

Ontario Energy Board

IN THE MATTER OF the *Ontario Energy Board Act, 1998*, S.O. 1998, c.15,
(Schedule B);

AND IN THE MATTER OF an Application by
Ontario Power Generation Inc. pursuant to section
78.1 of the *Ontario Energy Board Act, 1998* for an
Order or Orders determining payment amounts for the
output of certain of its generating facilities.

Final Argument On Behalf Of
Energy Probe Research Foundation

December 6, 2010

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**Final Argument On Behalf Of
Energy Probe Research Foundation**

How these Matters came before the Board

- 1. On May 26, 2010, Ontario Power Generation Inc. (the “Applicant” or “OPG”), filed an application with the Ontario Energy Board (the “Board”) seeking an Order or Orders of the Board for approval of increases in payment amounts for the output of certain of its generating facilities, effective March 1, 2011. Energy Probe Research Foundation (“Energy Probe”) filed a Notice of Intervention on June 17, 2010.**
- 2. Energy Probe participated in the Board process leading up to this proceeding: EB-2009-0331, a consultative process to discuss the filing requirements for OPG in the current payment amounts application and the most efficient means by which issues and evidence might be reviewed and tested in the course of this proceeding.**
- 3. Further, Energy Probe attended OPG’s Stakeholder Information Sessions held in advance of the current Application filing, held on March 29 and April 1, 2010.**
- 4. Energy Probe participated in the untranscribed Issues Conference held on July 6, 2010, and filed Comments thereafter on the Revised Draft Issues List. Energy Probe filed Interrogatories and participated in the Technical Conference, held on August 26, 2010.**

5. A Settlement Conference was held September 14, 2010; Oral Hearings commenced on October 4, 2010. Energy Probe participated in both and conducted cross-examination of a number of the Applicant's witness panels during October and November.

Argument Overview

6. Energy Probe has conducted itself as an all issues intervenor throughout this proceeding.

7. In its Argument, Energy Probe will not seek to explore all outstanding Issues before the Board, but will be examining those Issues of concern to Energy Probe where we believe we can be of most assistance to the Board.

This Decision is Unusually Important:

8. By any normal test – quantum of money involved or importance of the commodity under discussion – this Hearing is an unusually important one for Ontario and for this Board. It also takes place during an economic recession and against a backdrop of rapidly escalating electricity prices, and rapidly escalating public, press, and political attention to this issue. Indeed, the subject of electricity rate relief – which was openly examined during a portion of the Hearing and lay just below the surface during much of the rest – has recently been addressed by the Ontario Government with two separate decisions from on high, independent of the decisions this Board makes in this Matter.

9. In addition, this is only the second time that the core assets of Ontario's dominant electricity generator have been subjected to independent regulatory scrutiny. It is therefore the first time that this Board has had an opportunity to compare OPG's performance to its plans and forecasts in the previous Application (EB-2007-0905), and to monitor OPG's response to the discussions and directives in the Decision arising from that Application.

GENERAL

Issue 1.1 Has OPG responded appropriately to all relevant Board directions from previous proceedings?

Process: The Applicant's Responsibility to Report Its Response to the Decision:

10. A propos of OPG's response to the discussions and directives in the Decision arising from the previous Application, Energy Probe is disappointed that several issues that consumed significant attention in that Proceeding – in the hearing, the Arguments, and the Decision – were not the subject of discussion in OPG's Application. We will use two of the issues that drew our own attention as examples here: Nuclear Advertising and the HIM, OPG's Hydroelectric Incentive Mechanism.

11. The issue of Nuclear Advertising was the subject of considerable discussion in the Hearing, and drew a bit more than a page in the Board's EB-2007-0905 Decision (pp. 32f), and a disallowance of \$2.3 million from a budget of \$6.0 million. We do understand that \$2.3 million is a very small fraction of OPG's Payments from ratepayers, but we still would have expected that OPG would give such an issue at least a cursory or summary follow-up mention in its subsequent Application, without further prompting. For example, was the sum cut from expenditures during the previous Test Period, or did the expenditure continue with funding from other sources? If it was cut,

what exactly was discontinued, and does OPG propose to continue that treatment in the Test Period for this Application.

12. Instead, the issue does not appear anywhere in the Application, and the proposed expenditures in the category have been spread through various OPG's budgets. When Energy Probe asked OPG's representatives where the expenditures appeared in the evidence, and which Panel would be addressing the issue, they weren't initially sure, although they were diligent in finding the answer and transmitting it promptly to us. Our concern is obviously not that vast sums are being wasted or misspent, nor is it that the Board's intentions have been thwarted. Indeed, we have been assured by OPG that the disallowed \$2.3 million has been completely cut from spending, and that it corresponded to OPG's contribution to the Canadian Nuclear Association's advertising program. That is our reading of the intention of the Board's Decision in this matter. We have no outstanding substantive concerns on this matter, and will not be discussing it below. Our only concern is that OPG did not feel required to provide follow-up reporting, as a matter of course, on an issue that was dealt with at some length in the previous Decision.

13. The second such issue concerns the HIM, OPG's Hydroelectric Incentive Mechanism. We do have outstanding substantive concerns with this issue, and we will deal with those substantive concerns below. But we will also highlight the issue here, as a second, similar example of what we see as a failure of process – the lack of follow-up reporting, as a matter of course, on an issue that was dealt with at some length in the previous Decision.

14. The issue is dealt with at some length in Section 3.5 “Design of Payment Amount” in the EB-2007-0905 Decision (pp. 50-55). The majority of that section deals with an alleged flaw in the proposed formula, and the

submissions of Energy Probe and AMPCO to that extent. As it happens, the alleged flaw only arose on the last day of the Oral Hearing, and OPG's admission that the allegation was not imaginary only came in an Undertaking Response that arrived long after the Oral Hearing had concluded – in Undertaking J15.6 from the EB-2007-0905 Proceeding, which was made Exh. K1.5 in this Proceeding.

15. In the end, the Board put the objections in abeyance, finding “that the structure of the proposed mechanism is an improvement on the current mechanism”, but added that “The Board will require OPG to present a review of the mechanism at the next proceeding, as it has undertaken to do. This review will examine the impact of the incentive structure on OPG's operating decisions.” (p. 55)

16. In its current Application, OPG has indeed provided a report on its earnings under the HIM and on the operation of the Pump Generating Station (PGS) that triggers the HIM payments. But the concerns about the precise operation of the HIM formula – concerns which OPG acknowledged to be founded on fact in our Exh. K1.5 and which engaged the Board's attention on pp. 52-55 of its EB-2007-0905 Decision – those concerns remain unmentioned, unexamined, and undiscussed.

17. Of course, we acknowledge that we could have raised these issues in Interrogatories, or the Technical Conference, to help fill these perceived gaps in the reporting record. In hindsight, we probably should have devoted more resources to checking the Application for completeness, and intervened where we found gaps. But we believe the importance of conscious follow-up of Board decisions is too great for it to rely on the presence or absence of individual intervenors, or their ability or willingness to spend time on early document

review. We believe that it is important to the smooth working and legitimacy of this regulatory process that issues not be “lost” from one Proceeding to the next, and that their fate is addressed from the start, as a matter of course and as a matter of process.

18. In short, we are reluctantly forced to:

Recommend: That this Board direct OPG to provide follow-up reporting as part of its next Application (or at the end of the new Test Period, if that comes sooner) that addresses the 2011-12 fate of each area and issue that this Board takes the trouble to address and rule on in its forthcoming Decision with Reasons.

Issue 1.2 Are OPG’s economic and business planning assumptions for 2011-2012 an appropriate basis on which to set payment amounts?

History, Costs, Megaprojects, and Nuclear Power:

19. We find an enormous chasm between common sense and evidence on a number of very important, big-ticket items that significantly affect payment amounts. In Exhibit K6.3, Jack Gibbons sums up the common-sense “non-evidentiary” view of Ontario's history with nuclear megaprojects (like the Darlington Refurbishment that is before you in this Proceeding) with the pithy “Fool me eleven times. . .” Alternatively, we are reminded of an old line from the Marx Brothers: “Who are you going to believe, me or your own eyes?”

20. Those of us who have been using “our own eyes” to mark the gaps between nuclear-project promises and ultimate reality have learned from that sorry experience. Some of us have even witnessed the earnest and heartfelt assurances by employees of OPG Nuclear and its predecessor Ontario Hydro Nuclear, while they explained to Parliamentary Committees and Royal Commissions and Special Inquiries why the future should not be judged according to the lessons of the past. “This time will be different.”

21. In this very Proceeding, we have read and heard extensive Evidence about three different examples of nuclear life-extension investments by OPG, currently at three very different stages of their lives. They weren't presented together, or joined on a chart, but juxtaposing the three of them reveals a greater truth, in our submission:

- The only one that is complete and can be analyzed carefully based on hard evidence (Pickering A Return to Service) has clearly been a huge mistake and a sink-hole for wealth. Indeed, OPG's witnesses took great pains to explain to us that the enormous over-budget sums that went into that project did not constitute a refurbishment! [Tr. v. 5 (public), pp. 32-35] We never heard how much more money a full refurbishment of those two small reactors would have cost, or how long it would take ratepayers to extinguish that additional debt through our Debt Retirement Charge.
- The one that is looming in the near future, now only a couple of years before its firm go-or-no-go decision, (Pickering B "Continued Operations" or "COOP") is very limited in scale but still in serious doubt – with OPG's stated confidence in its going ahead, at a "medium level", centering around 50%. [E.g., Tr. v. 4, p. 117]
- And finally, the one that is farthest in the future and still in its preliminary planning stages (Darlington Refurbishment) is presented as essentially a Sure Thing, the best thing since sliced bread! More specifically, there is enormously high confidence on the part of the OPG witnesses and analysts that this Refurbishment will in fact proceed, be completed, and operate successfully for a very long time at a remarkably competitive cost! [E.g., Exh. D2 / T2 /S1, Fig. 1, Page 8/17]

22. There is a clear and simple pattern here, although it is certainly not the one that OPG's witnesses have intentionally presented: The more real the nuclear project, the greater the delays, cost overruns, losses, frustration, and pain. The more unreal, projected, planned, or funding-unreleased, the more perfect it appears.

23. Looking outside OPG, there are a few additional data points, and they seem to fall on the same curve: The “completed” MAPLE projects are as real and cancelled as Pickering-A Units 2 and 3. The refurbishments by AECL in New Brunswick and Bruce Power in Ontario are still ongoing and therefore only partially real, and their level of delays, cost overruns, losses, frustration, and pain still seems intermediate between the “clearly worth doing” Artist's Conception of future projects and the “What were we thinking?” reality of past projects.

24. We face a choice – we can place our faith in some heartfelt but incredible evidence suggesting that we have all passed a “tipping point” that has suddenly changed the world as we know it, or we can place our faith in an overwhelmingly consistent pattern of repeated experiences many of which were themselves preceded by similarly heartfelt evidentiary claims to the contrary. Given such a choice, Energy Probe would never risk its precious credibility on the incredible evidence. We will be returning to this simple logic under a number of Issues, but the over-arching recommendation remains the same:

Energy Probe urges you to benefit from Ontario's hard-won experience in forecasting OPG's (and its predecessor's) large nuclear projects. Consequently, Energy Probe urges you to resist the temptation of endorsing real and irretrievable expenditures whose prudence is unproven and contrary to that experience, and accepting fictional, evanescent, accounting-based “rate relief” in return.

Issue 1.3 **Is the overall increase in 2011 and 2012 revenue requirement reasonable given the overall bill impact on consumers?**

Price Restraint, Cost Control, Nuclear Power, and the Nature of this “Dispute”:

25. In a typical regulatory Rate Hearing, much of the “dispute” usually concerns money. Money that goes to the Proponent's Shareholders has to come from Ratepayers. The more one party gets, the more the other one pays. Shareholders like getting money as much as ratepayers like saving it, and they hate losing money as much as ratepayers hate spending it, so the lines are clearly drawn. A few public-interest groups show up without vested interests, but much of the discussion centers around this zero-sum game, each party drawing self-serving lines across the pie.

26. Among the best features of this kind of dispute, is that it lends itself beautifully to an adversarial quasi-judicial Hearing, a “conflict between parties”, not unlike a Civil Suit. The rules are extensively codified, the players are well-paid experts, and the stakes are high. Watching the players win and lose points often has the excitement and drama of a good sporting match. An unusually skilled player can occasionally score points with a weak factual or logical base, but – especially if the two sides are reasonably well matched in depth of pockets -- the results often approach wisdom, especially with the help of an experienced and wise Hearings Panel.

27. Perhaps surprisingly, the previous Proceeding, EB-2007-0905, occasionally resembled that kind of a dispute. OPG wanted to spend even more OM&A money on the Pickering-A reactors, which were already the most expensive (in OM&A \$/Mwh output) of any nuclear reactors in North America, if not the world. Ratepayers didn't want to pay; some wanted to shut the

reactors completely, and others just wanted to withhold some of that money. The Board Panel heard the arguments pulling to and fro, and made a decision.

28. This Proceeding, EB-2010-0008, seems to have fewer of those classic tug-of-war zero-sum pie-cutting disputes over money. Of course, ratepayers still want to pay less. And OPG wants to continue paying its staff world-class wages and benefits. But in many of the current “disputes”, OPG seems to have sharpened its pencils just like a ratepayer group! On nuclear-station end-of-life dates, their apparently unsupportable Pickering-A assumption will save ratepayers several millions of dollars for now, and the still-only-planned Darlington refurbishment will save ratepayers several hundreds of millions for now – in both cases, whether the ultimate reality bears any relationship to the assumptions or not.

29. It is understandably hard to find a vested interest to participate in an adversarial Hearing, to insist that these plants should be depreciated faster, and their decommissioning and fixed waste-disposal costs should be collected faster from ratepayers. On this topic, one could forgive the ratepayer intervenors for supporting the Applicant, whether or not they actually expect to see Pickering-A producing valuable electricity in 2021, or Darlington in 2051.

30. But if most of the well-educated, experienced people in the hearing room would be willing to make good-sized side bets against ever seeing those reactors operating productively that far in the future, whose job is it to ensure that those unlikely forecasts don't become the basis for risky fly-now-pay-later ratemaking?

31. It is fun for Energy Probe to say "It's Energy Probe's job," but the fun doesn't last long.

32. When a publicly owned corporation like OPG, initially directed by the Government to operate as a commercial enterprise, is later directed to re-think and reduce its application for a rate increase, we are already far removed from the classic Rate Hearing with true adversaries fighting over money, and uncomfortably close to the world of The Old Ontario Hydro, a Corporation whose object appeared (at least to Energy Probe) to forecast as optimistically as possible, postpone asset retirement as long as possible, and generally postpone rate increases without in any way controlling actual costs.

33. Is it a legitimate role for OPG, as a creature of (this) government AND as a supposedly "commercial enterprise", to push costs into the future in order to moderate short-term price increases? Is it a legitimate role for the Ontario Energy Board to permit them to do so?

34. At the risk of speaking the words of a giant in the form of a dwarf, Energy Probe submits that neither of those roles is legitimate. Real cost containment can serve the long-term interests of ratepayers and taxpayers alike. Make-believe cost containment has not worked in Ontario in the past, and it cannot be trusted to work in the future. If the Government of today believes that it is in the Public Interest to shift the burden of paying OPG's costs from ratepayers to somebody else, then (a) Energy Probe respectfully disagrees with that Government, but (b) this Government has clearly demonstrated – and quite recently – that it has the power and the willingness to do exactly that. We would submit that this regulatory Board is therefore relieved of any responsibility to divorce near-term rates from real costs.

35. Energy Probe strongly recommends that this Panel apply prudence, common sense, and wisdom, to ensure that OPG's Rate Requirement reflects its actual financial prospects and its likely costs as clearly and honestly as possible, without recourse to "rate relief" that does not arise from real cost reductions.

36. To the extent that OPG's proposed Revenue Requirement is too high by including imprudent expenditures, we recommend that it be lowered. To the extent that OPG's proposed Revenue Requirement is too low by incorporating unrealistically optimistic assumptions in their calculations, we believe it should be raised. We have not attempted to "net out" the various corrections we have recommended, in both directions. Nor do we believe that a running total should be maintained as an intermediate part of this rate-making exercise. We would urge this Board to do what is right for rational, prudent, sustainable ratemaking purposes, and let the Government manipulate Hydro rates as it sees fit.

37. If the Board's Decision contains individual decisions that increase OPG's Revenue Requirement more than the remainder of the Board's decisions lower OPG's Revenue Requirement, then the Revenue Requirement will increase, and vice versa. That is exactly how it should be, in Energy Probe's submission. We do not anticipate that OPG's shrinking portion of Ontario's ballooning Hydro bills should receive special "creative accounting" attention in the interest of deferring rate increases that are otherwise rational, prudent, sustainable, and appropriate.

RATE BASE

Issue 2.2 Is OPG's proposal to include CWIP in rate base for the Darlington Refurbishment Project appropriate?

38. As outlined above in our section "History, Costs, Megaprojects, and Nuclear Power" (Issue 1.2), and below in our section on Issue 6.11 regarding Darlington end-of-life, Energy Probe does not expect the Darlington Refurbishment to generate net benefits for Ontario electricity ratepayers. As a result, we oppose the inclusion of CWIP for this project in rate base for the Test Period. Should our submissions on Darlington Refurbishment expenses fail, we take no position on the CWIP issue. We note that CWIP is designed to recover real and largely non-refundable OPG expenditures from ratepayers, simply in advance of when the "asset" comes "into service". We are primarily concerned about the imprudent expenditures, and not the early recovery.

CAPITAL STRUCTURE AND COST OF CAPITAL

Issue 3.3 Should the same capital structure and cost of capital be used for both OPG's regulated hydroelectric and nuclear businesses? If not, what capital structure and/or cost of capital parameters are appropriate for each business?

39. Energy Probe submits that it is crucial for consumers, ratepayers and the environment that OPG make only those capital investments whose expected returns justify the risk associated with those investments and that the costs of capital for OPG's regulated hydroelectric business and its nuclear business are different, and differ as well from the cost of capital resulting from the Board's decisions in EB-2007-0905 and EB-2009-0084.

40. Energy Probe further submits that the expert submissions on cost of capital for OPG and Pollution Probe both acknowledge that the risk of OPG's nuclear business is higher than that of its regulated hydroelectric business. Accordingly, Energy Probe submits that the cost of capital for OPG's nuclear business is higher than that for its regulated hydroelectric business.

41. Energy Probe submits that the Board should deem a higher equity ratio for OPG's nuclear business than for its regulated hydroelectric business. In this regard, Energy Probe accepts the recommendations of Professors Kryzanowski and Roberts that the equity ratio for OPG's nuclear business should be 50% and that the equity ratio for its regulated hydroelectric business should be 40%. However, neither ratio should exceed 50% as it is important to maintain a significant debt ratio in each business to avoid the documented tendency toward excessive amounts of equity in unregulated utilities.

42. Energy Probe submits that the hearing and expert evidence in this proceeding have produced the additional evidence and analysis on cost of capital and capital structure that the Board found to be necessary in its decision in EB-2007-0905 in order to support different capital structures for OPG's nuclear and regulated hydroelectric businesses.

43. Energy Probe also submits that the main finding in the expert report of Ms. McShane is of limited value as it addresses a very specific and relatively minor issue that would only arise if her statistical analyses had supported the view that beta and the cost of equity differed as between OPG's nuclear and regulated hydroelectric businesses.

44. Energy Probe further submits that the capital structure decisions of firms are based, in large measure, on managements' qualitative assessments of risk having regard to the nature of their firms' assets and the expectations of capital markets, inter alia. On this basis, the Board should, similarly, exercise its judgment and find that the evidence now available is sufficiently robust as to support separate capital structures.

45. Energy Probe submits that the Board should require OPG to use the resulting costs of capital as hurdle rates in its analyses of capital expenditures in its two regulated businesses.

Definition of Cost of Capital

46. For greater certainty, Energy Probe submits that the phrase "cost of capital" in Issue 3.3 above refers to the familiar weighted-average cost of capital in which the component costs of equity (r_E) and debt (r_D) are weighted by their respective shares ($E/E+D$, $D/(E+D)$) in the allowed capital structure.

47. In oral examination, Ms. McShane agreed that this was her understanding of the phrase "cost of capital" in Issue 3.3.¹

¹ Transcript, volume 12, p.32 at line 18-24

48. OPG's evidence illustrates the required calculation.² Its cost of capital is 7.59% determined as the weighted average of its equity and debt costs on a pre-tax basis:

$$\begin{aligned} WACC_{OPG} &= r_E \left(\frac{E}{E+D} \right) + r_D \left(\frac{D}{E+D} \right) \\ &= 0.0985 \left(\frac{3030.6}{3030.6 + 3417.5} \right) + 0.0558 \left(\frac{3417.5}{3030.6 + 3417.5} \right) \\ &= (0.0985 \times 0.47) + (0.0558 \times 0.53) \\ &= 0.0759 \end{aligned}$$

49. This illustrative calculation indicates that the equity ratio (E/E+D) is a crucial component of the weighted-average cost of capital.

50. Accordingly, three "costs of capital" can be distinguished: the overall cost of capital for OPG ($WACC_{OPG}$), the cost of capital for OPG's regulated hydroelectric business ($WACC_{Hydro}$), and the cost of capital for OPG's nuclear business ($WACC_{Nuclear}$).

General Comments on Value-Maximization and Cost of Capital

51. There is general agreement by all parties in this proceeding that the cost of capital for a business depends on the magnitudes and types of risks to which that business is exposed.³ In order to maximize the value of the business, proposed capital expenditures should be evaluated with reference to a cost of capital that takes these risks into consideration. If the expected return from a capital expenditure exceeds that cost of capital, the business

² Ex. C1-T1-S1, Table 1

³ Conventional finance textbooks state this differently: the cost of capital depends on the use to which funds are applied, not on the sources of those funds.

should undertake that investment and thereby increase the market value of its net worth.

52. In applying this approach, the business estimates the net cash flows expected from the project and then uses the applicable, risk-adjusted cost of capital as the discount rate in assessing the project's net present value.

53. It is to be emphasized that this conventional approach does not adjust the expected cash flows for risk. Rather, risk is reflected in the cost of capital. If the cash flows themselves are to be risk-adjusted, then it is not clear what cost of capital figure should be adopted as the discount rate⁴ and, accordingly, the decision to accept or reject the investment may not be value-maximizing.

54. No objection has been raised to the observation of Professors Kryzanowski and Roberts that when a company is involved in two or more business lines, the cost of capital may well differ by business line.⁵ Hence, if the company uses the same cost of capital to evaluate all capital expenditures, it will adopt some projects that offer returns that are below the risk-adjusted cost of capital and hence are "too risky". Such investments are not value-maximizing and make the company's asset profile more risky over time.

55. It may be argued that since the Ontario government owns OPG, its investments ought not to be evaluated on the basis of commercial value-maximization. However, the Board has already determined that ownership identity is not a relevant factor. Indeed, OPG emphasizes its commercial

⁴ In such case, it could be argued that the discount rate should be the risk-free rate of return. However, there is no finance theory that supports this approach.

⁵ Prepared Testimony of Dr. Lawrence Kryzanowski and Dr. Gordon Roberts, Evidence filed on behalf of Pollution Probe, Ex. M, Tab 10, filed August 31, 2010 at p.15

mandate in its argument-in-chief:

OPG has a single shareholder – the Province of Ontario. OPG is incorporated under the *Ontario Business Corporations Act* and OPG’s Board of Directors is appointed by the Province with a mandate to operate the company as a commercial enterprise. To do that, OPG must receive just and reasonable payment amounts for its prescribed facilities that cover the costs of operating and maintaining these assets and making new investments in them, and allow the company to earn a fair return on invested capital.⁶

53. On this basis, Energy Probe submits that OPG’s investment policies and its approach to cost of capital are appropriately analyzed from the commercial, value-maximizing perspective.

OPG’s Capital Budgeting Procedures

54. While OPG does estimate the cash flows from investments in its regulated hydroelectric and nuclear businesses, it does not follow the conventional approach of discounting those cash flows at their costs of capital, i.e. at the $WACC_{Hydro}$ or the $WACC_{Nuclear}$ respectively.

55. As described in this hearing, OPG adjusts the estimated cash flows for risk and then discounts them at the tax-adjusted $WACC_{OPG}$. It determines that cost of capital using the formula for ROE provided in the Board’s decision in EB-2009-0084 and the 47% equity ratio set by the Board in its decision in EB-2007-0905. With a further adjustment for tax, OPG estimates that its current cost of capital is approximately 7%.⁷

⁶ Argument-in-Chief, Ontario Power Generation Inc., filed November 19, 2010, p.1

⁷ OPG response to Energy Probe interrogatory #002, Issue 1.2, Ex. L-T6-S002

56. OPG's risk-adjustments to the expected cash flows from investments in nuclear and regulated hydroelectric involve Monte Carlo simulation and perhaps other adjustments. Accordingly, OPG's procedures take account of risk twice, in the project-specific cash flows and in the tax-adjusted $WACC_{OPG}$. However, OPG's procedure is confusing because it is not clear which risks are taken into account in the cash flows and which are reflected in the discount rate.

57. This confusion is particularly serious in light of Ms. McShane's use of the Capital Asset Pricing Model ("CAPM") in her various statistical tests. In the CAPM framework, the expected return on (i.e. the cost of) equity that informs the assessment of ROE is based solely on non-diversifiable risks because, as Ms. McShane acknowledges, investors cannot expect to be compensated for bearing diversifiable risks in an efficient capital market.⁸

58. Hence, when OPG adjusts the expected cash flows of an investment project for risk, it is not clear whether it is inappropriately including diversifiable risks, or counting the non-diversifiable risks already reflected in the cost of equity component of the discount rate.

59. Using the tax-adjusted $WACC_{OPG}$ would be acceptable from a value-maximizing perspective if OPG's investments in its nuclear and hydroelectric businesses were of similar risk. In that case, however, it would not be necessary to adjust the cash flows for risk; indeed, to do so would result in a double-counting of risk.

⁸ K.C. McShane, "Report to Ontario Power Generation. Technology-Specific Capital Structures: An Assessment", Foster Associates, Inc. Filed May 26, 2010, Ex. C3-T1-S1 at p.47

60. Thus, even if it were appropriate for OPG to adopt the tax-adjusted $WACC_{OPG}$ as the cost of capital for all projects, there would still be no reason to believe that all and only value-maximizing investments were being identified.

61. As discussed further below, the expert evidence is clear that investments in OPG's nuclear and regulated hydroelectric businesses differ substantially in risk. This evidence calls OPG's approach to cost of capital into serious question.

Ms. McShane's Statistical Analyses

62. In her report to OPG⁹, Ms. McShane attempts to estimate "technology-specific" capital structures, i.e. for regulated hydroelectric and for nuclear. In Energy Probe's view, her argument is flawed and her statistical methodology does not support her conclusions. Nevertheless, Energy Probe accepts her qualitative assessment that that OPG's nuclear business is riskier than its regulated hydroelectric business.

63. In fact, Ms. McShane's various tests for technology-specific capital structures are not about capital structure directly. Rather, she takes the Board's ROE formula as the starting point and attempts to determine whether rates of return required by equity investors in OPG's regulated hydroelectric and nuclear businesses differ from the formula ROE and from each other. She proposes that if such differences exist, it would be necessary and possible to reflect those differences in the capital structure of OPG's two businesses because the Board's formula (in her view) prevents OPG from using technology-specific ROE's in capital expenditure analysis.

⁹ K.C. McShane, "Report to Ontario Power Generation. Technology-Specific Capital Structures: An Assessment", Foster Associates, Inc. Filed May 26, 2010, Ex. C3-T1-S1.

64. Although her approach is not entirely clear, it appears that if the cost of equity for nuclear were found to be (say) 10% then, since the Board's ROE formula awards OPG only 9.85% by her calculation, she would conclude that the equity ratio for nuclear should be higher than the 47% established by the Board for OPG as a whole.

65. Ms. McShane does not discuss how the equity ratio would be changed in such a circumstance. As she stated in her oral evidence¹⁰, since her various statistical tests did not find differences in beta and the cost of equity as between regulated hydroelectric and nuclear, it was not necessary for her to articulate a methodology for translating such differences into technology-specific capital structures.

66. In her report, Ms. McShane concludes that there is no sufficiently robust basis for recommending technology-specific capital structures and hence supports OPG's current use of $WACC_{OPG}$ and the same equity ratio to evaluate prospective investments in its regulated hydroelectric and nuclear businesses.

67. With respect, Ms. McShane's endorsement of OPG's current practice does not follow from the statistical findings in her report. As a statistical matter, all that one can draw from her various analyses is that she has been unable to identify differences in beta and the cost of equity as between nuclear and regulated hydroelectric.

¹⁰ Transcript, volume 12, at p.58, line 6--p.59, line 8.

68. In Energy Probe's view, the most that Ms. McShane is entitled to conclude is that her various analyses do not support the use of different ROE's for OPG's nuclear and regulated hydroelectric businesses and that therefore the Board properly ought to apply the formula ROE to both businesses pending further research.

69. If there is no difference in ROE then, according to her approach, there is no consequential basis for adjusting the equity ratios for risk. Accordingly, Ms. McShane may properly conclude only that the equity ratios for OPG's nuclear and regulated hydroelectric business do not require the adjustment that would be required if different equity costs and ROE's for nuclear and regulated hydroelectric had been identified.

70. In Energy Probe's submission, all Ms. McShane has done is demonstrate one, and only one, reason not to adjust the equity ratios of nuclear and regulated hydroelectric. Neither Ms. McShane nor OPG appear to grasp the fundamentally limited nature of her statistical analyses or the conclusions that properly follow.

71. However, there may be other reasons for adopting technology-specific capital structures. Indeed, the balance of Ms. McShane's report clearly shows that OPG's nuclear business is riskier than its regulated hydroelectric business.

72. For example, regarding production, operating and cost recovery risks, Ms. McShane refers to a business risk assessment conducted by Foster Associates in 2007. Citing to this report, Ms. McShane writes:

The 2007 business risk assessment concluded that the production/operating risks related to the nuclear assets are significantly higher than those of the hydroelectric generation facilities and higher than those of any other type of generation...¹¹

Although Ms. McShane concludes:

there has been no significant *change* in the relative or absolute production/operating risks of the nuclear and hydroelectric operations¹²

her principal conclusion that nuclear risk is significantly higher than hydroelectric risk remains intact.

72 Regarding operating risk, Ms. McShane finds that the operating leverage of OPG's nuclear business is higher than that of its regulated hydroelectric business:

A 5% decline in nuclear production would decrease the 2010 return on equity of the nuclear operations on a stand-alone basis by approximately seven percentage points. By comparison, a 5% decline in production the regulated hydroelectric generating assets would reduce the return on equity for those operations on a stand-alone basis by less than one percentage point.¹³

73. In the conclusion to her expert report, Ms. McShane states:

The qualitative assessment of the relative business risks of the hydroelectric and nuclear operations support the conclusion that the nuclear operations face materially higher business risks than the hydroelectric operations. However, given the constraints of the available market data and the lack of proxy companies that are comparable to each of the two technologies, none of the analyses conducted were able to provide any quantitative insight

¹¹ K.C. McShane, "Report to Ontario Power Generation. Technology-Specific Capital Structures: An Assessment", Foster Associates, Inc. Filed May 26, 2010, Ex. C3-T1-S1 at p.27

¹² K.C. McShane, "Report to Ontario Power Generation. Technology-Specific Capital Structures: An Assessment", Foster Associates, Inc. Filed May 26, 2010, Ex. C3-T1-S1 at p.28 (italics added)

¹³ K.C. McShane, "Report to Ontario Power Generation. Technology-Specific Capital Structures: An Assessment", Foster Associates, Inc. Filed May 26, 2010, Ex. C3-T1-S1, at pp.30-31

into reasonable differential capital structures for the two operations....¹⁴

74. In reaching this conclusion, Ms. McShane fails to interpret her own statistical analyses correctly. The “constraints of available data” to which she refers support only the limited reason for not adjusting the equity ratios discussed above at paragraphs 67-70, supra.

75. Having regard for Ms. McShane’s detailed review of the business risks of OPG’s nuclear and regulated hydroelectric businesses, her expert opinion that no significant change in relative risk therein has occurred since the 2007 business risk assessment is new, incremental evidence that is sufficiently robust for the Board to rely on in its assessment of technology-specific capital structures, particularly when taken in conjunction with the expert submissions of Professors Kryzanowski and Roberts.

76. In Energy Probe’s view, this portion of Ms. McShane’s evidence is new and convincing, and sufficiently robust to address the Board’s concern in its decision in EB-2007-0905 that further evidence would be needed to support technology-specific capital structures.

Comments on Evidence of Professors Kryzanowski and Roberts

77. The expert report prepared by Professors Kryzanowski and Roberts for this hearing¹⁵ updates and expands upon their previous evidence in EB-2007-0905. Energy Probe submits that their expert report has sufficient new information and analysis as to support the Board’s requirement in its decision

¹⁴ K.C. McShane, “Report to Ontario Power Generation. Technology-Specific Capital Structures: An Assessment”, Foster Associates, Inc. Filed May 26, 2010, Ex. C3-T1-S1, at p.70

¹⁵ Prepared Testimony of Dr. Lawrence Kryzanowski and Dr. Gordon Roberts, Evidence filed on behalf of Pollution Probe, Ex. M, Tab 10, filed August 31, 2010.

in EB-2007-0905 that further evidence would be needed in order to support separate capital structures.

78. Energy Probe accepts the empirical approach taken by Professors Kryzanowski and Roberts. In Energy Probe's view, there is no finance theory that clearly indicates how a firm's capital structure should be determined. As noted by Ms. McShane, conventional finance theory suggests that tax considerations support a highly levered capital structure.¹⁶ Similarly, Professors Kryzanowski and Roberts note that firms with "hard" assets tend to have higher debt ratios than firms with significant "soft" assets such as patents and other forms of goodwill.¹⁷ In Energy Probe's view, finance theory and research of this type are of very limited assistance in identifying the appropriate equity ratios for OPG's regulated hydroelectric and nuclear businesses.

79. Energy Probe submits that there is a significant measure of agreement between Ms. McShane's qualitative assessment and Professors Kryzanowski and Roberts's empirical approach regarding the business risk of OPG's regulated hydroelectric and nuclear businesses. The only significant difference in their respective conclusions is that Professors Kryzanowski and Roberts have reached specific numerical conclusions about the equity ratios.

80. Energy Probe wishes to call attention to the study by Drs. Sanyal and Bulan of capital structures of U.S. electric utilities under deregulation that Professors Kryzanowski and Roberts cited.¹⁸ It is highly significant that when

¹⁶ K.C. McShane, "Report to Ontario Power Generation. Technology-Specific Capital Structures: An Assessment", Foster Associates, Inc. Filed May 26, 2010, Ex. C3-T1-S1 at p.17

¹⁷ Prepared Testimony of Dr. Lawrence Kryzanowski and Dr. Gordon Roberts, Evidence filed on behalf of Pollution Probe, Ex. M, Tab 10, filed August 31, 2010 at p. 36

¹⁸ Prepared Testimony of Dr. Lawrence Kryzanowski and Dr. Gordon Roberts, Evidence filed on behalf of Pollution Probe, Ex. M, Tab 10, filed August 31, 2010 at p. 61

those companies' capital structures were no longer regulated, they adopted equity ratios that were higher than under regulation. It appears that those U.S. utilities previously had equity-oriented capital structures and under deregulation those ratios increased.

Energy Probe's Concluding Comments on Issue 3.3

81. Energy Probe urges the Board to recognize that there is no clear-cut formula for determining capital structures whether for firms in general or, as in this case, for divisions of OPG. Rather, capital structure decisions are based on management's appreciation of business risk, capital market conditions, asset specificity and taxation, inter alia. It is highly appropriate for the Board to adopt a similarly qualitative approach in determining the appropriate deemed equity ratios for OPG's regulated hydroelectric and nuclear businesses.

82. In its decision in EB-2007-0905, the Board adopted a debt-oriented capital structure for OPG as a whole. Since OPG's capital structure will continue to be regulated by the Board, Energy Probe submits that each of its regulated hydroelectric and nuclear businesses should be debt-oriented. Indeed, it would be inappropriate to adopt the equity ratios of deregulated U.S. electric utilities as a point of reference for either of OPG's businesses.

83. If, as Ms. McShane and Professors Kryzanowski and Roberts agree, OPG's nuclear business is more risky than its regulated hydroelectric business, then it would be appropriate to allow a higher equity ratio for the former than for the latter. However, the need to maintain a debt-oriented capital structure in the nuclear business implies that the equity ratio thereof should not be more than 50%.

84. Since the regulated hydroelectric business is less risky, its deemed equity ratio should be less than 50%. Energy Probe submits that the 40% equity ratio proposed by Professors Kryzanowski and Roberts is appropriate. Energy Probe further submits that, for present purposes, the Board should accept the weighting scheme based on share of asset generation capacity used by Professors Kryzanowski and Roberts¹⁹ which yields the Board's required 47% for OPG's overall equity ratio for the prescribed assets.

85. Energy Probe notes, however, that the weighting scheme based on share of asset generation capacity may not continue to produce the 47% combined equity ratio that the Board has adopted. Indeed, it may be necessary to apply a different weighting scheme in the future to obtain the Board's desired result.

86. In Energy Probe's view, the adoption of a particular weighting procedure for the sole purpose of complying with the Board's 47% aggregate equity ratio is essentially arbitrary. The Board may wish to review this aspect in the future.

87. If the Board adopts separate deemed equity ratios for OPG's regulated hydroelectric and nuclear businesses, it may not be clear what OPG should do in order to comply. Doubtless, it would regularly calculate and update the cost of capital for its regulated hydroelectric business ($WACC_{Hydro}$), and the cost of capital for its nuclear business ($WACC_{Nuclear}$) using the deemed equity ratios as appropriate. However, without further direction from the Board, nothing

¹⁹ Prepared Testimony of Dr. Lawrence Kryzanowski and Dr. Gordon Roberts, Evidence filed on behalf of Pollution Probe, Ex. M, Tab 10, filed August 31, 2010. p.66.

prevents OPG from continuing to use its current procedures and the WACC_{OPG} in its project appraisals in both businesses.

88. Indeed, Ms. McShane was unable to indicate what should be different if the Board were to adopt separate, technology-specific capital structures²⁰:

DR. SCHWARTZ: All right. Then the question more specifically is have you -- and Because perhaps it wasn't part of your mandate -- but the question was have you considered what would be different? If they do adopt separate equity ratios, for example, presumably, something is going to happen that would be different than if they had not done that.

Have you considered what those things might be? As I said, the answer may be no, because it wasn't part of your mandate. I'm sorry –

MS. McSHANE: I guess the answer is I would have thought the only major things that would have changed are you have different capital structures for the two operations. But I don't know beyond that whether there's anything of great materiality that would change.

But I guess the bottom line is I didn't think about it beyond that.

89. Energy Probe submits that the Board would not have held this hearing if compliance with a decision by the Board to adopt separate capital structures required only that OPG maintain updated costs of capital for its regulated hydroelectric and nuclear businesses.

90. Energy Probe submits that OPG must use those capital structures to determine the respective costs of capital in its project appraisal. In Energy Probe's view, this entails using those costs of capital as the discount rates in

²⁰ Transcript, volume 12, at p.67, line 18 – p.68, line 6

its capital budgeting procedures. If, following a Board decision to adopt separate capital structures, OPG continues the current practice of evaluating all capital expenditures using its overall cost of capital with additional risk adjustments to the cash flows, then the Board would properly find that OPG had not complied with the Board's decision.

91. It will be apparent that if OPG uses the costs of capital appropriate to its regulated hydroelectric and nuclear businesses as the discount rate in project appraisal but, in addition, continues to adjust expected cash flows for risk, then it will have accounted for risk twice. On this basis, it will not be identifying all and only those capital projects that maximize value.

92. For all the reasons presented above, Energy Probe therefore submits that the Board should adopt separate capital structures for OPG's regulated hydroelectric and nuclear businesses and also require that OPG use the resulting costs of capital in the commercially value-maximizing manner.

CAPITAL PROJECTS

Regulated Hydroelectric

Issue 4.2 Are the capital budgets and/or financial commitments for 2011 and for the regulated hydroelectric business appropriate and supported by business cases?

93. Exhibit D1-T1-S2 Attachment 1 Tab 5 presents the business case for the proposed Cornwall Energy and Information centre. According to the evidence, this centre is expected to cost \$12 M to construct and approximately \$500 k per year in operating costs.

94. Supporting justification for the centre is contained in the response to Board Staff interrogatory L-1-018. That response describes three main benefits of the centre to ratepayers as the justification for charging the costs to the regulated hydroelectric revenue requirement.

95. The first benefit cited relates to the need for OPG to maintain support for its operations in the community (Cornwall) in which the Saunders plant is located. Among the statements made are:

“The centre will play an important role in enhancing OPG’s support within the local community with key stakeholders.”
(lines 43-44 on page 1)

96. Also clear from the evidence is the fact that OPG has not had a visitor’s center at the Saunders plant since 1992 (lines 34-35). In an effort to determine what changes in community support had occurred that necessitated a visitors center after 16 years operating without one, Energy Probe submitted interrogatory L-6-24.

97. In that interrogatory the applicant was asked whether support for the Saunders plant had declined and for what reasons. The response refers to the issue of payments in lieu of property taxes introduced by Government legislation in 2001. The issue is summarized in Attachment 1 to the interrogatory which is a speech given by OPG’s Executive Vice President for Hydroelectric, Mr. John Murphy in Cornwall in February 2008.

98. Pages 5 and 6 contain the relevant excerpts from Mr. Murphy’s speech. According to Mr. Murphy, a problem arose when the way in which generators paid property taxes to municipalities was changed. Prior to 2001, hydroelectric generators paid property taxes directly to municipalities

apparently on the basis of assessments from the Municipal Property Assessment Corporation (MPAC).

99. In 2001, the provincial government passed legislation eliminating property taxes on hydroelectric generating stations and introducing a Gross Revenue Charge payable by generators to the provincial government which then made payments in lieu of taxes to the affected municipalities. However, according to Mr. Murphy's statement, payments in lieu did not increase when MPAC assessments for the hydro stations increased and this became an issue with municipalities like Cornwall.

100. Mr. Murphy characterized this as a tax policy issue for which OPG was not to blame. Mr. Shea in cross examination reiterated that position but added that OPG seemed to be caught in the middle, regardless. (Transcript Vol 1 p.156 lines 27 to p.157 line 4).

101. When asked if there were other issues between the City of Cornwall and OPG, Mr. Shea replied that he was not aware of any. (Transcript Vol 1 p.156 lines 17-21).

102. According to the evidence, the dispute with the provincial government over the size of payments in lieu of property taxes is the only issue identified by the applicant as negatively affecting its relationship with the City of Cornwall. It appears to Energy Probe that the Cornwall Centre is being offered by OPG as an appeasement to the City to help relieve the tension arising from the provincial government's handling of the property tax issue.

103. Energy Probe submits that appeasement for the actions of the Province is not a benefit to ratepayers nor is it a proper reason to charge ratepayers the \$12 M cost of the Information Centre. The provincial government is OPG's sole shareholder and should bear the cost of such appeasement strategies carried out on its behalf by OPG.

104. The second benefit to ratepayers cited by OPG is that the centre will provide "an integral component of OPG's campaign for Waterways Public Safety" (lines 11-15 on page 2 of L-1-018). When questioned about how this campaign has been carried out to date, Mr. Shea stated in cross examination that the public safety message is currently conveyed primarily through media advertising and school presentations. None of these would be displaced by the messaging at the Cornwall Information Centre though, according to Mr. Shea (Transcript Vol 1, p. 151 line 23 to page 152 line 15).

105. Also impacting the effectiveness of using the centre as an "integral component" of the campaign is the expectation for how many people will actually visit the centre. Mr. Shea was unable to provide an estimate of the expected number of visitors but conceded that 100,000 visitors per year would be "too big a number". (transcript vol 1 page 153 lines 17-19).

106. Energy Probe submits that the Waterways Public Safety campaign is directed at all residents of the province and can be most effectively presented through mass media and targeted presentations in schools throughout the province. The likelihood that the Saunders center will contribute anything significant to this program is, in Energy Probe submission, remote. Energy Probe, therefore, questions the value of this benefit to ratepayers when they are already funding the more effective media and school presentation forums for the water safety message.

107. The third benefit to ratepayers appears at lines 17-23 in the L-1-018 response. This benefit is that the centre will be used as an educational venue “to teach students about power generation” and will “provide a year-round facility for local community and educational groups for meetings, art displays, and other cultural events”. It is claimed that these uses will enhance “OPG’s involvement and reputation within the local community”.

108. Energy Probe submits that these uses are not a benefit to ratepayers in the province although they may be a benefit to the local ratepayers in the Cornwall area that actually make use of the centre. However, given that most provincial ratepayers will never visit the centre, Energy Probe submits that they should not be charged for the limited benefits to the local community.

109. Energy Probe further submits that OPG’s mandate is to provide electricity, not education or cultural opportunities. Charging ratepayers for activities outside the company’s mandate is an improper use of the regulated rates for the prescribed facilities.

OPERATING COSTS

Nuclear

Issue 6.7 Are the proposed expenditures related to the continued operations at Pickering B appropriate?

110. Energy Probe generally has less confidence in the success and good performance of OPG’s “COOP” project than OPG has, which is itself very little, according to the evidence. As a result, we would prefer to see the project funded by a private Shareholder, at its risk and for its potential benefit if all

goes well. In the present case, where that elegant bit of incentive regulation seems to be unavailable, we have no submissions. We do believe, however, that a stand-alone project with such low confidence of success would be unlikely to draw guaranteed ratepayer payments in many other contexts.

Other Costs

Issue 6.11 Are the amounts proposed to be included in the test period revenue requirement for other operating cost items, including depreciation expense, income and property taxes, appropriate?

111. We do not expect Pickering-A to operate until 2021, and do not believe it is prudent for rates to be based on that unlikely assumption. We recommend that the Board revise that to a more proximate and more likely end-of-service life for ratemaking purposes. See our introductory section entitled Price Restraint, Cost Control, Nuclear Power, and the Nature of this "Dispute" (Issue 1.3).

112. Similarly, we do not expect Darlington to operate until 2051, and do not believe it is prudent for rates to be based on that unlikely assumption. We recommend that the Board revise that to a more proximate and more likely end-of-service life for ratemaking purposes. At least until funds are released in response to a "release-quality" cost estimate, we would urge the Board to resist advancing Darlington's end-of-service life for ratemaking purposes past its non-refurbished end-of-service life. See our Argument Overview section entitled History, Costs, Megaprojects and Nuclear Power (Issue 1.2)

NUCLEAR WASTE MANAGEMENT AND DECOMMISSIONING LIABILITIES

Issue 8.2 Is the revenue requirement amount for nuclear liabilities related to nuclear waste management and decommissioning costs appropriately determined?

113. We believe that the revenue requirement amounts for the nuclear liabilities related to nuclear waste management and decommissioning costs for the Pickering-A and Darlington stations have been set too low, as a direct result of the decision to leave and move (respectively), their End-Of-Service dates to unrealistically late dates. We have discussed this issue in our corresponding sections on Issue 6.11, and further in our introductory section entitled Price Restraint, Cost Control, Nuclear Power, and the Nature of this “Dispute” (Issue 1.3)(re: Pickering-A) and in our Argument Overview section entitled History, Costs, Megaprojects, and Nuclear Power (Issue 1.2)(re: Darlington).

DESIGN OF PAYMENT AMOUNTS

Issue 9.1 Is the design of regulated hydroelectric and nuclear payment amounts appropriate?

The Hydroelectric Incentive Mechanism (“HIM”)

114. As quoted above, in our Argument Overview section entitled “Process: The Applicant’s responsibility to report its response to the Decision”, the HIM issue was dealt with at some length in Section 3.5 “Design of Payment Amount” of the EB-2007-0905 *Decision* (pp. 50-55). That Decision includes a lengthy discussion dominated by a concern pursued by Energy Probe in cross-

examination of OPG's final witness panel and in a resulting Undertaking Response, which is Exh. K1.5 in this Proceeding.

115. In that Undertaking Response, OPG finally contradicted its panel's sworn testimony and conceded that the concern was indeed based on fact, but argued – misleadingly, in our submission – that the effect was *de minimis*.

116. In the previous Proceeding, the Board declined to address our concern for the 2008-09 Test Period, at least pending “a review of the mechanism at the next proceeding. . . This review will examine the impact of the incentive structure on OPG's operating decisions.” (p. 55)

117. Although OPG's review did not mention or directly address that concern, OPG's evidence in this Proceeding strongly supports Energy Probe's concern, by revealing that both the HIM payments and the over-incented PGS operation from the past Test Period actually exceeded forecasted values very significantly. For example, Exh. J1.11 concedes that the above-forecast HIM revenue to OPG in 2009 not only exceeded the 90% statistical error bands on OPG's official forecast, the forecast probability of reaching a number that high was only 1.7% -- their forecast had 98.3% confidence that it would NOT go that high!

118. Not only is the error in the formula not *de minimis* from a theoretical or calculated point of view, it hasn't turned out to be *de minimis* in practice, either. In short, there is a flaw in the formula, it is still there, and it is not *de minimis*.

119. We would urge this Board Panel to reexamine the previous Panel's interim decision on this matter, and repair this flawed formula so it does what it was designed to do, and no more.

120. In principle, Energy Probe continues to support the use of the HIM, provided that the flaw is fixed. Indeed, if the current formula were amended so it actually performed the way it is described – *e.g.*, in EB-2007-0905 Exh. I1 / T1 / S1 and on pp. 51-52 of the EB-2007-0905 *Decision* -- we believe it would provide an appropriate level of incentive, and would properly align the interests of OPG and the ratepayers.

121. Unfortunately, the current formula does not do so, because of a relatively simple flaw.

The Problem with the HIM Formula

122. According to the rationale for the formula, it rewards OPG at the regulated rate for its average production, but requires it to buy or sell incremental energy at the HOEP-market price, in any hour in which its Hydroelectric generation is lower or higher than that hourly average production. The averaging is done monthly. The formula is most easily accessible on p. 51 of the EB-2007-0905 *Decision* (p.7 of Exh. K1.3 in this Proceeding), and the rationale is presented there and throughout EB-2007-0905 Exh. I1 / T1 / S1.

123. To our knowledge, this information was not repeated in OPG's current Application, presumably because OPG is not proposing any changes to the *status quo*.

124. Throughout EB-2007-0905 Exh. I1 / T1 / S1, and in the formula and the examples, the terms “hourly volume” and “MWavg” and “actual average hourly net energy production over the month” are used interchangeably, and represent the key “base case” or “pivot” or “threshold” number, around which the performance-based HIM operates. The text of that Exhibit explains throughout that this level of production may change from year to year and month to month, primarily as a function of available water, from falling rain and melting snow.

E.g., As indicated in Ex. E1-T1-S1, forecast energy values are based on expected water flow conditions, and include all baseload and peaking energy from the regulated hydroelectric facilities. [*ibid*, p. 6/17, ll. 12-14]

125. In effect, the key “base” number in the incentive formula is one that purportedly comes from God, or from Mother Nature.

126. The vital fact that OPG's Exhibit does not explain – and which indeed was vociferously and consistently denied by OPG's witnesses throughout Energy Probe's Cross-Examination on this subject in the last Hearing [EB-2007-0905 Tr. Vol. 15, pages 99-120] – is that this central MWavg term in the formula is not simply the product of semi-predictable rainfall and snow melt, but that it is also directly affected by OPG's activities! In fact, the actual operation of OPG's PGS (Pump Generating Station), which is the very object of this incentive, decreases MWavg by a significant and predictable amount, thereby generally increasing the HIM payments to OPG, above and beyond the level implied in that Exhibit.

127. Put simply, there is an undesirable and undocumented “positive feedback” or “circular amplification” effect in the formula. Once that effect is examined, it becomes clear that the incentive is significantly “richer” than intended or appropriate, and it will inescapably lead to excessive payments from ratepayers, and will presumably also lead to over-use of the PGS in response to the excessive incentive.

128. The mechanism of the undesirable “feedback” is relatively simple, as is the remedy:

- The purpose of the PGS is to pump water uphill at Niagara, consuming electricity when it is abundant and cheap, and subsequently letting the water flow through its turbines, generating electricity when it is scarce and expensive.**
- Like most mechanical devices and all energy-storage mechanisms, the PGS returns less energy than it consumes. Specifically, OPG has consistently estimated its “turn-around efficiency” at 44%, indicating that (e.g.) it produces 44 MWh of electricity in return for consuming 100 MWh.**
- In other words, every time the PGS consumes 100 MWh and uses that water to generate power, OPG's total net generation predictably and unavoidably drops by 56 MWh, the difference between consumption and output.**
- Through the action of the HIM's flawed formula, that loss of generation converts some of OPG's generation from the “below the line” regulated price to the “above the line” HOEP price, generally increasing OPG's HIM payments more than it decreases OPG's regulated payments.**
- Because the magnitude of the distorting “feedback” effect is known, not in dispute, and a simple function of the energy consumption of the PGS, it is simple to “tune out” of the formula's operation, without jeopardizing any of the benefits of the HIM approach, or increasing OPG's operating risk.**

- The formula can be repaired simply by replacing MWavg with a corrected number. The monthly total generation on which it is based should be incremented by adding 54 MWh for every 100 MWh consumed by the PGS for pumping. That incremented number would then be divided into an hourly average and used as a corrected MWavg.
- Skipping the monthly totalling, MWavg in the formula should be set to Hourly Average Rate LESS 0.54 times Hourly Average PGS electricity consumption. (Like MWavg, the other numbers are calculated for the current month, each month.)

The concern here is NOT about “gaming”, NOR is it about OPG changing behaviour near the end of the month.

129. In the previous Proceeding, and even in the *Decision* (e.g., p. 55), there are numerous references to the potential for “gaming”, or for changing PGS operation in the waning hours of the month in order to manipulate the monthly outcome, and thereby MWavg. We have never expressed any of those concerns, and we do not believe that they are valid. The effect of PGS operation on MWavg, and the so-called “second payment” or excess incentive, occurs equally throughout the month, and is a predictable and unavoidable consequence of PGS operation, the way the formula is currently set up.

130. After OPG's Panelists steadfastly denied the very existence of this unfortunate effect under our Cross-Examination in EB-2007-0905, we tried simpler and simpler scenarios in an attempt to get them to concede its existence. Eventually, we had to settle for an Undertaking, to examine one of the very most simplified scenarios. That cartoon-like scenario involved a 30-day month in which the PGS was never used in the first 29 days, then on the last day it pumped for 6 hours then it generated for the last 6. When that Undertaking was fulfilled, OPG admitted that the pumping did increase the HIM payment by lowering MWavg (i.e., in addition to the intended incentive payment, from the

spread between the low purchase price and the higher sale price), but OPG dismissed the results as *de minimis* -- largely because the amount of operation in that one day was small, and that the scenario was unrealistic! Those characteristics were all the result of having to construct a simplified cartoon-like "thought experiment", which unfortunately spilled over into an imputed concern about "gaming" or about month-end behaviour. Those concerns were misplaced, and misleading.

131. We believe that market players should respond to the incentives they face, including incentives established by regulatory rules. And we do not generally refer to that behaviour as "gaming". If this Board chooses to continue to over-reward OPG for running its PGS, we should not be surprised or offended if OPG runs its PGS more than it should and collects surprisingly and excessively high HIM payments.

Didn't OPG indicate that practical considerations, plus non-energy charges, would diminish this "second payment", and push it toward being *de minimis*?

132. In this Hearing, Energy Probe cross-examined OPG's witnesses to test those claims. We do not believe that the case for *de minimis* has remotely been made, but we will still address these arguments for those who disagree with us.

133. Let us take them in turn.

Practical Considerations:

134. In our simplistic hypothetical, in the 2008 Undertaking that is Exh. K1.5 here, we assumed that the PGS was used for flat-out pumping for 6 hours per day, and for generating for 6 hours per day. In that Undertaking response and

on the stand, OPG's evidence suggested that the hypothetical rate of use was unrealistically high, so the resulting quantum of the excessive "second payment" (from the flaw in the formula) would also be too high.

135. As one test of that claim, we asked for an Undertaking to give us the actual capacity factors for the PGS in 2009, using the simple logic that "If it exists, it must be possible." The response is in Exh. J1.12. In that response, OPG calculates the implied average capacity factors in our hypothetical (on the pumping and generating days) as "13 per cent in generation mode and 18 per cent in pump mode." By comparison, the actual average capacity factors during the entire year 2009 were reported in that response as "8 per cent in generation mode and 12 per cent in pump mode."

136. In short, in a recent sample of only two years, we have already had one whose average use of the PGS reached approximately 64.5% of the level of the hypothetical. If there are rational grounds for confidence that we won't see even higher levels in the next few years, we do not believe that they have been placed in evidence.

137. Even if it is appropriate to discount the theoretical calculations by about a third, on the unproven assumption that 2009 was as PGS-intensive as a year could ever be, for practical reasons, we do not see how that turns a significant number of millions of dollars in unearned annual incentive payments, into something that is trivial or *de minimis*.

What about the \$15/MW non-energy charges?

138. Although OPG's witnesses in Day One never agreed with us on this matter, we steadfastly argue that including any of the costs of running the PGS – including these non-energy charges – in this analysis constitutes double-

counting on OPG's part, and should be eliminated from this discussion.

139. The purpose of the calculations in Exh. K1.5 was to quantify the magnitude of the flaw in the formula, the "second payments" that accrues to OPG from the circular effect of PGS operation on MWavg. In reality, OPG faces costs and benefits and risks and rewards from using its PGS under the current formula, with and without its current flaw. That is the point of the incentive, and there is no rational reason to apportion some of the costs to the flaw in the calculation. If the formula were amended as we recommend and worked correctly, and the PGS were operated appropriately, OPG's spread between on-peak and off-peak prices, around a correctly-set "pivot point", would routinely cover more than their full costs of operations, without the extra benefit that accrues from lowering MWavg.

140. With the flawed formula, they still do not incur any extra operating costs because the formula is flawed, or because they have acknowledged that it is flawed, or because they have attempted to calculate the size of the flaw! In fact, OPG's witnesses in this hearing staunchly insisted that this "second payment" has absolutely no impact on their decisions to use the PGS or not! If we take that at face value, why should the non-energy charges of running it be attributed to the second payment, when the non-energy charges are unavoidable as soon as the decision is made to run the PGS's pumps?

141. Because we can see no merit to the inclusion of these non-energy charges in the calculation of the "incremental revenue" or "second payment" that flows to OPG from the PGS's lowering of MWavg, we would urge this Board to correct the bottom-line numbers on the last page of OPG's 2008 response in our Exh. K1.5. The correct estimate for this "incremental revenue" from operation of the PGS at our hypothetical rate (admittedly higher than the

average rate in 2009) is \$34,930 per day, not \$16,200 per day. The “incremental revenue” from a year of such operation would be 365 x \$34,930, or \$12,749,450. Discounting the total down to 2009 levels of PGS activity still leaves \$8,223,395.25 – far from *de minimis* in our submission.

142. In our submission, the only way to consider these sums to be *de minimis* is to compare them directly to OPG's total Revenue Requirement, or some large fraction of it. That is precisely what OPG does in several parts of that 2-year-old undertaking response, Exh. K1.5 in this Proceeding. For example, the last page misleadingly minimizes the effect of PGS operations on MWavg (from one day's operation and from two day's operation) by comparing it to the total volume of electricity generated by all of OPG's regulated hydroelectric stations! In fact, these are substantial sums, larger than many issues that this Hearing has discussed, and that this Panel will address.

Wouldn't “sharing” the incentive with ratepayers solve the problem, too?

143. We have heard from some intervenors who believe that the best and simplest solution to excessive HIM payments is to “share” or “claw back” a percentage of the incentive payments. We concede that it might be theoretically possible to estimate the precise quantum of the erroneous over-payment and over-incentive in the current formula and correct it with a sharing or claw-back mechanism. But we believe that doing so – even with the “right” percentage applied, which would not be a simple number like 50% or 75% -- would still be less desirable as a regulatory practice than correcting the flaw in the formula, for the following reasons:

- The rationales behind the existing HIM – that the incentive is based on market signals, that it is economically efficient and mimics the incentives on a market player, and that its efficiency creates “positive externality benefits” to ratepayers in the form of lower peak rates – are valid and elegant, in our view. Only the implementation is flawed, and

even that is only flawed in one regard, which can be fixed easily and directly.

- If OPG's analysis of the benefits of the HIM to ratepayers (presented in EB-2007-0905 Exh. I1 / T1 / S1) is even close to the truth, then the benefits are already generously "shared" with ratepayers, and the case for an additional "claw-back" seems weak, if not punitive.
- Since the existing formula, once repaired, would apparently give an appropriate incentive signal and also create significant ratepayer benefits, the temptation for ratepayer representatives to insist on collecting a large share of the incentives and therefore weakening OPG's incentives, risks "killing the goose that lays the golden eggs".
- The HIM formula is apparently unique – neither Energy Probe nor the OPG witness panel in EB-2007-0905 could cite another – in "anchoring" an incentive formula to a number that is partly under the control of the incented entity. We believe that this kind of circularity should be encouraged, without its predictably perverse "feedback" effects are expressly tuned out, as we have proposed. "Discounting" the incentive payments might conceivably produce the same size payments and incentives, but we believe it would lend more legitimacy or precedential weight to this kind of undesirable circular incentive formula.
- Even if a "clawback" compromise seems popular and attractive from a "settlement" or "dispute resolution" point of view, Energy Probe would urge the Board to reject it, based on the principles we outlined in our Introductory section on Price Restraint, Cost Control, Nuclear Power, and the Nature of this "Dispute". Incentive schemes, in our Submission, should be designed according to the principles of incentives and incentive regulation, and not chosen by a popularity poll among intervenors.

144. We recommend that the Board eliminate the circularity or "second payment" in the present HIM formula, by adding a correction to the calculation of MWavg. MWavg in the formula should be set (monthly) to Hourly Average Rate LESS 0.54 times Hourly Average PGS electricity consumption. This correction will restore MWavg to its value before the circular effect of the flaw we have been discussing. Since we doubt that OPG understood or planned this

self-serving flaw, we believe that this correction will also restore the formula to the state in which OPG effectively intended to propose it. We recommend that OPG continue to receive 100% of the HIM payment calculated by that corrected formula.

Costs

145 Energy Probe submits that it participated responsibly in this proceeding. Energy Probe requests the Board award 100% of its reasonably incurred costs.

ALL OF WHICH IS RESPECTFULLY SUBMITTED

December 6, 2010