energy and the resulting cost of debt of
608 DPC, the entire discussion of Drs. Kryzanowski and Roberts with respect to
609 “regulatory arbitrage” (page 111) is moot.

610

611 Q. Is there any way to judge retrospectively whether the cost of debt incurred by
612 NWT Energy and thus DPC were reasonable at the time of issue?

613

614 A. Yes. As stated in Board Decision 1-97 (January 14, 1997), the Board “examined
615 the evidence before it and agrees with the parties that the above interest rates are
616 reasonable for this portion of the capital structure. The Board approves lease
617 interest rates of 10.063% and 10.044% for the Test Years 1996/97 and 1997/98
618 respectively.” In my view, a retrospective reconsideration of the prudence of the
619 capital lease arrangement entered into by NTPC more than 10 years ago
620 constitutes retroactive ratemaking.

621

622 Nevertheless, a comparison of the yields on the NWT Energy debentures to yields
623 prevailing on outstanding long-term B++ rated Canadian utility bonds at the time
624 the NWT Energy debt issues were made and the funds were loaned to DPC
625 provides a clear indication that the cost of the debt component of the capital lease
626 was reasonable.

627

628 Q. Why is the proper comparison to B++ rated utility bonds when the Government of
629 the Northwest Territories (GNWT), which guarantees the Corporation’s debt, has
630 a debt rating by Moody’s of Aa1¹²?

631

632 A. As previously noted, the GNWT has only been rated by Moody’s since February
633 2005. Debt issued by the Corporation or a subsidiary of the Corporation in the
634 mid-1990s would not likely have been able to achieve a debt rating higher than
635 B++, given the Corporation’s small size (and the small size of its debt issues), its
636 business risk profile and relative unfamiliarity to potential investors at the time.

637

638 Q. What were the yields on B++ rated long-term Canadian utility bonds at the time
639 the three debt issues by NWT Energy were done?

640

¹² Equivalent to a CBRS rating of A+ (High). The rating of the GNWT was upgraded from Aa3 to Aa1 in November 2006.

641 A. The yields on outstanding long-term B++ rated Canadian utility bonds at the end
642 of the month prior to the month of each of the three debt issues are presented
643 below.

644
645

Table 3

Date	Yields on B++ Rated Utility Debt
April 1995	10.42%
September 1995	10.15%
August 1996	8.67%

646

647 Note: The April and September 1995 yields represent a
648 composite of long-term issues (10 years or more to
649 maturity); the August 1996 yield is for 30-year debt
650 only.

651 Source: Canadian Bond Rating Service

652

653 The table above confirms that the cost of the debt component of the capital lease
654 between NTPC and DPC was reasonable in light of capital market conditions at
655 the time.

656

657 Q. What about the return on the equity component of the lease?

658

659 A. Drs. Kryzanowski and Roberts claim that the return on the equity component
660 should be lower than the equity return for NTPC since the risk of a capital lease is
661 no higher than the risk of secured debt. In fact, the rate of return on DPC's equity
662 component (which represents only 6.74% of DPC's capital structure) is 0.25%
663 lower than NTPC's allowed return on equity, as specified in the Agreement
664 between NTPC and DPC. Since DPC bears the risk of cost disallowances related
665 to the Agreement, as well as the risk that the payments required under the lease
666 will not fully cover its actual costs, a return on the DPC equity component of its

667 capital structure equal to NTPC's allowed equity return less 0.25% is
668 reasonable.¹³

669

670 Q. Drs. Kryzanowski and Roberts also conclude that NTPC somehow gains from the
671 regulatory process and its non-taxable status in the lease arrangement. Do you
672 believe that is the case?

673

674 A. No. There is no gain to NTPC from the regulatory process and its non-taxable
675 status. First of all, while NTPC can include the full amount of the depreciation
676 and the capital costs of the lease in its revenue requirement, those amounts are
677 fully passed through to DPC as part of the cost of the lease.

678

679 Second, there is no gain to NTPC relative to a taxable utility that had entered into
680 a similar lease arrangement. The taxable utility would have been able, as is
681 NTPC, to include the depreciation expense and the full amount of the capital costs
682 of the lease in its revenue requirement. The depreciation expense and the full
683 amount of the capital costs of the lease (both the interest and equity
684 components)¹⁴ would have been deductible by the taxable utility for income tax
685 purposes. The only difference between the taxable utility and NTPC is that the
686 taxable utility would have also been authorized to recover in its revenue
687 requirement an allowance for corporate income taxes so as to be able to earn an
688 after-tax return on its common equity equal to that allowed by its regulator. All
689 other things equal (e.g. rate base, capital structure and allowed return on equity),
690 the cost of the lease to the ratepayers of a taxable utility would be higher than that
691 incurred by the ratepayers of NTPC by the amount of the income tax allowance.

692

¹³ Since the Agreement provides for the return on the DPC equity to track NTPC's allowed return, ratepayers have benefited from the reduction in NTPC's allowed/negotiated returns on equity since the capital lease was executed. Had the return on equity been fixed over the term of the Agreement – which would not be unusual – the return on the equity component of the lease could have remained fixed over its term at the 0.25% below NTPC's allowed return at the time the Agreement was finalized, that is, at a return on equity of 11.60% (11.85% - 0.25%).

¹⁴ From the perspective of the lessee, 100% of the capital costs are interest for income tax purposes

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FAIR RETURN ON EQUITY

- Q. Please summarize your rebuttal testimony on the fair return on equity.
- A. The key points of my rebuttal testimony are summarized below:
1. I have updated the results of my equity risk premium and discounted cash flow tests. The results indicate that a fair return on equity for NTPC remains at 10.5% and 10.75% for the 2006/07 and 2007/08 test years respectively.
 2. The recommended returns of Drs. Kryzanowski and Roberts of 6.75% and 7.20% are well below the range of reasonableness.
 3. The lowest return allowed for an investor-owned Canadian utility subject to an automatic adjustment mechanism at the 4.65% long-term Canada bond yield forecast by the witnesses for the 2007/08 test year is 8.7%. Recent allowed returns for mature electric utilities in Canada have been as high as 10.25%.
 4. Capital market participants, including debt rating agencies, pension funds and equity analysts, consider the returns allowed for Canadian utilities to be too low, particularly in comparison to their U.S. peers.
 5. The allowed returns for the typical state-regulated U.S. gas and electric utility have recently been approximately 10.3-10.4% on equity ratios of 48%. The allowed returns for electric transmission companies set by the federal regulator have been higher, averaging approximately 11.5%.

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6. In contrast to Drs. Kryzanowski and Roberts' recommended returns, my recommended returns on equity for NTPC are within the range of returns that have actually been allowed for NTPC's North American peers operating in a similar capital market and risk environment.

7. Drs. Kryzanowski and Roberts rely solely on one test, the Capital Asset Pricing Model, a variant of the equity risk premium test, to estimate the cost of equity. The Capital Asset Pricing Model is not inherently superior to other tests, and sole reliance on its results for the purpose of setting a fair return on equity is not appropriate. The Capital Asset Pricing Model does not even attempt to address the comparable earnings standard of a fair return on equity. In contrast, I have relied on five different tests for estimating a fair return, which results in a more robust approach to the estimation of a fair return.

8. Drs. Kryzanowski and Roberts' critiques of my application of the various tests are unwarranted. My rebuttal testimony addresses each of the principal methodological critiques that have been put forward by the witnesses. In sum, there is no basis for Drs. Kryzanowski and Roberts' conclusion that my recommended returns on equity for NTPC are upwardly biased.

Q. Please update your recommended return on equity for NTPC to reflect more recent available data.

A. With respect to the equity risk premium test, the actual 30-year Canada yield for the 2006/2007 test year was 4.25%, compared to the forecast yield of 4.3% used in my pre-filed testimony. For the 2007/2008 test year, the average forecast 10-year Canada bond yields from the most recent Consensus Economics, *Consensus Forecasts* (April 10, 2007) are 4.0% and 4.4% in July 2007 and April 2008

752 respectively for an average of 4.2%. The median forecasts, preferred by Drs.
753 Kryzanowski and Roberts, are 4.15% and 4.5% respectively, for an average of
754 4.3%. While current spreads between 10- and 30-year Canada bond yields
755 continue to be at historically low levels (currently 8 basis points), it is reasonable
756 to expect the yield curve to resume its normal upward slope. As I noted in my
757 pre-filed testimony, the average spread between 10- and 30-year Canada bond
758 yields has been approximately 30 basis points.¹⁵ On that basis, I see no reason to
759 change my forecast of 4.5% for long-term Canada bond yields for the 2007/2008
760 test year. By comparison, Drs. Kryzanowski and Roberts are relying on a forecast
761 of 4.65% for the 2007/2008 test year.

762
763 An update of the historic Canadian, U.S. and U.K. equity and bond market returns
764 through 2006 leads to slightly higher achieved risk premiums in all three countries
765 (approximately 20 basis points for all three on both an arithmetic and geometric
766 average basis); see Schedule 7, Updated. There have been no changes that would
767 cause me to revise my estimate of the equity market risk premium of 6.5%. My
768 estimate of the relative risk adjustment of 0.65-0.70 also is unchanged. The
769 resulting equity risk premium remains at 4.25% to 4.75%.

770
771 An update of the historic utility risk premiums based on averages calculated
772 through 2006 does not change the achieved Canadian utility risk premiums; the
773 achieved U.S. utility risk premiums increase by approximately 20 basis points
774 (See Schedule 14, Updated). The addition of 2006 data does not change my
775 estimated utility risk premium of 5.0-5.5%.

776
777 The DCF-based equity risk premium test was also updated through the end of
778 2006. The update indicates an average utility risk premium over the 1993-2006
779 period of 3.9% (at an average 30-year government bond yield of 5.9%) and an
780 average risk premium of 4.3% for the period 1998-2006 (average 30-year

¹⁵ Average over the entire period (June 1982-March 2007) for which the Bank of Canada has been separately reporting yields on 10-year and 30-year benchmark bonds.

781 government bond yield of 5.3%); see Schedule 16, Updated, page 1 of 2. An
782 update of the correlation analyses between (1) interest rates and equity risk
783 premiums and (2) interest rates, equity risk premiums and utility/government
784 bond yield spreads result in an equity risk premium at a long Canada bond yield
785 of 4.25% for test year 2006/2007 of 4.6% and at the 2007/2008 test year forecast
786 30-year Canada yield of 4.50% of approximately 4.5% (See Schedule 16,
787 Updated, page 2 of 2).

788

789 Based on the three equity risk premium approaches, the indicated benchmark
790 equity risk premium remains in the range of 4.25-5.25% (mid-point of 4.75%) at
791 both the actual 2006/2007 30-year Canada bond yield of 4.25% and the forecast
792 2007/2008 test year forecast 30-year Canada bond yield of 4.50%.

793

794 The corresponding benchmark utility costs of equity at the 2006/2007 forecast
795 4.25% long Canada bond yield and the 2007/2008 forecast 4.50% long Canada
796 yield are 9.0% and 9.25% respectively. Adding 50 basis points for financing
797 flexibility results in benchmark returns on equity of 9.5% for 2006/2007 and
798 9.75%, unchanged from the pre-filed evidence.

799

800 The discounted cash flow (DCF) test was updated using daily prices for the month
801 ended April 13, 2007 and analysts' growth forecasts for March 2007. The
802 resulting DCF cost of equity based on both the constant growth and two-stage
803 models is approximately 8.5-9.0%, compared to 8.6-9.3% in the pre-filed
804 evidence (See Schedules 18 and 19, Updated). Inclusive of a 50 basis point
805 financing flexibility adjustment, the updated DCF test result is 9.0-9.5%,
806 compared to 9.0-9.75% in the pre-filed testimony.

807

808 The comparable earnings test was not updated since the 2006 returns on equity
809 are not yet available for all firms. The comparable earnings result remains
810 unchanged at 12.0%. However, given the strong growth in profits in 2006, I
811 would not expect a material change in the results.

812

813 In light of the minor changes in the results of the updated equity risk premium and
814 DCF tests, the benchmark returns on equity remain unchanged for both test years
815 at 10.0% and 10.25% respectively. Similarly, my recommended returns of 10.5%
816 and 10.75% for NTPC for the two test years remain unchanged.

817

818 Q. Drs. Kryzanowski and Roberts recommend a return on equity for an average risk
819 Canadian utility of 6.75% for 2006/2007 and 7.20% for 2007/2008. Please put
820 those recommendations into perspective.

821

822 A. The recommendations of Drs. Kryzanowski and Roberts, based on the application
823 of the Capital Asset Pricing Model, are premised on yields on 30-year
824 Government of Canada bonds of 4.20% and 4.65% respectively for the two test
825 years. The yield on long-term A/BBB+ rated utility bonds over the 2006/2007
826 test year was 5.5%. The current yield spread between long-term A/BBB+ rated
827 utility bonds and long Canadas is 1.25 percentage points, which translates into an
828 expected yield for the 2007/2008 test year of 5.90%. Drs. Kryzanowski and
829 Roberts' recommended returns on equity assume that equity shareholders require
830 a premium of only 1.30 percentage points to invest in utility equities at market
831 value rather than utility bonds.

832

833 Q. How would allowed returns on equity of 6.75-7.20% compare to the returns
834 allowed for other utilities?

835

836 A. They would be significantly lower than the returns allowed for other North
837 American utilities. At a long Canada yield of 4.65% as proposed by Drs.
838 Kryzanowski and Roberts for the 2007/2008 test year, the lowest allowed return
839 for a Canadian investor-owned utility subject to an automatic adjustment
840 mechanism would be 8.7%, 1.50 percentage points higher than the 7.20% return
841 recommended for 2007/2008. The range of allowed returns for all Canadian
842 investor-owned utilities subject to an automatic adjustment formula is 8.7% to

843 9.4%, or approximately 8.9% on average. The most recent allowed returns for
844 Canadian investor-owned utilities not governed by automatic adjustment
845 formulas have been in the range of 9.55% (Nova Scotia Power, February 2007) to
846 10.25% (Maritime Electric, June 2006). This Board recently approved a return
847 on equity of 9.5% for Northland Utilities (September 2006).

848

849 Q. Is there any evidence that capital market participants view the levels of Canadian
850 allowed returns as too low?

851

852 A. Yes. Both of the major debt rating agencies (DBRS and S&P) have commented
853 on the low level of allowed returns.

854

855 DBRS has commented generally on the relatively low common equity ratios and
856 returns that are allowed in Canada. In a May 2003 commentary,¹⁶ DBRS noted
857 that it would like to see both the deemed common equity ratios and allowed
858 equity returns increased to levels more consistent with U.S. returns.

859

860 As noted previously in the discussion of capital structure, DBRS commented on
861 both the low common equity ratios and approved equity returns of the ATCO
862 utilities subsequent to the EUB's Generic Cost of Capital Decision. Additional
863 DBRS reports citing the challenge of low approved returns on equity were
864 published for other Alberta utilities, i.e., AltaLink (November 2004), and
865 FortisAlberta (September 2004), following the Board decision. DBRS also
866 commented in a report for Ontario Power Generation (OPG) that regulated
867 vertically integrated utilities in the U.S. have deemed capital structures ranging
868 from 35% common equity to 55% common equity and have an approved ROE
869 ranging from 9.75% to 13.5%. A comparable entity to OPG (that is, a regulated
870 generation company), according to DBRS, would be near the top of both ranges.¹⁷

871

¹⁶ *The Rating Process and the Cost of Capital for Utilities: Five Reasons Why Canadian Utilities have Lower Ratios and Five Changes to Regulation Which Should be Introduced in Canada.*

¹⁷ DBRS, *Rating Report: Ontario Power Generation, Inc.*, August 3, 2006.

872 S&P has also commented on the low levels of allowed returns in Canada. A
873 report by S&P commenting on the low equity returns allowed the ATCO group of
874 utilities after the EUB Generic decision was cited earlier.

875
876 In a more recent report for AltaLink (rated A-), S&P stated,

877
878 Like many regulated utilities in Canada, AltaLink's average financial
879 profile is constrained by a comparatively low approved ROE (8.93% in
880 2006) on a thin deemed equity base of 35%. (S&P, *Research Summary:*
881 *AltaLink*, June 5, 2006)

882 In its report for Union Gas issued subsequent to the utility's 2006 settlement in
883 which the allowed common equity ratio was raised to 36%, the two weaknesses
884 referred to by S&P were the high leverage associated with company's regulated
885 capital structure and the relatively low allowed ROE compared with global peers
886 (S&P, *Research: Union Gas*, August 24, 2006).

887 In general, S&P considers that Canadian utility financial policies tend to be
888 aggressive with leverage and regulators parsimonious with returns (noting that
889 the "aggressive leverage" is largely a result of regulatory directives.

890 In the National Energy Board's August 2005 *Canadian HydroCarbon System*
891 *Report*, as noted above, pension funds had indicated to the Board that the basic
892 financial parameters (allowed return on equity and deemed capital structure) in its
893 regulatory scheme should be improved. In its 2006 report of the same name, the
894 NEB reported that a number of analysts felt that the ROE generated by the NEB
895 formula and by other Canadian regulators' formulas "were a little too low" and
896 not supportive of dividend growth or credit metrics. A number of analysts
897 commented that where they have "Buy" recommendations on utility stocks, the
898 recommendations tend to reflect the prospects of the unregulated operations.¹⁸

¹⁸ In many cases, the ROEs achieved by the entity whose shares are traded have been materially higher than the ROEs allowed under the formulas. The allowed ROE generated by the NEB formula averaged 9.6% over the period 2002 to 2005; the ROE reported for TransCanada Pipelines Ltd by DBRS over that same period was 12.7%. For Terasen Gas, its allowed ROE averaged 9.2%; Terasen Inc.'s ROE (as reported by DBRS) averaged 11.1%. Canadian Utilities Ltd. reported an average ROE of 14.7%, compared to its regulated subsidiaries' allowed ROEs of approximately 9.6%.

899 Analysts also commented that companies have reduced costs and taken other
900 steps to improve profitability and dividend growth for several years, and
901 wondered how long that could continue.

902
903 While equity analysts rarely comment on the level of allowed returns, one equity
904 analyst has expressed the view that the current level of allowed ROEs, expected to
905 be approximately 8.6% in 2007 when her report was prepared, are confiscatory.
906 Specifically, in *Pipelines/Gas & Electric Utilities*, dated December 7, 2006,
907 Karen Taylor, equity analyst for BMO Capital Markets, concluded:

908
909 We believe that regulators have consistently refused to give weight to a
910 number of arguments that would result in higher allowed returns, solely on
911 the basis that to do so would result in higher customer rates.

- 912
- 913 ● The North American capital markets are increasingly integrated
914 and investors have the ability to invest in utility assets north and
915 south of the border.
- 916 ● There is merit incorporating U.S. market metrics into the analysis
917 and that the Canadian benchmark equity portfolio (the S&P/TSX)
918 may not meet the theoretical requirement for a diversified market
919 portfolio.
- 920 ● The returns on comparable investments with similar risk, whether
921 they be Canadian or U.S. examples, should be considered.
- 922 ● The allowed return on equity and deemed equity must satisfy all
923 aspects of the Fair Return Standard and that no part of the Standard
924 has priority.
- 925 ● No pipeline or energy utility in our regulated coverage universe
926 has issued equity in the last five years to fund, on an unlevered
927 basis, a dollar-for-dollar equity investment in utility rate base.
928 Continued assertions by regulators that utilities have adequate
929 access to capital are not credible with respect to the equity
930 component, as access to equity has not been tested over the
931 ensuing period.
- 932 ● Continued investment in utility rate base by the owners of utilities
933 is not an acquiescence that the allowed return on equity is
934 appropriate and that investment may relate to other obligations
935 including the utility's obligation to be the supplier or supply of last
936 resort and fulfill the obligation to serve, maintain the safe and
937 reliable operation [of] or the utility, and may be fulfilling specific
938 conditions of its operating licence.

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- A failure by utility companies to annually litigate the allowed return on equity “formula” does not constitute acceptance of the adequacy of the allowed return. Rather, we believe that the lack of annual litigation reflects the cost of the process, the time required to pursue litigation that detracts from management’s ability to focus on the efficient operation of the business and the potential damage to important utility regulatory and customer relationships.
....
 - The evidentiary standard is too high and almost impossible to meet. Moreover, we believe that notwithstanding decisions from the Supreme Court that stipulate otherwise, utility regulators continue to rely heavily on their quasi-judicial and expert status to impose a bare-bones return on equity and drive down the deemed capital structure of the utility in order to protect customers from prices, without the fear of reconsideration upon appeal. Regulators must establish the cost of equity and deemed equity not because they are experts in this regard, but in order to establish just and reasonable rates. The regulator is not permitted to consider the effects on customers in the determination of the allowed ROE and capital structure, and we do not believe that the regulator is permitted to factor in other policy objectives into its determination of the allowed return on equity; i.e., we do not believe that the regulator is permitted to reduce the allowed return on equity and/or deemed equity for small utility companies in order to encourage consolidation or any other specific policy objective. We believe in these situations, that the inclusion of these other factors in the assessment of cost of equity and designation of deemed equity, unlawfully transfers value to utility ratepayers from its legitimate owner, the utility shareholders.
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970 Q. What have the average allowed returns on equity and the corresponding allowed
971 common equity ratios been?

972

973 A. The average return that was allowed for electric utilities by state regulators during
974 2006 was 10.4% on an average common equity ratio of 49%. During the first
975 quarter of 2007, the average return allowed was 10.3% on an average common
976 equity ratio of 48%. For gas distribution utilities, the average allowed return in
977 2006 was 10.4% on an average common equity ratio of 47%; the return allowed

978 during the first quarter of 2007 was also 10.4% on an average common equity
979 ratio of 48%.¹⁹

980

981 The baseline allowed returns (i.e., exclusive of incentives) allowed by the Federal
982 Energy Regulatory Commission (FERC) for transmission operations (considered
983 to be less risky than integrated electrics) during 2005 and 2006 have averaged
984 approximately 11.5%. The FERC has recognized the importance of allowing
985 reasonable returns in order to reverse the chronic underinvestment in transmission
986 infrastructure. The Conference Board of Canada, in reference to the allowed
987 returns for U.S. electricity transmission, underscored the importance of
988 competitive returns for transmission in Canada. In its May 2004 Briefing entitled,
989 *Electricity Restructuring: Opening Power Markets*, the Conference Board stated,

990

991 Investors are discouraged by limitations on the regulated cost recovery for
992 transmission upgrading. Transmission companies are simply not seeing
993 favourable risk/return ratios on their investments, and know that they can
994 realize better returns in the United States, where regulated rates of return
995 are much higher. Rates of return to Canadian firms for transmission
996 projects are around 9 to 10 per cent, well below the 13 to 14 per cent
997 available to U.S. companies. These lower rates discourage investment in
998 Canadian utilities. Moreover, investors are additionally deterred by the
999 fact that existing cost-of-service rates do not reflect the economic value of
1000 the transmission grid.

1001

1002 Q. Would you agree that the returns allowed by other regulators do not constitute an
1003 independent assessment of a fair and reasonable return on equity?

1004

1005 A. Yes. A fair return on equity must be determined independently of what other
1006 regulators allow. Nevertheless, the returns allowed for other utilities and the
1007 reactions of capital market participants to the allowed returns can provide a
1008 useful perspective on the reasonableness of the return recommended. Allowed
1009 returns on equity of 6.75-7.20% for an average risk utility are well outside a
1010 range of reasonableness.

¹⁹ Regulatory Research Associates, *Major Rate Case Decisions – January-March 2007*, April 3, 2007.

1011

1012 Q. Drs. Kryzanowski and Roberts utilize one method (Capital Asset Pricing Model
1013 or “CAPM”) for estimating a fair return on equity and criticize your testimony for
1014 using multiple methods because, in their view, all of the other methods are
1015 inferior to the CAPM. Is this a fair criticism?

1016 A. No. The CAPM is not inherently superior to any of the other tests that are
1017 available to estimate a fair return on equity. Various highly regarded academics
1018 have recognized significant problems with both the conceptual basis and the
1019 practical application of the CAPM. A number of the findings in that regard were
1020 cited in my Pre-filed Testimony. For example,

1021 Empirical tests of the CAPM have, in retrospect, produced results that are
1022 often at odds with the theory itself. Much of the failure to find empirical
1023 support for the CAPM is due to our lack of ex ante, expectational data.
1024 This, combined with our inability to observe or properly measure the
1025 return on the true, complete, market portfolio, has contributed to the body
1026 of conflicting evidence about the validity of the CAPM. It is also possible
1027 that the CAPM does not describe investors’ behavior in the marketplace.
1028

1029 Theoretically and empirically, one of the most troubling problems for
1030 academics and money managers has been that the CAPM’s single source
1031 of risk is the market. They believe that the market is not the only factor
1032 that is important in determining the return an asset is expected to earn.
1033 (Diana R. Harrington, *Modern Portfolio Theory, The Capital Asset Pricing
1034 Model & Arbitrage Pricing Theory: A User’s Guide*, Second Edition,
1035 Prentice-Hall, Inc., 1987, page 188)

1036 -----
1037

1038 Beta, the risk measure from the capital-asset pricing model, looks nice on
1039 the surface. It is a simple, easy-to-understand measure of market
1040 sensitivity. Alas, beta also has its warts. The actual relationship between
1041 beta and rate of return has not corresponded to the relationship predicted
1042 in theory during long periods of the twentieth century. Moreover, betas
1043 for individual stocks are not stable from period to period, and they are
1044 very sensitive to the particular market proxy against which they are
1045 measured.
1046

1047 I have argued here that no single measure is likely to capture adequately
1048 the variety of systematic risk influences on individual stocks and

1049 portfolios. Returns are probably sensitive to general market swings, to
1050 changes in interest and inflation rates, to changes in national income, and,
1051 undoubtedly, to other economic factors such as exchange rates. And if the
1052 best single risk estimate were to be chosen, the traditional beta measure is
1053 unlikely to be everyone's first choice. The mystical perfect risk measure
1054 is still beyond our grasp. (Burton Malkiel, *A Random Walk Down Wall*
1055 *Street*, New York: W. W. Norton & Co., 2003, page 240)

1056
1057

1058

1059 Beta is not very useful for determining the expected return on a stock, and
1060 it actually has nothing to say about the CAPM. For many years, we have
1061 been under the illusion that the CAPM is the same as finding that beta and
1062 expected returns are related to each other. That is true as a theoretical and
1063 philosophical tautology, but pragmatically, they are miles apart. Dr.
1064 Stephen A. Ross, "Is Beta Useful?" *The CAPM Controversy: Policy and*
1065 *Strategy Implications for Investment Management*, AIMR, 1993.

1066

1067 A February 2007 article published in the *Financial Times* (Attachment A to my
1068 rebuttal testimony) highlights concerns of both academics and practitioners with
1069 respect to the CAPM. The bottom line, based on the level of concerns raised, is
1070 that it is not reasonable to conclude that the CAPM is superior to other models,
1071 particularly for the purpose of setting a fair return on equity, and underscores the
1072 need for using multiple tests.

1073 Q. Why do you say "particularly for the purpose of setting a fair return on equity"?

1074 A. A fair return is one that meets the three standards that I set out in my Pre-filed
1075 Testimony (p. 19), i.e., one that provides a utility with the opportunity to:

- 1076 1. earn a return on investment commensurate with that of comparable risk
- 1077 enterprises;
- 1078 2. maintain its financial integrity; and,
- 1079 3. attract capital on reasonable terms.

1080

1081 The CAPM attempts to measure what an equity investor should require as a return
1082 within the context of a diversified portfolio. Its focus is solely on the minimum

1083 return that will allow a company to attract equity capital. It does not, however,
1084 address the broader issue of whether its results, when applied to the book value of
1085 equity, will permit the utility to maintain its financial integrity. Nor does the
1086 CAPM address or measure returns actually available on similar risk investments,
1087 that is, it does not address the comparable returns standard.

1088

1089 Q. When Drs. Kryzanowski and Roberts apply the CAPM, they use a market risk
1090 premium of 4.9% versus your 6.5%. They claim your market risk premium is
1091 overstated due to the averaging method, the historic time periods, and the
1092 weighting formula for risk premiums from different countries. They also claim
1093 that you did not recognize the declining trend in the market risk premium. Please
1094 address these criticisms.

1095

1096 A. With respect to the averaging method, Drs. Kryzanowski and Roberts claim that it
1097 is incorrect to only use a simple average of the historic risk premiums (arithmetic
1098 average) when there is evidence that returns are mean reverting. Mean reverting
1099 essentially means that low returns can be expected to be followed by high returns,
1100 so that investors can reasonably expect that, over time, returns will return to some
1101 long term average. The argument essentially is that, if there is evidence that
1102 historically returns have been mean reverting, the estimate of the required future
1103 equity risk premium ought to take into account the predictability of future returns
1104 by giving some weight to the historic compound, or geometric, return. The
1105 geometric, or compound, return is the constant annual rate of return that an
1106 investment would have achieved if it had earned the same return year after year.
1107 The compound average return ignores the fact that there is uncertainty
1108 surrounding the actual return that an investor will ultimately achieve over the
1109 investment period. Unless the achieved return is the same year after year, the
1110 arithmetic average will always be higher than the geometric average. The more
1111 volatility there is in year to year returns, the larger will be the differential between
1112 the simple arithmetic average and the compound average.

1113

1114 The weight to be given to each of the averages is largely a matter of judgment, as
1115 the evidence of Drs. Kryzanowski and Roberts demonstrates. There is no
1116 universally accepted formula for giving weight to one average or the other. Drs.
1117 Kryzanowski and Roberts state that they gave 75% weight to the arithmetic
1118 average and 25% weight to the geometric average. I have similarly given
1119 primary, but not sole, weight to arithmetic averages in estimating the forward-
1120 looking risk premium. As my estimate of the market risk premium is based on
1121 multiple considerations, not solely an average of historically observed risk
1122 premiums over a specific period of time, I did not rely on an explicit weighting
1123 scheme for the two types of averages.

1124

1125 Q. Drs. Kryzanowski and Roberts criticize your choice of historic period (1947-
1126 2005) for estimating the forward looking risk premium. Specifically, they state
1127 that the chosen time period “results in an inflated estimate of the going-forward
1128 likelihood of achieving the high realized returns on equities and low realized
1129 returns on bonds that followed World War II.” (p. 131). Is this a fair criticism?

1130

1131 A. No. It would be inappropriate to “cherry pick” the post World War II period.
1132 Equally, it could be argued that other sub-periods are not representative of future
1133 expectations and whose inclusion or exclusion might inflate or deflate the
1134 estimate of the expected long-term forward looking returns or risk premium. For
1135 example, the 1947-2005 period included the effects of:

1136

1137 1. A period of high inflation and rapidly rising interest rates. Inflation in
1138 Canada averaged close to 10% over the 1974 to 1980 period and over 7%
1139 from 1974-1990. Long-term Canada bond yields rose from 6.5% at the
1140 end of 1971 to 18% in 1982, compared to the forecast yield on 10-year
1141 Canada bonds of 5.0% over the next decade.²⁰

1142

²⁰ Consensus Economics, *Consensus Forecasts*, April 2007.

- 1143 2. Two relatively deep recessions in Canada (1981-82 and 1990-1991). The
1144 latter was accompanied by an extended period of restructuring as industry
1145 adjusted to the introduction of NAFTA.
1146
- 1147 3. A substantial shift in the state of government finances. In 1985, the
1148 federal deficit as a percent of GDP hit a high of 8.6%. By 1998, the
1149 federal budget was in surplus where it has remained.
1150
- 1151 4. A secular break in the rate of inflation. Since 1991, the average rate of
1152 inflation in Canada has averaged 2.1% (similar to the rate of 2.0% that is
1153 expected over the next decade²¹).
1154
- 1155 5. A period of rapidly declining interest rates. Long-term Canada bond
1156 yields declined from their 1982 high of 18% to a low of 4.2% in 2005, a
1157 level that had not been experienced since the 1950s.
1158
- 1159 6. The internet bubble and bust in 1996-2002.
1160
- 1161 Q. Drs. Kryzanowski and Roberts claim that the observed risk premium during the
1162 1947-2005 period overstates the future risk premium because it includes an
1163 upward valuation in the market that cannot be repeated. In support of their
1164 position, they quote an article by Arnott and Bernstein published in 2001 that
1165 referenced a substantial increase in price/dividend ratios from 1926-2001. How
1166 do you respond?
1167
- 1168 A. The article to which Drs. Kryzanowski and Roberts refer was based on analysis of
1169 data that ended when the price/earnings ratio of the U.S. equity market was well
1170 above historic norms, reflecting effects of the internet bubble. The price/earnings
1171 ratio of the U.S. equity market (as proxied by the S&P 500) reached a high of 33
1172 times during the internet bubble and was still close to 30 times in 2001/2002. By

²¹ Consensus Economics, *Consensus Forecasts*, April 2007.

1173 the end of 2006, the price/earnings ratio had declined to 18 times, and is still 18
1174 times,²² compared to an average of 16 times from 1926-2005. While the current
1175 P/E ratio is slightly higher than its historic average, it is well within historic
1176 norms, and is in sharp contrast to the P/E ratio at the peak of the market bubble.

1177

1178 As I discussed in my pre-filed testimony (pages 30-33), I have analyzed the
1179 impact of rising price/earnings ratios in both Canada and the U.S. on the
1180 sustainability of past equity market returns, taking into account the substantial
1181 decline in the equity markets when the internet bubble burst. My analysis showed
1182 that the average achieved market returns for the period prior to the equity market
1183 bubble (1947-1989) were actually lower than the average including the equity
1184 market bubble (1947-2005). In sum, there is no basis for concluding that the
1185 increase in market valuations point to lower equity market returns in the future
1186 than in the past.

1187

1188 Q. Drs. Kryzanowski and Roberts then allege that you have not taken into account
1189 the steadily declining trend in market risk premiums. Is this the case?

1190

1191 A. No. The reason that the observed risk premiums have declined is because the
1192 achieved returns on long-term Canada bonds reflect (1) historic yields that were
1193 much higher than they are expected to be; and (2) the significant capital gains that
1194 have occurred since long Canada bond yields began to decline. As discussed in
1195 my pre-filed evidence, the high bond returns in the 1980-2005 period were the
1196 primary explanation of the observed decline in achieved equity risk premiums.
1197 With interest rates at current levels, the high level of achieved returns on bonds
1198 cannot continue. Thus the experienced level of bond returns overstates a
1199 reasonable estimate of future bond returns. A more reasonable estimate of future
1200 bond returns is the expected yield on long Canada bonds, forecast at the time of

²² Based on 12 months trailing earnings (*Barron's*, January 1, 2007 and April 16, 2007).

1201 my pre-filed testimony at 5.3%.²³ In contrast, as Drs. Kryzanowski and Roberts
1202 agree, there has been no material change in the equity market returns (p. 132).

1203

1204 The table below summarizes the achieved equity market returns for the Canadian
1205 equity market over various periods from 1947-2005.

1206

1207

Table 4

Average of All Possible:					
25-Year Rolling Averages		Cumulative Averages 1947 forward		Cumulative Averages 2005 backward	
Arithmetic	Geometric	Arithmetic	Geometric	Arithmetic	Geometric
11.8%	10.5%	12.6%	11.3%	11.5%	10.6%

1208

1209 Source: Schedule 8 from pre-filed testimony and Rebuttal Schedule 5.

1210

1211 For the 1924-2005 period, the longest period covered by the capital market data
1212 available for Canada from the Canadian Institute of Actuaries, the arithmetic and
1213 geometric average equity market returns were 11.8% and 10.2% respectively.

1214

1215 The historic data for equity market returns above support a geometric average of
1216 approximately 10.5% and an arithmetic average of no less than 11.75%. If Drs.
1217 Kryzanowski and Roberts' 25%/75% weighting scheme is applied to the historic
1218 equity market returns, the indicated equity market return is approximately 11.5%.
1219 An 11.5% equity market return relative to a long-term risk-free rate of 5.3%
1220 produces an equity market risk premium of 6.2%. This estimate gives no weight
1221 to data from the U.S. market.

1222

1223 Q. Drs. Kryzanowski and Roberts take issue with your using achieved equity risk
1224 premiums from other markets for estimating the future risk premium on two

²³ Long-term (2007-2016) forecast for 10-year Canada bond yields of 5.0% plus historic spread between 10- and 30-year Canada bond yields of approximately 30 basis points, from Consensus Economics, *Consensus Forecasts*, October 2006. The most recent long-term forecast of 10-year Canada bond yields (April 2007) is unchanged from the October 2006 forecast.

1225 grounds: first, it ignores the benefits of international diversification and second, it
1226 does not adjust for historic differences in risk among the markets. Could you
1227 please address this criticism?

1228

1229 A. In regard to the first, one of the key reasons for using data from markets other
1230 than the Canadian market is the problematic nature of the Canadian historic data,
1231 which suggests the historic risk premiums understate the expected risk premium.
1232 The reliability of Canadian historic data is discussed at length in my pre-filed
1233 testimony (Appendix A). In that context, the data from the U.S. and the U.K. are
1234 used as an alternative measure of the historic risk premium.

1235

1236 With respect to the benefits of international diversification, one of the principal
1237 reasons for investing abroad is the opportunity to earn similar or higher returns
1238 than available in the domestic market while bearing similar or lower risk. From
1239 this perspective, there is no rationale for concluding that the returns and risk
1240 premiums that Canadian investors would anticipate from investing abroad would
1241 be reduced from those anticipated from domestic markets only.

1242

1243 As regards the historic difference in the risk in equity markets, on the basis of
1244 historic volatility, the U.S. equity market has been marginally more risky than the
1245 Canadian market over the 1947-2005 period as measured by the annual volatility
1246 (standard deviation) in returns. The standard deviation of the U.S. equity market
1247 returns was 16.4%; the corresponding standard deviation of Canadian equity
1248 market returns was 16.9%. The difference in the volatility between the two
1249 countries over this period would produce a marginal difference (approximately 10
1250 basis points) in the level of the required return.²⁴

²⁴ Assume that the achieved equity compound return in the two countries over the period was identical, at 11.0% (equal to the compound, or geometric average, equity market return in Canada over the 1947-2005 period), with the standard deviations of annual returns for the two countries as provided above. The compound average in conjunction with the standard deviation permits the estimation of the associated arithmetic average return. The arithmetic average is equal to the compound average plus one half the variance in returns, where the variance is equal to the standard deviation squared. The resulting arithmetic average for the U.S. market would be 12.4%, compared to 12.3% for Canada. The difference in the

1251

1252 Q. Drs. Kryzanowski and Roberts criticize the use of adjusted betas in the
1253 application of the equity risk premium test. They argue that there are two
1254 rationales given for adjusting the beta toward 1.0, neither of which is warranted.
1255 The first is to account for betas' tendency to trend toward the market beta of 1.0,
1256 and the second is to take account of utilities' interest rate sensitivity. In regard to
1257 the first rationale, the witnesses state that there is no evidence that utility betas
1258 trend toward the market mean of 1.0. In regard to the second, they argue that,
1259 going forward, the bond market risk premium should be low given the low level
1260 of interest rates and thus the premium required by utilities for interest rate risk to
1261 be immaterial. Have Drs. Kryzanowski and Roberts covered the key rationales
1262 for adjusting the beta?

1263

1264 A. No. The most important reason for adjusting the beta is because the objective of
1265 the exercise is not to forecast the future beta. The objective of the exercise is to
1266 estimate the investors' return requirement. As I discussed in my pre-filed
1267 testimony, and further supported by Attachment A to the rebuttal testimony, raw
1268 betas are nothing more than a calculated correlation between the stock price
1269 movements of a stock and the market index (relative volatility). The empirical
1270 evidence in support of the single risk factor (beta) model is weak. Higher beta
1271 stocks have earned less and lower beta stocks have earned more than the simple
1272 model predicts. The use of an adjusted beta is intended to mitigate the
1273 deficiencies in raw betas as a predictor of future returns.²⁵

arithmetic average can be interpreted as the difference in return required for the difference in volatility between the two markets, which is 10 basis points.

²⁵ Moreover, raw betas say nothing about the fundamental economic risks of investing in a business enterprise. This is well illustrated by reference to a gold mining company. Gold stocks are sometimes thought of as counter-cyclical, ones whose stock price increases when the rest of the market increases and vice versa. As commodity stocks, the prices of mining gold stocks are likely to be quite volatile, but if they move counter to the rest of the market, they might have negative betas. If that is the case, then the CAPM would predict that investors would require a return on the gold mining stock that is lower than the risk-free rate. However, since the fundamental operating risks of a gold mining enterprise are substantial, it is counterintuitive that a gold mining company would invest in a project at an expected return less than the risk-free rate.

1274

1275 Q. Drs. Kryzanowski and Roberts critique your use of the discounted cash flow
1276 model, applied to utilities, essentially on the grounds that the (1) the results are
1277 characterized by circularity, since the growth forecast is dependent on the returns
1278 regulators will allow; (2) if investors are being overcompensated for risk, the
1279 model will generate returns that are too high; and (3) the growth component of the
1280 model, if based on analysts' forecasts, is likely to be biased by analyst optimism.
1281 Please address these concerns.

1282

1283 A. The DCF test was initially adapted for use in a regulated context by Dr. Myron
1284 Gordon, Professor Emeritus at the University of Toronto. It was first presented in
1285 a regulatory proceeding in the mid-1960s. Dr. Gordon commented on the DCF
1286 model in a book review published in the *Globe and Mail* (March 29, 2003) on the
1287 DCF model as follows,

1288 Regulating privately owned electric-power companies in the U.S. has been
1289 highly successful, in part due to a model I developed for arriving at a fair
1290 rate of return on capital for a utility company.

1291 Despite the criticisms of the DCF test offered by Drs. Kryzanowski and Roberts,
1292 the DCF test applied to samples of utilities remains one of the principal tests
1293 relied on by the majority of U.S. regulators (both state and federal). While cost of
1294 capital experts participating in rate cases in the U.S. routinely take the position
1295 that the DCF test, like other tests, has its own set of "warts" and is not inherently
1296 superior to other tests (and thus should be used exclusively), I am not aware of
1297 any expert who has taken the position that it should be disregarded.

1298

1299 The circularity concern has some validity. However, circularity is mitigated by
1300 (a) using samples of companies, not the specific company to which the DCF test
1301 is being applied and (b) using the consensus of growth forecasts for the
1302 companies in the samples. With regard to the second, the use of the available
1303 consensus of analysts' earnings forecasts for the growth component eliminates the

1304 possibility that the results are colored by an analyst's own subjective views of
1305 what the regulator should allow.

1306

1307 With respect to the concern that the model will generate returns that are too high,
1308 that argument is totally at odds with the how the model works. Suppose a utility
1309 is expected to earn, for example, a return on book value of 12.0%, and the market
1310 views that return as higher than the required return. The price of the stock adjusts
1311 upward (and the dividend yield downward), so that the expected DCF return
1312 equals the return that investors require in relation to the market value of the
1313 shares.

1314

1315 On the issue of optimism in the analysts' forecasts, relatively little research has
1316 been done on the properties of the long-term forecasts, as noted in Harris, Robert
1317 S. and Marston, Felicia C., "The Market Risk Premium: Expectational Estimates
1318 Using Analysts' Forecasts", *Journal of Applied Finance*, Vol. 11, 2001. The
1319 authors, who use analysts' long-term growth forecasts to develop DCF estimates
1320 and risk premiums for the equity market as a whole, go on to say, "Analysts'
1321 optimism, if any, is not necessarily a problem for the analysis in this paper. If
1322 investors share analysts' views, our procedures will still yield unbiased estimates
1323 of required returns and risk premia." Drs. Kryzanowski and Roberts claim that
1324 such findings "attribute considerable [sic] irrationality to investors in that they
1325 believe forecasts that they know have an optimistic bias." However, since
1326 analysts' forecasts continue to be widely disseminated, and stock prices continue
1327 to react positively and negatively when actual earnings are higher or lower than
1328 the forecasts, investors clearly give significant weight to analysts' forecasts when
1329 forming their own expectations.

1330

1331 With specific regard to utilities, as quintessential mature companies, it would be a
1332 reasonable inference that investors would expect the long-term growth of utilities

1333 to approach the long-term growth in the economy as a whole.²⁶ The long-term
1334 growth forecasts for the economy can be used as a benchmark for testing whether
1335 the analysts' five-year growth forecasts for growth are systematically "optimistic"
1336 estimates of a reasonable rate of long-term growth. As regards the DCF-based
1337 equity risk premium test, the average of the analysts' forecast earnings growth
1338 rates for the sample of low risk utilities was 4.6% over the period 1993-2006 (3rd
1339 Qtr) and 4.9% over the period 1998-2006 (3rd Qtr); see Schedule 16 of my pre-
1340 filed evidence. By comparison, the consensus forecasts of long-term growth in
1341 the economy issued over the same periods averaged 5.25% and 5.3% respectively,
1342 on average 0.55% higher than the analysts' forecasts. This comparison does not
1343 lead to the conclusion that analysts' growth forecasts for utilities would have been
1344 viewed by investors as systematically optimistic.

1345

1346 Q. Drs. Kryzanowski and Roberts also take issue with the use of historic utility risk
1347 premiums because they conclude that they constitute a "free lunch" that is, that
1348 utility investors have been overcompensated relative to what regulators intended
1349 and relative to the returns earned by investors invested in the market composite.
1350 How do you respond to this?

1351

1352 A. I disagree with this assessment. Drs. Kryzanowski and Roberts' comparison fails
1353 to consider the impact of the significant change in the bond markets that was
1354 occurring over this period. The returns achieved by the utility sector over the two
1355 specific periods would have been positively impacted by the significant decline in
1356 bond yields experienced over this time period. Since utilities are interest-sensitive
1357 stocks, it is to be expected that they would have been more positively impacted
1358 than other sectors of the economy. Long-term Canada bond yields averaged
1359 10.1% in 1988 and 8.4% in 1995, compared to 4.4% in 2005. Due to the decline
1360 in bond yields the annual arithmetic average total return on long-term Canada

²⁶ As I noted in response to HC-NTPC.38, the FERC relies on GDP growth to estimate expected long-term growth in its standard DCF models for gas and oil pipelines. The development of their model was in part validated by the valuation practices of Merrill Lynch and Prudential Securities who relied on the growth in the economy as their estimate of long-term growth for all firms, including regulated firms.

1361 bonds from 1988 to 2005 averaged 11.35%, compared to 13.1% for the S&P/TSX
1362 Utilities Sector. Hence, the utility sector only outperformed bonds over this period
1363 by 1.75%.

1364
1365 It is also worth noting that, over this period, the returns achieved on the S&P/TSX
1366 Composite underperformed the S&P 500, on an arithmetic basis, by over two
1367 percentage points. The performance of the Canadian equity market during a
1368 significant portion of the cited period was considered mediocre, which was partly
1369 responsible for the push to eliminate the Foreign Property Rule.²⁷ In principle, it
1370 would be inappropriate to use an underperforming index as a benchmark.

1371
1372 Q. How have you ensured that your historic utility risk premium test does not rely on
1373 values that overstate investor return requirements?

1374
1375 A. My analysis of historic utility returns and risk premiums looks at the long-term, in
1376 order to ensure that a range of outcomes and economic scenarios are taken into
1377 account.

1378
1379 Q. Drs. Kryzanowski and Roberts add a financing flexibility adjustment of 10 basis
1380 points to their CAPM result, compared to the 50 basis points that you added to
1381 your “bare-bones” equity risk premium and DCF test results. Do you believe the
1382 adjustment made by Drs. Kryzanowski and Roberts is adequate?

1383

²⁷ The Investment Funds Institute of Canada (IFIC) had estimated in 1999 that raising the foreign investment cap to 20% would increase returns by 1% and raising the cap to 30% would increase the returns by another 0.5%. *Paving the Way for Change to RRSP Foreign Content Rules*, Tom Hockin, President and CEO IFIC, January 31, 2000. The Pension Investment Association of Canada (PIAC) and the Association of Canadian Pension Management (ACPM) had commissioned a report entitled *The Foreign Property Rule: A Cost-Benefit Analysis* (David Burgess and Joel Fried, University of Western Ontario, November 2002), which supported the removal of the cap. *The Globe and Mail* reported that the removal of the foreign content cap is expected to “have the broadest long-term impact of any personal finance measure in the budget. Global stock markets, accessible to any investor through global equity mutual funds, have historically made higher returns than the Canadian market, which only accounts for just over 2 per cent of the world’s stock market value.” Rob Carrick, “Finance: Your Bottom Line”, *Globe and Mail.com*, February 23, 2005.

1384 A. No. In principle, the financing flexibility adjustment should be at least adequate
1385 to allow a utility a degree of financing flexibility that would allow it, if traded as a
1386 stand alone entity, to maintain its financial integrity (market/book ratio of 1.10
1387 times). A 50 basis point allowance is required at a minimum to allow for
1388 adequate financing flexibility. As I noted in my pre-filed evidence (Appendix D),
1389 the return that is required in comparison to market value (as derived from the
1390 equity risk premium and DCF tests) needs to be adjusted to produce a fair and
1391 reasonable return when applied to book value.²⁸

1392
1393 Q. Have any regulators in Canada approved an allowance of 50 basis points for
1394 government-owned utilities?

1395
1396 A. Yes, both EUB and the Ontario Energy Board have explicitly done so.

1397
1398 Q. Do Drs. Kryzanowski and Roberts agree with the use of the Comparable Earnings
1399 Test in estimating a fair return on equity?

1400
1401 A. No. Drs. Kryzanowski and Roberts outline their reasons why the comparable
1402 earnings test is problematic and should be given no weight in determining the
1403 return on equity for NTPC. I address their critiques below:

- 1404
1405
1406 1. There is no agreement on what time period should be used.
1407
1408 ● There is general agreement that the returns should cover a business
1409 cycle, and that cycle should be fundamentally similar to the next
1410 cycle. My comparable earnings analysis covers a cycle that was

²⁸ As I indicated in Appendix D, this premise was recognized by the Independent Assessment Team in setting the returns on equity for the Power Purchase Arrangements in Alberta when they stated in their July 1999 report, “This is sometimes associated with flotation costs but is more properly regarded as providing a financial cushion which is particularly applicable given the use of historic cost book values I traditional rate of return regulation in Canada. No such adjustment has ever been made in UK utility regulation cases which tend to use market values or current cost values.”

1411 characterized by a similar rate of inflation and economic growth as
1412 is forecast for the next cycle.

1413

1414 It bears noting that the same criticism is equally valid for the
1415 CAPM.

1416

1417 2. There is no agreement on how structural changes in the economy or the
1418 number of economic sectors in the economy should be dealt with.

1419

1420 ● Similar to the response to the first criticism, structural changes in
1421 the economy can be dealt with by looking to a business cycle
1422 whose fundamentals (e.g., inflation, growth) were similar to those
1423 expected for the next business cycle. With respect to the number
1424 of economic sectors in the economy, since the comparable earnings
1425 test focuses on those companies within sectors that are most
1426 similar to utilities (e.g., in terms of maturity and stability of
1427 demand), the proliferation of new sectors in the economy is not a
1428 significant issue.

1429

1430 This criticism is equally applicable to the CAPM; there is no
1431 agreement on how to deal with structural changes in the economy
1432 in the application of that model.

1433

1434 3. The predictive usefulness of historic rates of return appears to remain
1435 untested. Unlike equity returns that are forward-looking due to the
1436 incorporation of expectations, rates of return are backward looking.

1437

1438 ● The equity risk premium test also incorporates market returns that
1439 are historic in nature. However, in both cases, the historic returns
1440 are not simply “accepted”. They are analyzed in a forward-looking
1441 context. It is for this reason that key economic variables that

1442 characterized the comparable earnings period of 1994-2005 were
1443 compared to forecasts for the next business cycle.

1444

1445 4. As an accounting-based measure, comparable earnings will only coincide
1446 with the investor's opportunity cost (desired rate of return) by accident.

1447

1448 ● I agree that the comparable earnings test does not measure the
1449 investor's opportunity cost of attracting equity capital as measured
1450 relative to market values. It does, however, provide a measure of
1451 the fair return based on the concept of opportunity cost.
1452 Specifically, the test arises from the notion that capital should not
1453 be committed to a venture unless it can earn a return
1454 commensurate with that available prospectively in alternative
1455 ventures of comparable risk. Since regulation is a surrogate for
1456 competition, the opportunity cost principle entails permitting
1457 utilities the opportunity to earn a return commensurate with the
1458 levels achievable by competitive firms facing similar risk.

1459

1460 5. As an accounting-based measure, comparable earnings are subject to
1461 variations in the quality of earnings. The time-varying use of "aggressive
1462 accounting" by firms makes earnings numbers not very reliable for
1463 determining ERP.

1464

1465 ● I agree that accounting practices may impact reported earnings.
1466 However, each Canadian firm must conform to Canadian GAAP;
1467 moreover, my selection of industries from which the companies are
1468 drawn was intended to exclude those whose accounting practices
1469 may be significantly different from those followed by utilities. In
1470 addition, by focusing on median, rather than simple average
1471 values, as well as on results over a business cycle, the impacts of
1472 such variations are mitigated.

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As discussed in point 4 above, the comparable earnings test is not intended to measure the market-based equity risk premium.

6. The test suffers from survivorship since it tends to be retrospective.
 - Survivorship bias in this context presumably refers to the possibility that the returns of the sample are artificially higher because firms that have failed are excluded from the analysis. However, the purpose of the exercise is to measure returns achievable by low risk firms with stable earnings, not to measure the returns of the universe of companies. Consequently, survivorship bias should not be an issue.

7. The Comparable Earnings Test is very dependent upon the criteria or screens used to select the sample members. Most analysts use accounting-based risk proxies to screen possible candidate firms. These screens are an attempt to identify a sample that is similar in risk to the low risk utilities. These accounting-based risk proxies measure total risk and not the systematic risk which is important to diversified investors. Thus, some firms with a high systematic risk survive the screening process. Some of the screens, such as ones that screen out firms with a high coefficient of variation for book returns, bias performance upwards.
 - These critiques do not apply to my selection criteria. My selection of Canadian industrials did not rely on accounting measures of risk. Companies were screened out that had an intermittent or non-existent dividend history, had high levels of systematic risk (betas), were ranked “Higher Risk” or “Speculative” by the Canadian Business Service or had non-investment grade debt ratings.

1504 8. The screens used by some experts produce comparable samples with an
1505 average price-to-book ratio and an average price-to-earnings ratio that
1506 exceeds that of a typical utility.

1507

1508 • I agree, but see no reason why this fact has any bearing on the
1509 validity of the comparable earnings test. The market/book ratio of
1510 unregulated companies should be expected to be higher than 1.0,
1511 given the expected relationship between market value and
1512 replacement cost (see Appendices C and E to my pre-filed
1513 testimony).

1514

1515 • Further, both the P/E ratios and market/book ratios must be
1516 evaluated in relative terms. The recent P/E and market/book ratios
1517 for my sample of Canadian industrial companies are lower than
1518 those of the S&P/TSX composite and well below those of indices
1519 like the S&P 500 and the S&P Industrials. The average P/E ratio
1520 for the S&P/TSX Composite from 1994-2005 was 28 times. For
1521 the S&P 500 and S&P Industrials, it was 24 times and 31 times
1522 respectively. For my sample of low risk Canadian industrials, the
1523 1994-2005 P/E ratio based on the average of annual medians was
1524 15 times.

1525

1526 The average market/book ratio for the S&P/TSX Composite was
1527 2.1 times from 1994-2005. In comparison, the average
1528 market/book ratio of the S&P 500 was 3.4 times; the S&P
1529 Industrials' market/book ratio was 3.9 times. The corresponding
1530 market/book ratio for my sample of low risk Canadian industrials
1531 was only 1.8 times (average of annual medians), very modest in
1532 relation to the referenced U.S. benchmarks.

1533

1534 9. While the current cost of new capital is based on current market values
1535 and inflation causes deviations between book and market values on the
1536 asset side, inflation also decreases the real value of long-term liabilities
1537 and part of the interest payment that represents a payment to debt holders
1538 for the depreciation of the real value of their holdings (i.e., a return of
1539 capital) is tax deductible. Thus, if the comparable earnings test were to be
1540 used, one would have to remove the benefit that utilities receive from the
1541 decrease in the real value of their liabilities resulting from inflation, and
1542 the tax benefit the utilities receive from the “interest” payments which
1543 represent a return of capital and not a return on capital.

1544
1545 • I disagree that adjustments to the comparable earnings test need to
1546 be made for these factors. The returns of the comparable
1547 unregulated firms are not adjusted for changes in the value of their
1548 debt; the returns reflect the book value of both the debt and equity.
1549 The interest expense included in the return on equity calculation is
1550 based on the original cost and coupon rates of the debt as issued.
1551 For taxable utilities, the tax benefits that arise from reliance on
1552 debt, rather than equity, flow to the ratepayers, not to the
1553 shareholders. (In contrast, in competitive firms, the shareholder
1554 receives the benefits of the tax deductions.)

1555
1556 10. Unlike the sample of non-utility comparables, regulated utilities are fully
1557 compensated for the actual cost of debt through the regulatory process and
1558 have access to deferral accounts.

1559
1560 • I agree that the business risks of utilities are lower than those of
1561 competitive industrials. However the higher business risks are
1562 largely offset by lower financial risks. The average common
1563 equity ratio of the Canadian industrial sample is close to 70% (see
1564 Schedule 20 in my pre-filed testimony), approximately 30

1565 percentage points higher than the average Canadian utility’s actual
1566 common equity ratio, with the result that the selected sample of
1567 industrials is in a similar risk class to an average risk utility.
1568 Further, I have explicitly recognized the somewhat higher risk of
1569 the industrials in my recommended return on equity. The
1570 comparable earnings test indicated returns in the range of 12.0-
1571 13.0%. My conclusion placed the comparable earnings result at
1572 the bottom end of the range to reflect the industrials’ marginally
1573 higher risks.

1574

1575 Q. Do Drs. Kryzanowski and Roberts acknowledge the relevance of the Comparable
1576 Earnings test to the unique circumstances of the regulated environment?

1577

1578 A. No, they do not. Ultimately, Drs. Kryzanowski and Roberts reject comparable
1579 earnings as “devoid of scientific merit”. In so doing, they fail to acknowledge
1580 that the relevance and importance of the comparable earnings test arises from
1581 circumstances that apply only in a regulated environment. Regulation relies on an
1582 original cost rate base construct, or convention, rather than the market values to
1583 which the “scientific” cost of attracting capital tests apply. The comparable
1584 earnings test measures comparable returns measured in a manner compatible with
1585 the regulatory construct for measuring the equity investment in a utility, that is, on
1586 the basis of original cost. The cost of attracting capital tests do not.

1587

1588 As I previously stated, there are three criteria for setting a fair return on equity,
1589 the ability to attract capital at reasonable rates, the maintenance of financial
1590 integrity and the opportunity to earn returns commensurate with those of
1591 comparable risk companies. The market-driven tests (DCF and risk
1592 premium/CAPM) directly address the first two criteria. The comparable earnings
1593 test addresses the third. The U.S. Supreme Court in *Bluefield Water Works &*
1594 *Improvement Co. v. Public Service Commission of West Virginia*, 262 U.S. 679,
1595 692 (1923) stated that a public utility is entitled to:

1596
1597 a return on the value of the property which it employs for the convenience
1598 of the public equal to that generally being made at the same time and in
1599 the same general part of the country on investments in other business
1600 undertakings which are attended by corresponding risks and uncertainties.
1601 . . .

1602
1603 Implementation of this standard, as articulated in *Bluefield*, needs to recognize
1604 that the regulatory construct (original cost rate base) and the manner in which the
1605 return is determined and set are not independent. In a truly competitive
1606 environment, prices are set on the basis of market values, not book values. Under
1607 original cost regulation, where the equity used for regulatory purposes is based on
1608 the original cost, the comparable earnings test is a meaningful guideline for a fair
1609 return.

1610

1611 Q. In rejecting the Comparable Earnings Test, Drs. Kryzanowski and Roberts make
1612 the claim that there is “widespread agreement among utility and intervenor
1613 witnesses and Boards that the Comparable Earnings Test is not appropriate for
1614 determining a fair rate of return.” Is this claim valid?

1615

1616 A. No. As stated, both in Appendix C of my pre-filed testimony and in response to
1617 BR-NTPC.28, the BCUC in its recent decision for Terasen Gas (March 2006),
1618 concluded that, while not relying on it in the instant case, it did not believe that
1619 Comparable Earnings had outlived its usefulness and might yet play a role in
1620 future ROE hearings

1621

1622 Q. Do the problems with the Comparable Earnings Test cited by Drs. Kryzanowski
1623 and Roberts mean that the results of Comparable Earnings Test should be
1624 ignored?

1625

1626 A. No. I make no claim that the comparable earnings test is perfect. However, the
1627 hurdles that Drs. Kryzanowski and Roberts enumerate are surmountable. Other
1628 tests, e.g., the CAPM, also face significant hurdles, which must be addressed in

1629 their application. Each of the traditional ROE tests brings a different perspective
1630 to the estimation of a fair return. The results of each test should be given weight
1631 to assure that the allowed return rests on a solid foundation and satisfies the three
1632 standards that underpin a fair return.

1633

1634 Q. Does this conclude your rebuttal testimony?

1635

1636 A. Yes.

**NORTHWEST TERRITORIES POWER
CORPORATION**

**Statistical Exhibit
to Accompany
Rebuttal Testimony**

of

KATHLEEN C. McSHANE



FOSTER ASSOCIATES, INC.
Bethesda, MD. 20814
April 2007

TABLE OF CONTENTS

REBUTTAL SCHEDULE 1: (Page 1 of 2)	ILLUSTRATIVE EXAMPLE OF THE EMBEDDED COST OF DEBT FOR AN ANNUALLY AMORTIZING BOND
REBUTTAL SCHEDULE 1 (Page 2 of 2)	ILLUSTRATIVE EXAMPLE OF THE EMBEDDED COST OF DEBT FOR A SINKING FUND BOND
REBUTTAL SCHEDULE 2:	IMPACT ON EMBEDDED COST OF DEBT DUE TO DIFFERENT RATES OF RETURN ON THE SINKING FUND CONTRIBUTIONS TO THE SINKING FUND MADE AT YEAR END
REBUTTAL SCHEDULE 3:	IMPACT ON EMBEDDED COST OF DEBT DUE TO DIFFERENT RATES OF RETURN ON THE SINKING FUND CONTRIBUTIONS TO THE SINKING FUND MADE AT MID YEAR
REBUTTAL SCHEDULE 4:	INVESTMENT POLICY/ALLOWED INVESTMENTS OF GOVERNMENT-OWNED UTILITIES
REBUTTAL SCHEDULE 5: (Page 1 of 3)	25-YEAR ROLLING GEOMETRIC AVERAGE MARKET RETURNS FOR CANADA AND THE U.S.
(Page 2 of 3)	CUMULATIVE GEOMETRIC AVERAGE MARKET RETURNS FOR CANADA AND U.S. (1947 FORWARD)
(Page 3 of 3)	CUMULATIVE GEOMETRIC AVERAGE MARKET RETURNS FOR CANADA AND U.S. (2005 BACKWARD)

SCHEDULE 7:
UPDATED HISTORIC EQUITY MARKET RISK PREMIUMS

SCHEDULE 14:
UPDATED HISTORIC UTILITY EQUITY RISK PREMIUMS

SCHEDULE 16:
UPDATED

(Page 1 of 2)

DCF-BASED EQUITY RISK PREMIUM STUDY FOR
LOW RISK US ELECTRIC AND GAS UTILITIES
(QUARTERLY AVERAGES OF MONTHLY DATA)

(Page 2 of 2)

DCF-BASED EQUITY RISK PREMIUM STUDY FOR
LOW RISK US ELECTRIC AND GAS UTILITIES
(REGRESSION ANALYSIS RESULTS)

SCHEDULE 18:
UPDATED

DCF COST OF EQUITY FOR BENCHMARK SAMPLE OF
U.S. ELECTRIC AND GAS UTILITIES
(BASED ON ANALYSTS' EARNINGS GROWTH FORECASTS)

SCHEDULE 19:
UPDATED

DCF COST OF EQUITY FOR BENCHMARK SAMPLE OF
U.S. ELECTRIC AND GAS UTILITIES
(TWO STAGE MODEL)

Tony Tassell: The time has come for the CAPM to RIP

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Few theories are more influential or important in driving financial markets as the inelegantly-named capital asset pricing model. Too bad it does not appear to work very well.

The CAPM, as it is widely known, is a cornerstone of modern financial market analysis, studied like a rosary by analysts and executives at business school. Most financial directors use it to assess everything from the viability of a new project to their cost of capital. Most stock market analysts consider it an essential tool.

But it has faced increasing criticism in recent years as unworkable in the real world, even from luminary market academics such as Harry Markowitz who laid the groundwork for the CAPM with research in 1950s on efficient portfolios.

CAPM is basically a model for valuing stocks or securities by relating risk and expected return. Developed separately by William Sharpe, John Lintner and Jack Treynor, it is based on the idea that investors demand additional expected return to take on additional risk.

It then assumes markets are efficiently priced to reflect greater returns for greater risk. The risk is assessed on a stock or security's so-called beta, a measure of a company's volatility and correlation with the market as a whole. A company with a share price that tends to rise and fall more than the market will have a high beta and vice versa.

It is a seductively simple, catch-all theory to quantify risk and forecast returns. It has spurred the development of quantitative investing.

But there is a problem. James Montier, analyst at Dresdner Kleinwort, says CAPM has become the financial theory equivalent of Monty Python's famous dead parrot sketch. He says the model is empirically bogus – it does not work in any way, shape or form. But like the shopkeeper who insists to a customer with a dead parrot in the sketch that the bird is merely resting, financial markets are in denial.

“The CAPM is, in actual fact, Completely Redundant Asset Pricing (CRAP),” he says.

Some of the most damning evidence came from an exhaustive 2004 study by Eugene Fama and Kenneth French, the academics who helped develop the efficient markets theory in the early 1970s, that argued stocks are always correctly priced as everything that is publicly known about the stock is reflected in its market price.

The study looked at all stocks on the New York Stock Exchange, the American Stock Exchange and Nasdaq from 1923 to 2003. As Montier states, the study shows CAPM woefully underpredicts the returns to low beta stocks and massively overstates the returns to high beta stocks. “Over the long run there has been essentially no relationship between beta and return,” he says.

Fama and French themselves concluded that while CAPM was a theoretical tour de force, its empirical track record was so poor that its use in “applications” was probably invalid. In others words, CAPM is a fine theory but useless in the real world.

A similar study of the 600 largest US stocks by Jeremy Grantham, the value investor, last year yielded similar results. It showed from 1969 to the end of 2005, the lowest decile of beta stocks – notionally the lowest risk – outperformed by an average 1.5 per cent a year. The highest beta stocks, or the riskiest, actually underperformed by 2.7 per cent a year.

The problems in the CAPM lie in its assumptions, particularly those used to derive the efficient portfolio that is used as a benchmark for the model in theory. The most commonly-cited criticism is an implicit assumption that all investors can borrow or lend funds on equal terms.

Other assumptions that have been criticised include: that there are no transaction costs, that all investors have a "homogeneity" of expectations and risk appetites and that investors can take any market exposure without affecting prices. It also assumes no taxes so investors are indifferent between dividends and capital gains.

Markowitz himself noted that the CAPM is like studying "the motions of objects on Earth under the assumption that the Earth has no air".

"The calculations and results are much simpler if this assumption is made. But at some point, the obvious fact that on Earth, cannonballs and feathers do not fall at the same rate should be noted," he says.

Current market conditions might be exacerbating problems. Vineer Bhansali, head of portfolio management analytics at Pimco, adds that the increasing availability of leverage for some investors may actually drive all risky security prices higher.

Grantham says the flaws in the CAPM are probably inconvenient enough for the academic financial establishment to want to ignore it. But there ought to be more debate, particularly in using beta as a risk benchmark.

The concept of pursuing absolute returns rather than relative performance is now widely debated. There needs to be a similar evolution in market thinking on how risk is defined, measured and dealt with.

Montier cites a quote from legendary investor Ben Graham: "What bothers me is that authorities now equate the beta with the concept of risk. Price variability, yes; risk, no. Real investment risk is measured not by the per cent a stock may decline in price in relation to the general market in a given period but by the danger of a loss of quality and earning power through economic changes or deterioration in management."

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**Illustrative Example of the Embedded Cost of Debt
For an Annually Amortizing Bond**

Assumptions:

- 1) 10% coupon
- 2) Mid-year convention assumed for outstanding principal.
- 3) Bond is systematically retired over 10 year life.
- 4) Retirements occur at the end of the year.

End of Year	Principal Outstanding	Interest Expense During Year	Average Principal Outstanding During Year	Embedded Cost of Debt
(1)	(2)	(3)	(4)	(5)=(3)/(4)
0	\$20	--	--	--
1	18	\$2.00	\$19	10.53%
2	16	\$1.80	17	10.59%
3	14	\$1.60	15	10.67%
4	12	\$1.40	13	10.77%
5	10	\$1.20	11	10.91%
6	8	\$1.00	9	11.11%
7	6	\$0.80	7	11.43%
8	4	\$0.60	5	12.00%
9	2	\$0.40	3	13.33%
10	0	\$0.20	1	20.00%

**Illustrative Example of the Embedded Cost of Debt
For a Sinking Fund Bond**

Assumptions:

- 1) 10% Coupon
- 2) Mid-year convention assumed for outstanding principal.
- 3) Contributions to the sinking fund made at the end of the year.

End of Year (1)	Principal Outstanding (EOY) (2)	Interest Expense During Year (3)	Sinking Fund Value (EOY) (4)	Sinking Fund Earnings (5)	Net Interest (6)=(3)-(5)	Net Debt (EOY) (7)=(2)-(4)	Average Net Debt Outstanding During Year (8)	Embedded Cost of Debt (9)=(6)/(8)
0	\$20	-	-	-	-	\$20	-	-
1	\$20	\$2.0	\$2	\$0.00	\$2.00	\$18	\$19	10.53%
2	\$20	\$2.0	\$4	\$0.20	\$1.80	\$16	\$17	10.59%
3	\$20	\$2.0	\$6	\$0.40	\$1.60	\$14	\$15	10.67%
4	\$20	\$2.0	\$8	\$0.60	\$1.40	\$12	\$13	10.77%
5	\$20	\$2.0	\$10	\$0.80	\$1.20	\$10	\$11	10.91%
6	\$20	\$2.0	\$12	\$1.00	\$1.00	\$8	\$9	11.11%
7	\$20	\$2.0	\$14	\$1.20	\$0.80	\$6	\$7	11.43%
8	\$20	\$2.0	\$16	\$1.40	\$0.60	\$4	\$5	12.00%
9	\$20	\$2.0	\$18	\$1.60	\$0.40	\$2	\$3	13.33%
10	\$20	\$2.0	\$20	\$1.80	\$0.20	\$0	\$1	20.00%

Impact on Embedded Cost of Debt Due to Different Rates of Return on the Sinking Fund Contributions to the Sinking Fund Made at Year End

Assumptions:

- 1) 10% Coupon
- 2) Mid-year convention assumed for outstanding principal.
- 3) Contributions to the sinking fund made at the end of the year.
- 4) Returns on the sinking fund estimated at 8%, 10% and 12%.

End of Year (1)	Principal Outstanding (EOY) (2)	Interest Expense During Year (3)	Sinking Fund Value (EOY) (4)	Sinking Fund Earnings (5)	Net Interest (6)=(3)-(5)	Net Debt (EOY) (7)=(2)-(4)	Average Net Debt Outstanding During Year (8)	Embedded Cost of Debt (9)=(6)/(8)	Difference from Embedded Cost at 10% Return
Return on Sinking Fund: 10%									
0	\$20	-	-	-	-	\$20	-	-	
1	\$20	\$2.0	\$2	\$0.00	\$2.00	\$18	\$19	10.53%	
2	\$20	\$2.0	\$4	\$0.20	\$1.80	\$16	\$17	10.59%	
3	\$20	\$2.0	\$6	\$0.40	\$1.60	\$14	\$15	10.67%	
4	\$20	\$2.0	\$8	\$0.60	\$1.40	\$12	\$13	10.77%	
5	\$20	\$2.0	\$10	\$0.80	\$1.20	\$10	\$11	10.91%	
6	\$20	\$2.0	\$12	\$1.00	\$1.00	\$8	\$9	11.11%	
7	\$20	\$2.0	\$14	\$1.20	\$0.80	\$6	\$7	11.43%	
8	\$20	\$2.0	\$16	\$1.40	\$0.60	\$4	\$5	12.00%	
9	\$20	\$2.0	\$18	\$1.60	\$0.40	\$2	\$3	13.33%	
10	\$20	\$2.0	\$20	\$1.80	\$0.20	\$0	\$1	20.00%	
Return on Sinking Fund: 8%									
0	\$20	-	-	-	-	\$20	-	-	
1	\$20	\$2.0	\$2	\$0.00	\$2.00	\$18	\$19	10.53%	0.00%
2	\$20	\$2.0	\$4	\$0.16	\$1.84	\$16	\$17	10.82%	0.24%
3	\$20	\$2.0	\$6	\$0.32	\$1.68	\$14	\$15	11.20%	0.53%
4	\$20	\$2.0	\$8	\$0.48	\$1.52	\$12	\$13	11.69%	0.92%
5	\$20	\$2.0	\$10	\$0.64	\$1.36	\$10	\$11	12.36%	1.45%
6	\$20	\$2.0	\$12	\$0.80	\$1.20	\$8	\$9	13.33%	2.22%
7	\$20	\$2.0	\$14	\$0.96	\$1.04	\$6	\$7	14.86%	3.43%
8	\$20	\$2.0	\$16	\$1.12	\$0.88	\$4	\$5	17.60%	5.60%
9	\$20	\$2.0	\$18	\$1.28	\$0.72	\$2	\$3	24.00%	10.67%
10	\$20	\$2.0	\$20	\$1.44	\$0.56	\$0	\$1	56.00%	36.00%
Return on Sinking Fund: 12%									
0	\$20	-	-	-	-	\$20	-	-	
1	\$20	\$2.0	\$2	\$0.00	\$2.00	\$18	\$19	10.53%	0.00%
2	\$20	\$2.0	\$4	\$0.24	\$1.76	\$16	\$17	10.35%	-0.24%
3	\$20	\$2.0	\$6	\$0.48	\$1.52	\$14	\$15	10.13%	-0.53%
4	\$20	\$2.0	\$8	\$0.72	\$1.28	\$12	\$13	9.85%	-0.92%
5	\$20	\$2.0	\$10	\$0.96	\$1.04	\$10	\$11	9.45%	-1.45%
6	\$20	\$2.0	\$12	\$1.20	\$0.80	\$8	\$9	8.89%	-2.22%
7	\$20	\$2.0	\$14	\$1.44	\$0.56	\$6	\$7	8.00%	-3.43%
8	\$20	\$2.0	\$16	\$1.68	\$0.32	\$4	\$5	6.40%	-5.60%
9	\$20	\$2.0	\$18	\$1.92	\$0.08	\$2	\$3	2.67%	-10.67%
10	\$20	\$2.0	\$20	\$2.16	(\$0.16)	\$0	\$1	-16.00%	-36.00%

Impact on Embedded Cost of Debt Due to Different Rates of Return on the Sinking Fund Contributions to the Sinking Fund Made at Mid Year

Assumptions:

- 1) 10% Coupon
- 2) Mid-year convention assumed for outstanding principal.
- 3) Contributions to the sinking fund made at the mid-point of the year.
- 4) Returns on the sinking fund estimated at 8%, 10% and 12%.

End of Year	Principal Outstanding (EOY)	Interest Expense During Year	Sinking Fund Value (EOY)	Sinking Fund Earnings	Net Interest	Net Debt (EOY)	Average Net Debt Outstanding During Year	Embedded cost of Debt	Difference from Embedded Cost at 10% Return
(1)	(2)	(3)	(4)	(5)	(6)=(3)-(5)	(7)=(2)-(4)	(8)	(9)=(6)/(8)	
Return on Sinking Fund: 10%									
0	\$20	-	0	-	-	\$20	-	-	
1	\$20	\$2.0	\$2	\$0.10	\$1.90	\$18	\$19	10.00%	
2	\$20	\$2.0	\$4	\$0.30	\$1.70	\$16	\$17	10.00%	
3	\$20	\$2.0	\$6	\$0.50	\$1.50	\$14	\$15	10.00%	
4	\$20	\$2.0	\$8	\$0.70	\$1.30	\$12	\$13	10.00%	
5	\$20	\$2.0	\$10	\$0.90	\$1.10	\$10	\$11	10.00%	
6	\$20	\$2.0	\$12	\$1.10	\$0.90	\$8	\$9	10.00%	
7	\$20	\$2.0	\$14	\$1.30	\$0.70	\$6	\$7	10.00%	
8	\$20	\$2.0	\$16	\$1.50	\$0.50	\$4	\$5	10.00%	
9	\$20	\$2.0	\$18	\$1.70	\$0.30	\$2	\$3	10.00%	
10	\$20	\$2.0	\$20	\$1.90	\$0.10	\$0	\$1	10.00%	
Return on Sinking Fund: 8%									
0	\$20	-	0	-	-	\$20	-	-	
1	\$20	\$2.0	\$2	\$0.08	\$1.92	\$18	\$19	10.11%	0.11%
2	\$20	\$2.0	\$4	\$0.24	\$1.76	\$16	\$17	10.35%	0.35%
3	\$20	\$2.0	\$6	\$0.40	\$1.60	\$14	\$15	10.67%	0.67%
4	\$20	\$2.0	\$8	\$0.56	\$1.44	\$12	\$13	11.08%	1.08%
5	\$20	\$2.0	\$10	\$0.72	\$1.28	\$10	\$11	11.64%	1.64%
6	\$20	\$2.0	\$12	\$0.88	\$1.12	\$8	\$9	12.44%	2.44%
7	\$20	\$2.0	\$14	\$1.04	\$0.96	\$6	\$7	13.71%	3.71%
8	\$20	\$2.0	\$16	\$1.20	\$0.80	\$4	\$5	16.00%	6.00%
9	\$20	\$2.0	\$18	\$1.36	\$0.64	\$2	\$3	21.33%	11.33%
10	\$20	\$2.0	\$20	\$1.52	\$0.48	\$0	\$1	48.00%	38.00%
Return on Sinking Fund: 12%									
0	\$20	-	0	-	-	\$20	-	-	
1	\$20	\$2.0	\$2	\$0.12	\$1.88	\$18	\$19	9.89%	-0.11%
2	\$20	\$2.0	\$4	\$0.36	\$1.64	\$16	\$17	9.65%	-0.35%
3	\$20	\$2.0	\$6	\$0.60	\$1.40	\$14	\$15	9.33%	-0.67%
4	\$20	\$2.0	\$8	\$0.84	\$1.16	\$12	\$13	8.92%	-1.08%
5	\$20	\$2.0	\$10	\$1.08	\$0.92	\$10	\$11	8.36%	-1.64%
6	\$20	\$2.0	\$12	\$1.32	\$0.68	\$8	\$9	7.56%	-2.44%
7	\$20	\$2.0	\$14	\$1.56	\$0.44	\$6	\$7	6.29%	-3.71%
8	\$20	\$2.0	\$16	\$1.80	\$0.20	\$4	\$5	4.00%	-6.00%
9	\$20	\$2.0	\$18	\$2.04	(\$0.04)	\$2	\$3	-1.33%	-11.33%
10	\$20	\$2.0	\$20	\$2.28	(\$0.28)	\$0	\$1	-28.00%	-38.00%

Investment Policy/Allowed Investments of Government-Owned Utilities

Company

Investment Policy/Investments

<p>Northwest Territories Power Corporation</p>	<p>Financial Administration Act (Amended by Bill 13): eligible investments include Provincial or Federal direct or guaranteed debt securities, debt securities of other governments, municipalities or entity provincially funded, financial institutions and highly rated corporate securities. Investment in other securities required permission of the appropriate Minister and the Minister of Finance.</p> <p>NTPC Act (Amended by Bill 9): amended the FAA to give NTPC the same investment powers that public companies have under the FAA and to ability to invest in "any securities and investment instruments that it determines to be prudent."</p>
<p>BC Hydro</p>	<p>Sinking funds invested in money market funds, province of BC or BC Crown Corporations and federal and other provincial government securities</p>
<p>EPCOR/City of Edmonton</p>	<p>Policy limits sinking fund investments to cash and bonds</p>
<p>Manitoba Hydro</p>	<p>Governed by Financial Administration Act; eligible investments include Provincial or Federal direct or guaranteed debt securities, debt securities of other governments, municipalities or entity provincially funded, financial institutions and highly rated corporate securities</p>
<p>Saskatchewan Power/SaskEnergy</p>	<p>Sinking fund includes Canadian and U.S. government bonds, Provincial and Municipal bonds, bonds issued by Crowns and supranationals, as well as cash and cash substitutes</p>
<p>Hydro Québec</p>	<p>Sinking fund includes only bonds of Hydro Québec</p>
<p>NB Power</p>	<p>Provincial Loans Act defines eligible investments, which include direct or guaranteed obligations of Canada or provinces, direct obligations of New Brunswick municipalities; direct or guaranteed obligations of a government in whose currency the province has issued debt; deposit receipts or like instruments issued by a Canadian chartered bank</p>
<p>Newfoundland and Labrador Hydro</p>	<p>Debenture states that sinking fund investments are limited to bonds, debentures or other evidence of indebtedness of, or guaranteed by, the Government of Canada or any province in Canada or any chartered bank in Canada</p>

25-YEAR ROLLING GEOMETRIC AVERAGE MARKET RETURNS FOR
CANADA AND THE U.S.

	Canada		U.S.	
	<u>Stock Returns</u>	<u>Long Government Bond Returns</u>	<u>Stock Returns</u>	<u>Long Government Bond Returns</u>
1947-1971	11.5%	2.7%	12.6%	1.8%
1948-1972	12.6%	2.6%	13.2%	2.1%
1949-1973	12.1%	2.8%	12.2%	1.9%
1950-1974	9.9%	2.5%	10.1%	1.9%
1951-1975	8.9%	2.7%	10.3%	2.2%
1952-1976	8.4%	3.5%	10.3%	3.0%
1953-1977	8.8%	3.7%	9.2%	2.9%
1954-1978	9.9%	3.6%	9.5%	2.8%
1955-1979	10.1%	3.1%	8.4%	2.4%
1956-1980	10.1%	3.2%	8.4%	2.3%
1957-1981	9.1%	3.2%	7.9%	2.6%
1958-1982	10.4%	4.4%	9.3%	3.7%
1959-1983	10.5%	5.1%	8.6%	4.0%
1960-1984	10.2%	5.8%	8.4%	4.7%
1961-1985	11.1%	6.5%	9.6%	5.3%
1962-1986	10.2%	6.8%	9.3%	6.2%
1963-1987	10.8%	6.7%	9.9%	5.8%
1964-1988	10.7%	6.9%	9.7%	6.1%
1965-1989	10.5%	7.3%	10.2%	6.7%
1966-1990	9.5%	7.4%	9.5%	6.9%
1967-1991	10.3%	8.3%	11.2%	7.5%
1968-1992	9.5%	8.9%	10.6%	8.3%
1969-1993	9.9%	9.8%	10.5%	9.0%
1970-1994	9.9%	9.4%	11.0%	8.9%
1971-1995	10.7%	9.6%	12.2%	9.6%
1972-1996	11.4%	9.7%	12.5%	9.0%
1973-1997	11.0%	10.4%	13.1%	9.4%
1974-1998	10.9%	10.9%	14.9%	10.0%
1975-1999	13.5%	10.6%	17.2%	9.4%
1976-2000	13.0%	11.1%	15.3%	9.8%
1977-2001	12.0%	10.5%	13.8%	9.3%
1978-2002	10.9%	10.6%	13.0%	10.1%
1979-2003	10.8%	10.9%	13.8%	10.2%
1980-2004	9.8%	11.4%	13.5%	10.6%
1981-2005	9.6%	11.9%	12.5%	11.1%
Min	8.4%	2.5%	7.9%	1.8%
Max	13.5%	11.9%	17.2%	11.1%
Mean	10.5%	7.0%	11.2%	6.2%
Stdev.	1.1%	3.3%	2.3%	3.2%
+1 Std	11.7%	10.2%	13.5%	9.4%
-1 Std dev.	9.4%	3.7%	8.9%	3.0%

Source: Ibbotson Associates; [Stocks, Bonds, Bills and Inflation: 2006 Yearbook](#),
[Market Results for 1926-2005](#), [Standardandpoors.com](#); Canadian Institute of Actuaries,
[Report on Canadian Economic Statistics 1924-2005](#)

**CUMULATIVE GEOMETRIC AVERAGE MARKET RETURNS
FOR CANADA AND THE U.S.
(1947 Forward)**

	Canada		U.S.	
	<u>Stock Returns</u>	<u>Long Government Bond Returns</u>	<u>Stock Returns</u>	<u>Long Government Bond Returns</u>
1947-1971	11.5%	2.7%	12.6%	1.8%
1947-1972	12.1%	2.6%	12.9%	1.9%
1947-1973	11.6%	2.6%	11.7%	1.8%
1947-1974	10.0%	2.5%	10.1%	1.9%
1947-1975	10.3%	2.5%	10.9%	2.2%
1947-1976	10.3%	3.0%	11.3%	2.6%
1947-1977	10.3%	3.1%	10.7%	2.5%
1947-1978	10.9%	3.0%	10.5%	2.4%
1947-1979	11.8%	2.8%	10.8%	2.3%
1947-1980	12.3%	2.8%	11.3%	2.1%
1947-1981	11.6%	2.6%	10.8%	2.1%
1947-1982	11.4%	3.6%	11.1%	3.0%
1947-1983	12.0%	3.8%	11.4%	2.9%
1947-1984	11.6%	4.0%	11.3%	3.2%
1947-1985	11.9%	4.5%	11.8%	3.9%
1947-1986	11.8%	4.8%	11.9%	4.3%
1947-1987	11.7%	4.7%	11.8%	4.2%
1947-1988	11.7%	4.9%	11.9%	4.3%
1947-1989	11.9%	5.1%	12.3%	4.6%
1947-1990	11.2%	5.1%	11.9%	4.6%
1947-1991	11.2%	5.5%	12.3%	4.9%
1947-1992	10.9%	5.6%	12.2%	5.0%
1947-1993	11.3%	6.0%	12.2%	5.3%
1947-1994	11.1%	5.6%	11.9%	5.0%
1947-1995	11.2%	6.0%	12.4%	5.5%
1947-1996	11.5%	6.1%	12.6%	5.3%
1947-1997	11.6%	6.4%	13.0%	5.5%
1947-1998	11.3%	6.5%	13.2%	5.7%
1947-1999	11.6%	6.2%	13.4%	5.4%
1947-2000	11.6%	6.4%	12.9%	5.7%
1947-2001	11.1%	6.3%	12.4%	5.6%
1947-2002	10.6%	6.4%	11.7%	5.8%
1947-2003	10.9%	6.4%	12.0%	5.7%
1947-2004	10.9%	6.4%	11.9%	5.8%
1947-2005	11.1%	6.6%	11.8%	5.8%
Min	10.0%	2.5%	10.1%	1.8%
Max	12.3%	6.6%	13.4%	5.8%
Mean	11.3%	4.7%	11.9%	4.0%
Stddev.	0.5%	1.5%	0.8%	1.5%
+1 Std	11.9%	6.2%	12.6%	5.5%
-1 Std dev.	10.8%	3.1%	11.1%	2.5%

Source: Ibbotson Associates; [Stocks, Bonds, Bills and Inflation: 2006 Yearbook](#)
[Market Results for 1926-2005, Standardandpoors.com](#); Canadian Institute of Actuaries,
[Report on Canadian Economic Statistics 1924-2005](#)

**CUMULATIVE GEOMETRIC AVERAGE MARKET RETURNS
FOR CANADA AND THE U.S.
(2005 Backward)**

	Canada		U.S.	
	<u>Stock Returns</u>	<u>Long Government Bond Returns</u>	<u>Stock Returns</u>	<u>Long Government Bond Returns</u>
1947-2005	11.1%	6.6%	11.8%	5.8%
1948-2005	11.3%	6.6%	11.9%	6.0%
1949-2005	11.3%	6.8%	12.0%	6.0%
1950-2005	11.1%	6.8%	11.9%	6.0%
1951-2005	10.5%	7.0%	11.6%	6.1%
1952-2005	10.3%	7.2%	11.4%	6.3%
1953-2005	10.5%	7.3%	11.3%	6.4%
1954-2005	10.7%	7.3%	11.5%	6.5%
1955-2005	10.2%	7.3%	10.8%	6.5%
1956-2005	9.9%	7.5%	10.4%	6.6%
1957-2005	9.8%	7.7%	10.5%	6.9%
1958-2005	10.5%	7.7%	11.0%	6.9%
1959-2005	10.1%	8.0%	10.4%	7.2%
1960-2005	10.3%	8.3%	10.4%	7.4%
1961-2005	10.5%	8.4%	10.6%	7.2%
1962-2005	10.0%	8.3%	10.3%	7.4%
1963-2005	10.4%	8.4%	10.7%	7.4%
1964-2005	10.3%	8.5%	10.5%	7.6%
1965-2005	10.0%	8.6%	10.3%	7.7%
1966-2005	10.0%	8.8%	10.3%	7.8%
1967-2005	10.5%	9.0%	10.9%	7.9%
1968-2005	10.3%	9.3%	10.5%	8.4%
1969-2005	10.0%	9.6%	10.5%	8.7%
1970-2005	10.3%	9.9%	11.1%	9.1%
1971-2005	10.8%	9.6%	11.3%	9.0%
1972-2005	10.8%	9.5%	11.2%	8.9%
1973-2005	10.4%	9.8%	11.0%	9.0%
1974-2005	10.7%	10.1%	11.9%	9.3%
1975-2005	12.2%	10.5%	13.4%	9.5%
1976-2005	11.9%	10.7%	12.7%	9.5%
1977-2005	12.0%	10.4%	12.4%	9.2%
1978-2005	12.0%	10.6%	13.1%	9.6%
1979-2005	11.4%	11.0%	13.4%	10.0%
1980-2005	10.3%	11.5%	13.2%	10.5%
1981-2005	9.6%	11.9%	12.5%	11.1%
Min	9.6%	6.6%	10.3%	5.8%
Max	12.2%	11.9%	13.4%	11.1%
Mean	10.6%	8.8%	11.4%	7.9%
Stdev.	0.7%	1.5%	1.0%	1.5%
+1 Std	11.3%	10.3%	12.4%	9.3%
-1 Std dev.	10.0%	7.3%	10.4%	6.4%

Source: Ibbotson Associates; Stocks, Bonds, Bills and Inflation: 2006 Yearbook
Market Results for 1926-2005, Standardandpoors.com; Canadian Institute of Actuaries,
Report on Canadian Economic Statistics 1924-2005

**HISTORIC EQUITY MARKET
RISK PREMIUMS**

**Canada
(1947-2006)**

Average	Stock Return	Bond Return	Risk Premium
Arithmetic	12.4	6.9	5.5
Geometric	11.2	6.5	4.7

**United States
(1947-2006)**

Average	Stock Return	Bond Return	Risk Premium
Arithmetic	13.2	6.2	7.0
Geometric	11.9	5.7	6.1

**United Kingdom
(1947-2006)**

Average	Stock Return	Bond Return	Risk Premium
Arithmetic	15.0	8.7	6.3
Geometric	12.3	6.3	6.0

Source: Ibbotson Associates, Stocks, Bonds, Bills and Inflation: 2006 Yearbook
Market Results for 1926-2005; Standardandpoors.com; U.S. Federal Reserve; Canadian Institute of Actuaries,
Report on Canadian Economic Statistics 1924-2005; Bank of Canada; TSX Review, www.statistics.gov.uk

HISTORIC UTILITY EQUITY RISK PREMIUMS

Canada (1956-2006)			
Average	Utilities Index Return	Bond Return	Risk Premium
Arithmetic	12.6	7.8	4.8
Geometric	11.5	7.8	3.7
United States (1947-2006)			
S&P/Moody's			
Average	Electric Index Return	Bond Return	Risk Premium
Arithmetic	11.4	6.2	5.2
Geometric	10.2	6.2	4.0
S&P / Moody's Gas			
Average	Distribution Index Return	Bond Return	Risk Premium
Arithmetic	12.3	6.2	6.1
Geometric	11.1	6.2	4.9

Note: The Canadian Utilities Index is based on the Gas/Electric Index of the TSE 300 (from 1956 to 1987) and on the S&P/TSX Utilities Index from 1988-2001. The S&P/Moody's Electric Index reflects S&P's Electric Index from 1947 to 2001. The 2002 to 2006 data were estimated using simple average of the prices and dividends for the utilities included in Moody's Electric Index as of the end of 2001. These utilities include American Electric Power, Centerpoint Energy, CH Energy, Cinergy, Consolidated Edison, Constellation, Dominion Resources, DPL, DTE Energy, Duke Energy, Energy East, Exelon, FirstEnergy, IDACORP, Nisource, OGE Energy, Pepco Holdings, PPL, Progress Energy, Public Service Enterprise Grp., Southern Co., Teco and Xcel Energy.

The S&P/Moody's Gas Distribution Index reflects S&P's Natural Gas Distributors Index from 1947 to 1984, when S&P eliminated its gas distribution index. The 1984-2001 data are for Moody's Gas index. The index was terminated in July 2002. The 2002-2006 returns were estimated using simple averages of the prices and dividends for the utilities that were included in Moody's Gas Index as of the end of 2001. These LDCs include AGL Resources, Keyspan Corp., Laclede Group, Northwest Natural, Peoples Energy and WGL Holdings.

Sources: TSX Review, Canadian Institute of Actuaries, Report on Canadian Economic Statistics 1924-2005, Standard & Poor's Analysts' Handbook, Ibbotson Associates, Stocks, Bonds, Bills and Inflation: 2006 Yearbook, Mergent Corporate News Reports, and U.S. Federal R

**DCF-BASED EQUITY RISK PREMIUM STUDY FOR
LOW RISK US ELECTRIC AND GAS UTILITIES
(Quarterly Averages of Monthly Data)**

		Expected	I/B/E/S	DCF Cost	Long Treasury	
		Dividend	Growth		Yield	Risk Premium
		Yield ^{1/}	Forecast			
1993	q1	5.5	4.7	10.2	7.0	3.2
	q2	5.4	4.7	10.1	6.9	3.3
	q3	5.2	4.8	9.9	6.3	3.7
	q4	5.4	4.5	9.9	6.2	3.7
1994	q1	5.8	4.2	10.1	6.7	3.3
	q2	6.1	4.3	10.4	7.3	3.1
	q3	6.2	4.3	10.5	7.6	2.9
	q4	6.4	4.0	10.4	7.9	2.5
1995	q1	6.2	3.9	10.1	7.6	2.5
	q2	6.1	4.0	10.1	6.9	3.1
	q3	6.0	3.9	9.9	6.7	3.2
	q4	5.5	4.0	9.5	6.2	3.3
1996	q1	5.4	4.0	9.4	6.4	3.1
	q2	5.7	4.0	9.7	7.0	2.7
	q3	5.7	4.1	9.8	7.0	2.8
	q4	5.5	4.1	9.6	6.6	3.0
1997	q1	5.6	4.1	9.7	6.9	2.8
	q2	5.7	4.1	9.9	6.9	3.0
	q3	5.4	4.2	9.6	6.5	3.1
	q4	4.9	4.1	9.0	6.1	2.9
1998	q1	4.7	4.2	8.9	5.9	2.9
	q2	4.7	4.4	9.1	5.8	3.3
	q3	4.8	4.4	9.2	5.4	3.9
	q4	4.5	4.3	8.8	5.1	3.7
1999	q1	5.2	4.5	9.7	5.4	4.3
	q2	5.1	4.6	9.7	5.8	3.9
	q3	5.1	4.7	9.8	6.1	3.7
	q4	5.5	4.8	10.3	6.4	3.9
2000	q1	5.8	4.8	10.6	6.2	4.5
	q2	5.8	5.0	10.8	6.0	4.9
	q3	5.7	5.3	11.0	5.8	5.2
	q4	4.9	5.3	10.2	5.6	4.6
2001	q1	5.0	5.3	10.3	5.4	4.8
	q2	5.0	5.7	10.7	5.8	4.9
	q3	5.1	5.4	10.5	5.4	5.0
	q4	5.0	5.5	10.5	5.3	5.1
2002	q1	4.9	5.6	10.4	5.7	4.8
	q2	4.7	5.6	10.3	5.7	4.6
	q3	5.1	5.6	10.7	5.1	5.5
	q4	5.0	5.4	10.4	5.1	5.3
2003	q1	5.2	5.4	10.5	4.9	5.6
	q2	4.7	5.1	9.9	4.7	5.2
	q3	4.7	4.9	9.6	5.3	4.3
	q4	4.6	4.7	9.2	5.2	4.0
2004	q1	4.4	4.5	8.9	5.0	4.0
	q2	4.6	4.5	9.1	5.4	3.8
	q3	4.5	4.5	9.0	5.1	3.9
	q4	4.3	4.4	8.7	4.9	3.7
2005	q1	4.2	4.5	8.7	4.7	4.0
	q2	4.1	4.4	8.5	4.4	4.1
	q3	3.9	4.2	8.2	4.4	3.8
	q4	4.2	4.6	8.9	4.6	4.2
2006	q1	4.2	4.9	9.1	4.7	4.4
	q2	4.4	4.9	9.3	5.2	4.1
	q3	4.1	4.9	9.1	4.9	4.2
	q4	3.9	4.6	8.6	4.7	3.9
Means for Long Treasury Yields:						
	Under 5.0	4.4	4.7	9.1	4.7	4.4
	5.0-5.99	4.9	4.9	9.8	5.5	4.3
	6.0-6.99	5.5	4.3	9.8	6.5	3.3
	7.0 and above	6.1	4.2	10.2	7.5	2.8
Means:						
	1993 - 2006Q4	5.1	4.6	9.7	5.9	3.9
	1998 - 2006Q4	4.8	4.9	9.6	5.3	4.3

^{1/} Dividend Yield is adjusted for half of I/B/E/S/ growth
Source: Standard & Poor's Research Insight, I/B/E/S and U.S. Federal Reserve

**DCF-BASED EQUITY RISK PREMIUM STUDY FOR
BENCHMARK US ELECTRIC AND GAS UTILITIES**
Regression Analysis Results

Equation 1:

$$\text{Equity Risk Premium} = 7.56 - 0.63 (\text{30-Year Treasury Yield})$$

t-statistics:

$$\text{Long-term Bond Yield} = -11.92$$

$$R^2 = 46\%$$

$$\begin{array}{l} \text{Equity Risk Premium at} \\ \text{2006/2007 Yield of 4.25\%} \end{array} = 4.88$$

$$\begin{array}{l} \text{Equity Risk Premium at Long-} \\ \text{Term Bond Yield of 4.50\%} \end{array} = 4.72$$

Equation 2:

$$\text{Equity Risk Premium} = 4.98 - 0.43 (\text{30-Year Treasury Yield}) + 1.03 (\text{Spread})$$

Where Spread = Spread between A-rated Utility Bond Yields and 30-year
Treasury Yields

t-statistics:

$$\text{Long-term Bond Yield} = -12.53$$

$$\text{Utility/government bond yield spread} = 16.48$$

$$R^2 = 79\%$$

$$\begin{array}{l} \text{Equity Risk Premium at} \\ \text{2006/2007 Yields of 4.25\% and} \\ \text{Spread of 1.20\%} \end{array} = 4.36$$

$$\begin{array}{l} \text{Equity Risk Premium at Long-} \\ \text{term Bond Yield of 4.50\% and} \\ \text{Spread of 1.20\%} \end{array} = 4.26$$

**DCF COST OF EQUITY FOR BENCHMARK SAMPLE OF
US ELECTRIC AND GAS UTILITIES
(BASED ON ANALYSTS' EARNINGS GROWTH FORECASTS)**

<u>Company</u>	<u>Annualized Last Paid Dividend</u> (1)	<u>Average Daily Closing Prices March 14 - April 13, 2005</u> (2)	<u>Expected Dividend Yield ^{1/}</u> (3)	<u>I/B/E/S Long-Term EPS Forecasts</u> (4)	<u>DCF Cost of Equity ^{2/}</u> (5)
AGL Resources	1.64	42.53	4.0	4.1	8.1
Consol. Edison	2.32	50.82	4.7	3.0	7.7
FPL Group	1.64	61.08	2.9	8.4	11.3
New Jersey Resources	1.52	50.02	3.2	5.3	8.5
NICOR Inc.	1.86	49.29	3.9	2.3	6.2
Northwest Nat. Gas	1.42	45.79	3.3	4.9	8.1
NSTAR	1.30	35.36	3.9	5.7	9.6
Piedmont Natural Gas	1.00	26.73	3.9	4.3	8.2
SCANA Corp.	1.76	43.43	4.2	4.7	8.9
Southern Co.	1.55	36.74	4.4	5.2	9.6
Vectren Corp.	1.26	28.48	4.6	4.5	9.1
WGL Holdings Inc.	1.35	32.12	4.4	3.5	7.9
WPS Resources	2.10	55.20	4.0	5.3	9.3
Mean	1.59	42.89	4.0	4.7	8.7
Median	1.55	43.43	4.0	4.7	8.5

^{1/} Expected Dividend Yield = (Col (1) / Col (2)) * (1 + Col (4))

^{2/} Expected Dividend Yield (Col (3)) + I/B/E/S Growth Forecast (Col (4))

Source: Standard and Poor's Research Insight, Yahoo.com and I/B/E/S (March 2007)

**DCF COST OF EQUITY FOR BENCHMARK SAMPLE OF
US ELECTRIC AND GAS UTILITIES
(TWO STAGE MODEL)**

<u>Company</u>	<u>Annualized Last Paid Dividend</u> (1)	<u>Average Daily Closing Prices March 14 - April 13, 2005</u> (2)	<u>I/B/E/S Long-Term EPS Forecasts</u> (3)	<u>Stage 2 GDP Growth ^{1/}</u> (4)	<u>DCF Cost of Equity ^{2/}</u> (5)
AGL Resources	1.64	42.53	4.1	5.1	8.9
Consolidated Edison Inc.	2.32	50.82	3.0	5.1	9.4
FPL Group	1.64	61.08	8.4	5.1	8.2
New Jersey Resources	1.52	50.02	5.3	5.1	8.1
Nicor Inc.	1.86	49.29	2.3	5.1	8.4
Northwest Natural Gas	1.42	45.79	4.9	5.1	8.1
NSTAR	1.30	35.36	5.7	5.1	9.0
Piedmont Natural Gas	1.00	26.73	4.3	5.1	8.8
SCANA Corp.	1.76	43.43	4.7	5.1	9.2
Southern Co.	1.55	36.74	5.2	5.1	9.5
Vectren Corp.	1.26	28.48	4.5	5.1	9.6
WGL Holdings Inc.	1.35	32.12	3.5	5.1	9.1
WPS Resources	2.10	55.20	5.3	5.1	9.0
Mean	1.59	42.89	4.7	5.1	8.9
Median	1.55	43.43	4.7	5.1	9.0

^{1/} Consensus forecast nominal rate of GDP growth, 2009-18

^{2/} Internal Rate of Return: I/B/E/S EPS forecast growth rate applies for first 5 years; GDP growth thereafter.

Source: Standard and Poor's Research Insight, Yahoo.com, Blue Chip *Economic Indicators* (March 2007) and I/B/E/S (March 2007)

Tony Tassell: The time has come for the CAPM to RIP

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Few theories are more influential or important in driving financial markets as the inelegantly-named capital asset pricing model. Too bad it does not appear to work very well.

The CAPM, as it is widely known, is a cornerstone of modern financial market analysis, studied like a rosary by analysts and executives at business school. Most financial directors use it to assess everything from the viability of a new project to their cost of capital. Most stock market analysts consider it an essential tool.

But it has faced increasing criticism in recent years as unworkable in the real world, even from luminary market academics such as Harry Markowitz who laid the groundwork for the CAPM with research in 1950s on efficient portfolios.

CAPM is basically a model for valuing stocks or securities by relating risk and expected return. Developed separately by William Sharpe, John Lintner and Jack Treynor, it is based on the idea that investors demand additional expected return to take on additional risk.

It then assumes markets are efficiently priced to reflect greater returns for greater risk. The risk is assessed on a stock or security's so-called beta, a measure of a company's volatility and correlation with the market as a whole. A company with a share price that tends to rise and fall more than the market will have a high beta and vice versa.

It is a seductively simple, catch-all theory to quantify risk and forecast returns. It has spurred the development of quantitative investing.

But there is a problem. James Montier, analyst at Dresdner Kleinwort, says CAPM has become the financial theory equivalent of Monty Python's famous dead parrot sketch. He says the model is empirically bogus – it does not work in any way, shape or form. But like the shopkeeper who insists to a customer with a dead parrot in the sketch that the bird is merely resting, financial markets are in denial.

“The CAPM is, in actual fact, Completely Redundant Asset Pricing (CRAP),” he says.

Some of the most damning evidence came from an exhaustive 2004 study by Eugene Fama and Kenneth French, the academics who helped develop the efficient markets theory in the early 1970s, that argued stocks are always correctly priced as everything that is publicly known about the stock is reflected in its market price.

The study looked at all stocks on the New York Stock Exchange, the American Stock Exchange and Nasdaq from 1923 to 2003. As Montier states, the study shows CAPM woefully underpredicts the returns to low beta stocks and massively overstates the returns to high beta stocks. “Over the long run there has been essentially no relationship between beta and return,” he says.

Fama and French themselves concluded that while CAPM was a theoretical tour de force, its empirical track record was so poor that its use in “applications” was probably invalid. In others words, CAPM is a fine theory but useless in the real world.

A similar study of the 600 largest US stocks by Jeremy Grantham, the value investor, last year yielded similar results. It showed from 1969 to the end of 2005, the lowest decile of beta stocks – notionally the lowest risk – outperformed by an average 1.5 per cent a year. The highest beta stocks, or the riskiest, actually underperformed by 2.7 per cent a year.

The problems in the CAPM lie in its assumptions, particularly those used to derive the efficient portfolio that is used as a benchmark for the model in theory. The most commonly-cited criticism is an implicit assumption that all investors can borrow or lend funds on equal terms.

Other assumptions that have been criticised include: that there are no transaction costs, that all investors have a "homogeneity" of expectations and risk appetites and that investors can take any market exposure without affecting prices. It also assumes no taxes so investors are indifferent between dividends and capital gains.

Markowitz himself noted that the CAPM is like studying "the motions of objects on Earth under the assumption that the Earth has no air".

"The calculations and results are much simpler if this assumption is made. But at some point, the obvious fact that on Earth, cannonballs and feathers do not fall at the same rate should be noted," he says.

Current market conditions might be exacerbating problems. Vineer Bhansali, head of portfolio management analytics at Pimco, adds that the increasing availability of leverage for some investors may actually drive all risky security prices higher.

Grantham says the flaws in the CAPM are probably inconvenient enough for the academic financial establishment to want to ignore it. But there ought to be more debate, particularly in using beta as a risk benchmark.

The concept of pursuing absolute returns rather than relative performance is now widely debated. There needs to be a similar evolution in market thinking on how risk is defined, measured and dealt with.

Montier cites a quote from legendary investor Ben Graham: "What bothers me is that authorities now equate the beta with the concept of risk. Price variability, yes; risk, no. Real investment risk is measured not by the per cent a stock may decline in price in relation to the general market in a given period but by the danger of a loss of quality and earning power through economic changes or deterioration in management."

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**Illustrative Example of the Embedded Cost of Debt
For an Annually Amortizing Bond**

Assumptions:

- 1) 10% coupon
- 2) Mid-year convention assumed for outstanding principal.
- 3) Bond is systematically retired over 10 year life.
- 4) Retirements occur at the end of the year.

End of Year	Principal Outstanding	Interest Expense During Year	Average Principal Outstanding During Year	Embedded Cost of Debt
(1)	(2)	(3)	(4)	(5)=(3)/(4)
0	\$20	--	--	--
1	18	\$2.00	\$19	10.53%
2	16	\$1.80	17	10.59%
3	14	\$1.60	15	10.67%
4	12	\$1.40	13	10.77%
5	10	\$1.20	11	10.91%
6	8	\$1.00	9	11.11%
7	6	\$0.80	7	11.43%
8	4	\$0.60	5	12.00%
9	2	\$0.40	3	13.33%
10	0	\$0.20	1	20.00%

**Illustrative Example of the Embedded Cost of Debt
For a Sinking Fund Bond**

Assumptions:

- 1) 10% Coupon
- 2) Mid-year convention assumed for outstanding principal.
- 3) Contributions to the sinking fund made at the end of the year.

End of Year	Principal Outstanding (EOY)	Interest Expense During Year	Sinking Fund Value (EOY)	Sinking Fund Earnings	Net Interest	Net Debt (EOY)	Average Net Debt Outstanding During Year	Embedded Cost of Debt
(1)	(2)	(3)	(4)	(5)	(6)=(3)-(5)	(7)=(2)-(4)	(8)	(9)=(6)/(8)
0	\$20	-	-	-	-	\$20	-	-
1	\$20	\$2.0	\$2	\$0.00	\$2.00	\$18	\$19	10.53%
2	\$20	\$2.0	\$4	\$0.20	\$1.80	\$16	\$17	10.59%
3	\$20	\$2.0	\$6	\$0.40	\$1.60	\$14	\$15	10.67%
4	\$20	\$2.0	\$8	\$0.60	\$1.40	\$12	\$13	10.77%
5	\$20	\$2.0	\$10	\$0.80	\$1.20	\$10	\$11	10.91%
6	\$20	\$2.0	\$12	\$1.00	\$1.00	\$8	\$9	11.11%
7	\$20	\$2.0	\$14	\$1.20	\$0.80	\$6	\$7	11.43%
8	\$20	\$2.0	\$16	\$1.40	\$0.60	\$4	\$5	12.00%
9	\$20	\$2.0	\$18	\$1.60	\$0.40	\$2	\$3	13.33%
10	\$20	\$2.0	\$20	\$1.80	\$0.20	\$0	\$1	20.00%

**Impact on Embedded Cost of Debt Due to Different Rates of Return on the Sinking Fund
Contributions to the Sinking Fund Made at Year End**

Assumptions:

- 1) 10% Coupon
- 2) Mid-year convention assumed for outstanding principal.
- 3) Contributions to the sinking fund made at the end of the year.
- 4) Returns on the sinking fund estimated at 8%, 10% and 12%.

End of Year (1)	Principal Outstanding (EOY) (2)	Interest Expense During Year (3)	Sinking Fund Value (EOY) (4)	Sinking Fund Earnings (5)	Net Interest (6)=(3)-(5)	Net Debt (EOY) (7)=(2)-(4)	Average Net Debt Outstanding During Year (8)	Embedded Cost of Debt (9)=(6)/(8)	Difference from Embedded Cost at 10% Return
Return on Sinking Fund: 10%									
0	\$20	-	-	-	-	\$20	-	-	
1	\$20	\$2.0	\$2	\$0.00	\$2.00	\$18	\$19	10.53%	
2	\$20	\$2.0	\$4	\$0.20	\$1.80	\$16	\$17	10.59%	
3	\$20	\$2.0	\$6	\$0.40	\$1.60	\$14	\$15	10.67%	
4	\$20	\$2.0	\$8	\$0.60	\$1.40	\$12	\$13	10.77%	
5	\$20	\$2.0	\$10	\$0.80	\$1.20	\$10	\$11	10.91%	
6	\$20	\$2.0	\$12	\$1.00	\$1.00	\$8	\$9	11.11%	
7	\$20	\$2.0	\$14	\$1.20	\$0.80	\$6	\$7	11.43%	
8	\$20	\$2.0	\$16	\$1.40	\$0.60	\$4	\$5	12.00%	
9	\$20	\$2.0	\$18	\$1.60	\$0.40	\$2	\$3	13.33%	
10	\$20	\$2.0	\$20	\$1.80	\$0.20	\$0	\$1	20.00%	
Return on Sinking Fund: 8%									
0	\$20	-	-	-	-	\$20	-	-	
1	\$20	\$2.0	\$2	\$0.00	\$2.00	\$18	\$19	10.53%	0.00%
2	\$20	\$2.0	\$4	\$0.16	\$1.84	\$16	\$17	10.82%	0.24%
3	\$20	\$2.0	\$6	\$0.32	\$1.68	\$14	\$15	11.20%	0.53%
4	\$20	\$2.0	\$8	\$0.48	\$1.52	\$12	\$13	11.69%	0.92%
5	\$20	\$2.0	\$10	\$0.64	\$1.36	\$10	\$11	12.36%	1.45%
6	\$20	\$2.0	\$12	\$0.80	\$1.20	\$8	\$9	13.33%	2.22%
7	\$20	\$2.0	\$14	\$0.96	\$1.04	\$6	\$7	14.86%	3.43%
8	\$20	\$2.0	\$16	\$1.12	\$0.88	\$4	\$5	17.60%	5.60%
9	\$20	\$2.0	\$18	\$1.28	\$0.72	\$2	\$3	24.00%	10.67%
10	\$20	\$2.0	\$20	\$1.44	\$0.56	\$0	\$1	56.00%	36.00%
Return on Sinking Fund: 12%									
0	\$20	-	-	-	-	\$20	-	-	
1	\$20	\$2.0	\$2	\$0.00	\$2.00	\$18	\$19	10.53%	0.00%
2	\$20	\$2.0	\$4	\$0.24	\$1.76	\$16	\$17	10.35%	-0.24%
3	\$20	\$2.0	\$6	\$0.48	\$1.52	\$14	\$15	10.13%	-0.53%
4	\$20	\$2.0	\$8	\$0.72	\$1.28	\$12	\$13	9.85%	-0.92%
5	\$20	\$2.0	\$10	\$0.96	\$1.04	\$10	\$11	9.45%	-1.45%
6	\$20	\$2.0	\$12	\$1.20	\$0.80	\$8	\$9	8.89%	-2.22%
7	\$20	\$2.0	\$14	\$1.44	\$0.56	\$6	\$7	8.00%	-3.43%
8	\$20	\$2.0	\$16	\$1.68	\$0.32	\$4	\$5	6.40%	-5.60%
9	\$20	\$2.0	\$18	\$1.92	\$0.08	\$2	\$3	2.67%	-10.67%
10	\$20	\$2.0	\$20	\$2.16	(\$0.16)	\$0	\$1	-16.00%	-36.00%

Impact on Embedded Cost of Debt Due to Different Rates of Return on the Sinking Fund Contributions to the Sinking Fund Made at Mid Year

Assumptions:

- 1) 10% Coupon
- 2) Mid-year convention assumed for outstanding principal.
- 3) Contributions to the sinking fund made at the mid-point of the year.
- 4) Returns on the sinking fund estimated at 8%, 10% and 12%.

End of Year	Principal Outstanding (EOY)	Interest Expense During Year	Sinking Fund Value (EOY)	Sinking Fund Earnings	Net Interest	Net Debt (EOY)	Average Net Debt Outstanding During Year	Embedded cost of Debt	Difference from Embedded Cost at 10% Return
(1)	(2)	(3)	(4)	(5)	(6)=(3)-(5)	(7)=(2)-(4)	(8)	(9)=(6)/(8)	
Return on Sinking Fund: 10%									
0	\$20	-	0	-	-	\$20	-	-	
1	\$20	\$2.0	\$2	\$0.10	\$1.90	\$18	\$19	10.00%	
2	\$20	\$2.0	\$4	\$0.30	\$1.70	\$16	\$17	10.00%	
3	\$20	\$2.0	\$6	\$0.50	\$1.50	\$14	\$15	10.00%	
4	\$20	\$2.0	\$8	\$0.70	\$1.30	\$12	\$13	10.00%	
5	\$20	\$2.0	\$10	\$0.90	\$1.10	\$10	\$11	10.00%	
6	\$20	\$2.0	\$12	\$1.10	\$0.90	\$8	\$9	10.00%	
7	\$20	\$2.0	\$14	\$1.30	\$0.70	\$6	\$7	10.00%	
8	\$20	\$2.0	\$16	\$1.50	\$0.50	\$4	\$5	10.00%	
9	\$20	\$2.0	\$18	\$1.70	\$0.30	\$2	\$3	10.00%	
10	\$20	\$2.0	\$20	\$1.90	\$0.10	\$0	\$1	10.00%	
Return on Sinking Fund: 8%									
0	\$20	-	0	-	-	\$20	-	-	
1	\$20	\$2.0	\$2	\$0.08	\$1.92	\$18	\$19	10.11%	0.11%
2	\$20	\$2.0	\$4	\$0.24	\$1.76	\$16	\$17	10.35%	0.35%
3	\$20	\$2.0	\$6	\$0.40	\$1.60	\$14	\$15	10.67%	0.67%
4	\$20	\$2.0	\$8	\$0.56	\$1.44	\$12	\$13	11.08%	1.08%
5	\$20	\$2.0	\$10	\$0.72	\$1.28	\$10	\$11	11.64%	1.64%
6	\$20	\$2.0	\$12	\$0.88	\$1.12	\$8	\$9	12.44%	2.44%
7	\$20	\$2.0	\$14	\$1.04	\$0.96	\$6	\$7	13.71%	3.71%
8	\$20	\$2.0	\$16	\$1.20	\$0.80	\$4	\$5	16.00%	6.00%
9	\$20	\$2.0	\$18	\$1.36	\$0.64	\$2	\$3	21.33%	11.33%
10	\$20	\$2.0	\$20	\$1.52	\$0.48	\$0	\$1	48.00%	38.00%
Return on Sinking Fund: 12%									
0	\$20	-	0	-	-	\$20	-	-	
1	\$20	\$2.0	\$2	\$0.12	\$1.88	\$18	\$19	9.89%	-0.11%
2	\$20	\$2.0	\$4	\$0.36	\$1.64	\$16	\$17	9.65%	-0.35%
3	\$20	\$2.0	\$6	\$0.60	\$1.40	\$14	\$15	9.33%	-0.67%
4	\$20	\$2.0	\$8	\$0.84	\$1.16	\$12	\$13	8.92%	-1.08%
5	\$20	\$2.0	\$10	\$1.08	\$0.92	\$10	\$11	8.36%	-1.64%
6	\$20	\$2.0	\$12	\$1.32	\$0.68	\$8	\$9	7.56%	-2.44%
7	\$20	\$2.0	\$14	\$1.56	\$0.44	\$6	\$7	6.29%	-3.71%
8	\$20	\$2.0	\$16	\$1.80	\$0.20	\$4	\$5	4.00%	-6.00%
9	\$20	\$2.0	\$18	\$2.04	(\$0.04)	\$2	\$3	-1.33%	-11.33%
10	\$20	\$2.0	\$20	\$2.28	(\$0.28)	\$0	\$1	-28.00%	-38.00%

Investment Policy/Allowed Investments of Government-Owned Utilities

Company

Investment Policy/Investments

<p>Northwest Territories Power Corporation</p>	<p>Financial Administration Act (Amended by Bill 13): eligible investments include Provincial or Federal direct or guaranteed debt securities, debt securities of other governments, municipalities or entity provincially funded, financial institutions and highly rated corporate securities. Investment in other securities required permission of the appropriate Minister and the Minister of Finance.</p> <p>NTPC Act (Amended by Bill 9): amended the FAA to give NTPC the same investment powers that public companies have under the FAA and to ability to invest in "any securities and investment instruments that it determines to be prudent."</p>
<p>BC Hydro</p>	<p>Sinking funds invested in money market funds, province of BC or BC Crown Corporations and federal and other provincial government securities</p>
<p>EPCOR/City of Edmonton</p>	<p>Policy limits sinking fund investments to cash and bonds</p>
<p>Manitoba Hydro</p>	<p>Governed by Financial Administration Act; eligible investments include Provincial or Federal direct or guaranteed debt securities, debt securities of other governments, municipalities or entity provincially funded, financial institutions and highly rated corporate securities</p>
<p>Saskatchewan Power/SaskEnergy</p>	<p>Sinking fund includes Canadian and U.S. government bonds, Provincial and Municipal bonds, bonds issued by Crowns and supranationals, as well as cash and cash substitutes</p>
<p>Hydro Québec</p>	<p>Sinking fund includes only bonds of Hydro Québec</p>
<p>NB Power</p>	<p>Provincial Loans Act defines eligible investments, which include direct or guaranteed obligations of Canada or provinces, direct obligations of New Brunswick municipalities; direct or guaranteed obligations of a government in whose currency the province has issued debt; deposit receipts or like instruments issued by a Canadian chartered bank</p>
<p>Newfoundland and Labrador Hydro</p>	<p>Debenture states that sinking fund investments are limited to bonds, debentures or other evidence of indebtedness of, or guaranteed by, the Government of Canada or any province in Canada or any chartered bank in Canada</p>

25-YEAR ROLLING GEOMETRIC AVERAGE MARKET RETURNS FOR
CANADA AND THE U.S.

	Canada		U.S.	
	<u>Stock Returns</u>	<u>Long Government Bond Returns</u>	<u>Stock Returns</u>	<u>Long Government Bond Returns</u>
1947-1971	11.5%	2.7%	12.6%	1.8%
1948-1972	12.6%	2.6%	13.2%	2.1%
1949-1973	12.1%	2.8%	12.2%	1.9%
1950-1974	9.9%	2.5%	10.1%	1.9%
1951-1975	8.9%	2.7%	10.3%	2.2%
1952-1976	8.4%	3.5%	10.3%	3.0%
1953-1977	8.8%	3.7%	9.2%	2.9%
1954-1978	9.9%	3.6%	9.5%	2.8%
1955-1979	10.1%	3.1%	8.4%	2.4%
1956-1980	10.1%	3.2%	8.4%	2.3%
1957-1981	9.1%	3.2%	7.9%	2.6%
1958-1982	10.4%	4.4%	9.3%	3.7%
1959-1983	10.5%	5.1%	8.6%	4.0%
1960-1984	10.2%	5.8%	8.4%	4.7%
1961-1985	11.1%	6.5%	9.6%	5.3%
1962-1986	10.2%	6.8%	9.3%	6.2%
1963-1987	10.8%	6.7%	9.9%	5.8%
1964-1988	10.7%	6.9%	9.7%	6.1%
1965-1989	10.5%	7.3%	10.2%	6.7%
1966-1990	9.5%	7.4%	9.5%	6.9%
1967-1991	10.3%	8.3%	11.2%	7.5%
1968-1992	9.5%	8.9%	10.6%	8.3%
1969-1993	9.9%	9.8%	10.5%	9.0%
1970-1994	9.9%	9.4%	11.0%	8.9%
1971-1995	10.7%	9.6%	12.2%	9.6%
1972-1996	11.4%	9.7%	12.5%	9.0%
1973-1997	11.0%	10.4%	13.1%	9.4%
1974-1998	10.9%	10.9%	14.9%	10.0%
1975-1999	13.5%	10.6%	17.2%	9.4%
1976-2000	13.0%	11.1%	15.3%	9.8%
1977-2001	12.0%	10.5%	13.8%	9.3%
1978-2002	10.9%	10.6%	13.0%	10.1%
1979-2003	10.8%	10.9%	13.8%	10.2%
1980-2004	9.8%	11.4%	13.5%	10.6%
1981-2005	9.6%	11.9%	12.5%	11.1%
Min	8.4%	2.5%	7.9%	1.8%
Max	13.5%	11.9%	17.2%	11.1%
Mean	10.5%	7.0%	11.2%	6.2%
Stdev.	1.1%	3.3%	2.3%	3.2%
+1 Std	11.7%	10.2%	13.5%	9.4%
-1 Std dev.	9.4%	3.7%	8.9%	3.0%

Source: Ibbotson Associates; [Stocks, Bonds, Bills and Inflation: 2006 Yearbook](#),
[Market Results for 1926-2005](#), [Standardandpoors.com](#); Canadian Institute of Actuaries,
[Report on Canadian Economic Statistics 1924-2005](#)

**CUMULATIVE GEOMETRIC AVERAGE MARKET RETURNS
FOR CANADA AND THE U.S.
(1947 Forward)**

	Canada		U.S.	
	<u>Stock Returns</u>	<u>Long Government Bond Returns</u>	<u>Stock Returns</u>	<u>Long Government Bond Returns</u>
1947-1971	11.5%	2.7%	12.6%	1.8%
1947-1972	12.1%	2.6%	12.9%	1.9%
1947-1973	11.6%	2.6%	11.7%	1.8%
1947-1974	10.0%	2.5%	10.1%	1.9%
1947-1975	10.3%	2.5%	10.9%	2.2%
1947-1976	10.3%	3.0%	11.3%	2.6%
1947-1977	10.3%	3.1%	10.7%	2.5%
1947-1978	10.9%	3.0%	10.5%	2.4%
1947-1979	11.8%	2.8%	10.8%	2.3%
1947-1980	12.3%	2.8%	11.3%	2.1%
1947-1981	11.6%	2.6%	10.8%	2.1%
1947-1982	11.4%	3.6%	11.1%	3.0%
1947-1983	12.0%	3.8%	11.4%	2.9%
1947-1984	11.6%	4.0%	11.3%	3.2%
1947-1985	11.9%	4.5%	11.8%	3.9%
1947-1986	11.8%	4.8%	11.9%	4.3%
1947-1987	11.7%	4.7%	11.8%	4.2%
1947-1988	11.7%	4.9%	11.9%	4.3%
1947-1989	11.9%	5.1%	12.3%	4.6%
1947-1990	11.2%	5.1%	11.9%	4.6%
1947-1991	11.2%	5.5%	12.3%	4.9%
1947-1992	10.9%	5.6%	12.2%	5.0%
1947-1993	11.3%	6.0%	12.2%	5.3%
1947-1994	11.1%	5.6%	11.9%	5.0%
1947-1995	11.2%	6.0%	12.4%	5.5%
1947-1996	11.5%	6.1%	12.6%	5.3%
1947-1997	11.6%	6.4%	13.0%	5.5%
1947-1998	11.3%	6.5%	13.2%	5.7%
1947-1999	11.6%	6.2%	13.4%	5.4%
1947-2000	11.6%	6.4%	12.9%	5.7%
1947-2001	11.1%	6.3%	12.4%	5.6%
1947-2002	10.6%	6.4%	11.7%	5.8%
1947-2003	10.9%	6.4%	12.0%	5.7%
1947-2004	10.9%	6.4%	11.9%	5.8%
1947-2005	11.1%	6.6%	11.8%	5.8%
Min	10.0%	2.5%	10.1%	1.8%
Max	12.3%	6.6%	13.4%	5.8%
Mean	11.3%	4.7%	11.9%	4.0%
Stddev.	0.5%	1.5%	0.8%	1.5%
+1 Std	11.9%	6.2%	12.6%	5.5%
-1 Std dev.	10.8%	3.1%	11.1%	2.5%

Source: Ibbotson Associates; [Stocks, Bonds, Bills and Inflation: 2006 Yearbook](#)
[Market Results for 1926-2005, Standardandpoors.com](#); Canadian Institute of Actuaries,
[Report on Canadian Economic Statistics 1924-2005](#)

**CUMULATIVE GEOMETRIC AVERAGE MARKET RETURNS
FOR CANADA AND THE U.S.
(2005 Backward)**

	Canada		U.S.	
	<u>Stock Returns</u>	<u>Long Government Bond Returns</u>	<u>Stock Returns</u>	<u>Long Government Bond Returns</u>
1947-2005	11.1%	6.6%	11.8%	5.8%
1948-2005	11.3%	6.6%	11.9%	6.0%
1949-2005	11.3%	6.8%	12.0%	6.0%
1950-2005	11.1%	6.8%	11.9%	6.0%
1951-2005	10.5%	7.0%	11.6%	6.1%
1952-2005	10.3%	7.2%	11.4%	6.3%
1953-2005	10.5%	7.3%	11.3%	6.4%
1954-2005	10.7%	7.3%	11.5%	6.5%
1955-2005	10.2%	7.3%	10.8%	6.5%
1956-2005	9.9%	7.5%	10.4%	6.6%
1957-2005	9.8%	7.7%	10.5%	6.9%
1958-2005	10.5%	7.7%	11.0%	6.9%
1959-2005	10.1%	8.0%	10.4%	7.2%
1960-2005	10.3%	8.3%	10.4%	7.4%
1961-2005	10.5%	8.4%	10.6%	7.2%
1962-2005	10.0%	8.3%	10.3%	7.4%
1963-2005	10.4%	8.4%	10.7%	7.4%
1964-2005	10.3%	8.5%	10.5%	7.6%
1965-2005	10.0%	8.6%	10.3%	7.7%
1966-2005	10.0%	8.8%	10.3%	7.8%
1967-2005	10.5%	9.0%	10.9%	7.9%
1968-2005	10.3%	9.3%	10.5%	8.4%
1969-2005	10.0%	9.6%	10.5%	8.7%
1970-2005	10.3%	9.9%	11.1%	9.1%
1971-2005	10.8%	9.6%	11.3%	9.0%
1972-2005	10.8%	9.5%	11.2%	8.9%
1973-2005	10.4%	9.8%	11.0%	9.0%
1974-2005	10.7%	10.1%	11.9%	9.3%
1975-2005	12.2%	10.5%	13.4%	9.5%
1976-2005	11.9%	10.7%	12.7%	9.5%
1977-2005	12.0%	10.4%	12.4%	9.2%
1978-2005	12.0%	10.6%	13.1%	9.6%
1979-2005	11.4%	11.0%	13.4%	10.0%
1980-2005	10.3%	11.5%	13.2%	10.5%
1981-2005	9.6%	11.9%	12.5%	11.1%
Min	9.6%	6.6%	10.3%	5.8%
Max	12.2%	11.9%	13.4%	11.1%
Mean	10.6%	8.8%	11.4%	7.9%
Stdev.	0.7%	1.5%	1.0%	1.5%
+1 Std	11.3%	10.3%	12.4%	9.3%
-1 Std dev.	10.0%	7.3%	10.4%	6.4%

Source: Ibbotson Associates; Stocks, Bonds, Bills and Inflation: 2006 Yearbook
Market Results for 1926-2005, Standardandpoors.com; Canadian Institute of Actuaries,
Report on Canadian Economic Statistics 1924-2005

**HISTORIC EQUITY MARKET
RISK PREMIUMS**

**Canada
(1947-2006)**

Average	Stock Return	Bond Return	Risk Premium
Arithmetic	12.4	6.9	5.5
Geometric	11.2	6.5	4.7

**United States
(1947-2006)**

Average	Stock Return	Bond Return	Risk Premium
Arithmetic	13.2	6.2	7.0
Geometric	11.9	5.7	6.1

**United Kingdom
(1947-2006)**

Average	Stock Return	Bond Return	Risk Premium
Arithmetic	15.0	8.7	6.3
Geometric	12.3	6.3	6.0

Source: Ibbotson Associates, Stocks, Bonds, Bills and Inflation: 2006 Yearbook
Market Results for 1926-2005; Standardandpoors.com; U.S. Federal Reserve; Canadian Institute of Actuaries,
Report on Canadian Economic Statistics 1924-2005; Bank of Canada; TSX Review, www.statistics.gov.uk

HISTORIC UTILITY EQUITY RISK PREMIUMS

Canada (1956-2006)			
Average	Utilities Index Return	Bond Return	Risk Premium
Arithmetic	12.6	7.8	4.8
Geometric	11.5	7.8	3.7
United States (1947-2006)			
S&P/Moody's			
Average	Electric Index Return	Bond Return	Risk Premium
Arithmetic	11.4	6.2	5.2
Geometric	10.2	6.2	4.0
S&P / Moody's Gas			
Average	Distribution Index Return	Bond Return	Risk Premium
Arithmetic	12.3	6.2	6.1
Geometric	11.1	6.2	4.9

Note: The Canadian Utilities Index is based on the Gas/Electric Index of the TSE 300 (from 1956 to 1987) and on the S&P/TSX Utilities Index from 1988-2001. The S&P/Moody's Electric Index reflects S&P's Electric Index from 1947 to 2001. The 2002 to 2006 data were estimated using simple average of the prices and dividends for the utilities included in Moody's Electric Index as of the end of 2001. These utilities include American Electric Power, Centerpoint Energy, CH Energy, Cinergy, Consolidated Edison, Constellation, Dominion Resources, DPL, DTE Energy, Duke Energy, Energy East, Exelon, FirstEnergy, IDACORP, Nisource, OGE Energy, Pepco Holdings, PPL, Progress Energy, Public Service Enterprise Grp., Southern Co., Teco and Xcel Energy.

The S&P/Moody's Gas Distribution Index reflects S&P's Natural Gas Distributors Index from 1947 to 1984, when S&P eliminated its gas distribution index. The 1984-2001 data are for Moody's Gas index. The index was terminated in July 2002. The 2002-2006 returns were estimated using simple averages of the prices and dividends for the utilities that were included in Moody's Gas Index as of the end of 2001. These LDCs include AGL Resources, Keyspan Corp., Laclede Group, Northwest Natural, Peoples Energy and WGL Holdings.

Sources: TSX Review, Canadian Institute of Actuaries, Report on Canadian Economic Statistics 1924-2005, Standard & Poor's Analysts' Handbook, Ibbotson Associates, Stocks, Bonds, Bills and Inflation: 2006 Yearbook, Mergent Corporate News Reports, and U.S. Federal R

**DCF-BASED EQUITY RISK PREMIUM STUDY FOR
LOW RISK US ELECTRIC AND GAS UTILITIES
(Quarterly Averages of Monthly Data)**

		Expected	I/B/E/S	DCF Cost	Long Treasury	
		Dividend	Growth		Yield	Risk Premium
		Yield ^{1/}	Forecast			
1993	q1	5.5	4.7	10.2	7.0	3.2
	q2	5.4	4.7	10.1	6.9	3.3
	q3	5.2	4.8	9.9	6.3	3.7
	q4	5.4	4.5	9.9	6.2	3.7
1994	q1	5.8	4.2	10.1	6.7	3.3
	q2	6.1	4.3	10.4	7.3	3.1
	q3	6.2	4.3	10.5	7.6	2.9
	q4	6.4	4.0	10.4	7.9	2.5
1995	q1	6.2	3.9	10.1	7.6	2.5
	q2	6.1	4.0	10.1	6.9	3.1
	q3	6.0	3.9	9.9	6.7	3.2
	q4	5.5	4.0	9.5	6.2	3.3
1996	q1	5.4	4.0	9.4	6.4	3.1
	q2	5.7	4.0	9.7	7.0	2.7
	q3	5.7	4.1	9.8	7.0	2.8
	q4	5.5	4.1	9.6	6.6	3.0
1997	q1	5.6	4.1	9.7	6.9	2.8
	q2	5.7	4.1	9.9	6.9	3.0
	q3	5.4	4.2	9.6	6.5	3.1
	q4	4.9	4.1	9.0	6.1	2.9
1998	q1	4.7	4.2	8.9	5.9	2.9
	q2	4.7	4.4	9.1	5.8	3.3
	q3	4.8	4.4	9.2	5.4	3.9
	q4	4.5	4.3	8.8	5.1	3.7
1999	q1	5.2	4.5	9.7	5.4	4.3
	q2	5.1	4.6	9.7	5.8	3.9
	q3	5.1	4.7	9.8	6.1	3.7
	q4	5.5	4.8	10.3	6.4	3.9
2000	q1	5.8	4.8	10.6	6.2	4.5
	q2	5.8	5.0	10.8	6.0	4.9
	q3	5.7	5.3	11.0	5.8	5.2
	q4	4.9	5.3	10.2	5.6	4.6
2001	q1	5.0	5.3	10.3	5.4	4.8
	q2	5.0	5.7	10.7	5.8	4.9
	q3	5.1	5.4	10.5	5.4	5.0
	q4	5.0	5.5	10.5	5.3	5.1
2002	q1	4.9	5.6	10.4	5.7	4.8
	q2	4.7	5.6	10.3	5.7	4.6
	q3	5.1	5.6	10.7	5.1	5.5
	q4	5.0	5.4	10.4	5.1	5.3
2003	q1	5.2	5.4	10.5	4.9	5.6
	q2	4.7	5.1	9.9	4.7	5.2
	q3	4.7	4.9	9.6	5.3	4.3
	q4	4.6	4.7	9.2	5.2	4.0
2004	q1	4.4	4.5	8.9	5.0	4.0
	q2	4.6	4.5	9.1	5.4	3.8
	q3	4.5	4.5	9.0	5.1	3.9
	q4	4.3	4.4	8.7	4.9	3.7
2005	q1	4.2	4.5	8.7	4.7	4.0
	q2	4.1	4.4	8.5	4.4	4.1
	q3	3.9	4.2	8.2	4.4	3.8
	q4	4.2	4.6	8.9	4.6	4.2
2006	q1	4.2	4.9	9.1	4.7	4.4
	q2	4.4	4.9	9.3	5.2	4.1
	q3	4.1	4.9	9.1	4.9	4.2
	q4	3.9	4.6	8.6	4.7	3.9
Means for Long Treasury Yields:						
	Under 5.0	4.4	4.7	9.1	4.7	4.4
	5.0-5.99	4.9	4.9	9.8	5.5	4.3
	6.0-6.99	5.5	4.3	9.8	6.5	3.3
	7.0 and above	6.1	4.2	10.2	7.5	2.8
Means:						
	1993 - 2006Q4	5.1	4.6	9.7	5.9	3.9
	1998 - 2006Q4	4.8	4.9	9.6	5.3	4.3

^{1/} Dividend Yield is adjusted for half of I/B/E/S/ growth
Source: Standard & Poor's Research Insight, I/B/E/S and U.S. Federal Reserve

**DCF-BASED EQUITY RISK PREMIUM STUDY FOR
BENCHMARK US ELECTRIC AND GAS UTILITIES**
Regression Analysis Results

Equation 1:

$$\text{Equity Risk Premium} = 7.56 - 0.63 (30\text{-Year Treasury Yield})$$

t-statistics:

$$\text{Long-term Bond Yield} = -11.92$$

$$R^2 = 46\%$$

$$\begin{array}{l} \text{Equity Risk Premium at} \\ \text{2006/2007 Yield of 4.25\%} \end{array} = 4.88$$

$$\begin{array}{l} \text{Equity Risk Premium at Long-} \\ \text{Term Bond Yield of 4.50\%} \end{array} = 4.72$$

Equation 2:

$$\text{Equity Risk Premium} = 4.98 - 0.43 (30\text{-Year Treasury Yield}) + 1.03 (\text{Spread})$$

Where Spread = Spread between A-rated Utility Bond Yields and 30-year
Treasury Yields

t-statistics:

$$\text{Long-term Bond Yield} = -12.53$$

$$\text{Utility/government bond yield spread} = 16.48$$

$$R^2 = 79\%$$

$$\begin{array}{l} \text{Equity Risk Premium at} \\ \text{2006/2007 Yields of 4.25\% and} \\ \text{Spread of 1.20\%} \end{array} = 4.36$$

$$\begin{array}{l} \text{Equity Risk Premium at Long-} \\ \text{term Bond Yield of 4.50\% and} \\ \text{Spread of 1.20\%} \end{array} = 4.26$$

**DCF COST OF EQUITY FOR BENCHMARK SAMPLE OF
US ELECTRIC AND GAS UTILITIES
(BASED ON ANALYSTS' EARNINGS GROWTH FORECASTS)**

<u>Company</u>	<u>Annualized Last Paid Dividend</u> (1)	<u>Average Daily Closing Prices March 14 - April 13, 2005</u> (2)	<u>Expected Dividend Yield ^{1/}</u> (3)	<u>I/B/E/S Long-Term EPS Forecasts</u> (4)	<u>DCF Cost of Equity ^{2/}</u> (5)
AGL Resources	1.64	42.53	4.0	4.1	8.1
Consol. Edison	2.32	50.82	4.7	3.0	7.7
FPL Group	1.64	61.08	2.9	8.4	11.3
New Jersey Resources	1.52	50.02	3.2	5.3	8.5
NICOR Inc.	1.86	49.29	3.9	2.3	6.2
Northwest Nat. Gas	1.42	45.79	3.3	4.9	8.1
NSTAR	1.30	35.36	3.9	5.7	9.6
Piedmont Natural Gas	1.00	26.73	3.9	4.3	8.2
SCANA Corp.	1.76	43.43	4.2	4.7	8.9
Southern Co.	1.55	36.74	4.4	5.2	9.6
Vectren Corp.	1.26	28.48	4.6	4.5	9.1
WGL Holdings Inc.	1.35	32.12	4.4	3.5	7.9
WPS Resources	2.10	55.20	4.0	5.3	9.3
Mean	1.59	42.89	4.0	4.7	8.7
Median	1.55	43.43	4.0	4.7	8.5

^{1/} Expected Dividend Yield = (Col (1) / Col (2)) * (1 + Col (4))

^{2/} Expected Dividend Yield (Col (3)) + I/B/E/S Growth Forecast (Col (4))

Source: Standard and Poor's Research Insight, Yahoo.com and I/B/E/S (March 2007)

**DCF COST OF EQUITY FOR BENCHMARK SAMPLE OF
US ELECTRIC AND GAS UTILITIES
(TWO STAGE MODEL)**

<u>Company</u>	<u>Annualized Last Paid Dividend</u> (1)	<u>Average Daily Closing Prices March 14 - April 13, 2005</u> (2)	<u>I/B/E/S Long-Term EPS Forecasts</u> (3)	<u>Stage 2 GDP Growth ^{1/}</u> (4)	<u>DCF Cost of Equity ^{2/}</u> (5)
AGL Resources	1.64	42.53	4.1	5.1	8.9
Consolidated Edison Inc.	2.32	50.82	3.0	5.1	9.4
FPL Group	1.64	61.08	8.4	5.1	8.2
New Jersey Resources	1.52	50.02	5.3	5.1	8.1
Nicor Inc.	1.86	49.29	2.3	5.1	8.4
Northwest Natural Gas	1.42	45.79	4.9	5.1	8.1
NSTAR	1.30	35.36	5.7	5.1	9.0
Piedmont Natural Gas	1.00	26.73	4.3	5.1	8.8
SCANA Corp.	1.76	43.43	4.7	5.1	9.2
Southern Co.	1.55	36.74	5.2	5.1	9.5
Vectren Corp.	1.26	28.48	4.5	5.1	9.6
WGL Holdings Inc.	1.35	32.12	3.5	5.1	9.1
WPS Resources	2.10	55.20	5.3	5.1	9.0
Mean	1.59	42.89	4.7	5.1	8.9
Median	1.55	43.43	4.7	5.1	9.0

^{1/} Consensus forecast nominal rate of GDP growth, 2009-18

^{2/} Internal Rate of Return: I/B/E/S EPS forecast growth rate applies for first 5 years; GDP growth thereafter.

Source: Standard and Poor's Research Insight, Yahoo.com, Blue Chip *Economic Indicators* (March 2007) and I/B/E/S (March 2007)