August 31, 2021

Christine E. Long
Registrar
Ontario Energy Board
P.O. Box 2319
2300 Yonge Street
Toronto ON
M4P 1E4

Dear Ms. Long

RE: EB-2020-0290 Ontario Power Generation Inc. - 2022-2026 Payment Amounts
Energy Probe Argument Submission

Attached is the argument submission of Energy Probe Research Foundation (Energy Probe) in the EB-2020-0290 proceeding, the application by Ontario Power Generation Inc. for approval of 2022-2026 Payment Amounts.

Respectfully submitted on behalf of Energy Probe.

Tom Ladanyi
Digitally signed by Tom Ladanyi
Date: 2021.08.31 16:11:07 -04'00'

Tom Ladanyi
TL Energy Regulatory Consultants Inc.

cc. Patricia Adams (Energy Probe)
Roger Higgin (Sustainable Planning Associates Inc.)
Evelyn Wong (OPG Regulatory Affairs)
Intervenors of Record

EB-2020-0290

Ontario Energy Board

IN THE MATTER OF the *Ontario Energy Board Act*, 1998,

AND IN THE MATTER OF an Application by Ontario Power Generation Inc. for an order or orders approving payment amounts for prescribed generating facilities commencing January 1, 2022.

Ontario Power Generation Payment Amounts 2022-2026

Energy Probe Research Foundation

Argument Submission

August 31, 2021

Energy Probe Argument Submission

Executive Summary

Energy Probe submits that it is not appropriate for OPG to book any SMR related costs in the NDVA. The NDVA is a variance account that was set up to record variance from proposed costs. OPG has not proposed any SMR costs. If NDVA was a deferral account, SMR costs could be recorded in it. However, NDVA is clearly not a deferral account.

Energy Probe submits that the actions of OPG in the management of the D2O Project were not prudent. The project was completed behind schedule and hundreds of millions over budget. The main purpose of the D2O facility was its use in the dewatering and processing of heavy water during refurbishment. Because of project delays, the D2O facility could not be used for refurbishment of the first of the four units at Darlington. Energy Probe submits that OEB should disallow $200 million which is 50% of the difference between the Full Release Execution Business Case Summary cost of $110 million and the final proposed amount of $510 million.

Regulatory Background

OPG filed a settlement proposal on July 16, 2021. The settlement proposal represented a comprehensive settlement on nearly all of the issues set out in the Issues List, with only a limited number of partially settled and unsettled issues.

With respect to Issues 1.2, 13.1 and 14.1, the Parties settled on all matters within the issues, with the exception of: (i) the recording of small modular reactor (SMR)-related costs in the Nuclear Development Variance Account (NDVA) in the context of the issue identified by the OEB in its Decision on Issues List, dated May 20, 2021; (ii) consideration of SMRs as a component of OPG's customer engagement process; and (iii) SMR-related reporting and record keeping requirements.

There was no settlement on Issue 7.6 as to whether the proposed in-service additions for the Heavy Water Storage and Drum Handling Facility (D2O Project) are reasonable. As a result of there being no settlement on the D2O Project, Issue 13.2 was partially settled as there are deferral and variance account (DVA) balances associated with the D2O Project.

The only issues that needed to be addressed in the oral hearing were those related to SMRs and the D2O Project. The oral hearing was held on August 4, 5 and 6, 2021.

SMR Issues

In its decision on the Issues List, the OEB explained the scope of the issue.

"The NDVA is addressed in O. Reg 53/05 and the account was approved as part of the EB-2007-0905 decision. However, there appears to be disagreement among parties regarding the appropriate use of the NDVA to record SMR-related costs.

This issue is before the OEB in this proceeding. There are financial risks to OPG's shareholder and ratepayers associated with ambiguity regarding an existing DVA. The OEB will consider the narrow issue of whether OPG's SMR-related costs are consistent with the purpose of the NDVA and thereby appropriate to be booked in the account."

NDVA is a Variance Account, not a Deferral Account. Ontario Regulation 53/05 was amended on February 13, 2008, by Ontario Regulation 27/08. The amendments created two accounts: the Nuclear Development Deferral Account (NDDA) by section 5.3 and the Nuclear Development Variance Account (NDVA) by section 5.4.

Nuclear development deferral account, transition

5.3 *(1) Ontario Power Generation Inc. shall establish a deferral account in connection with section 78.1 of the Act that records, for the period up to the effective date of the Board's first order under section 78.1 of the Act, the costs incurred and firm financial commitments made on or after June 13, 2006, in the course of planning and preparation for the development of proposed new nuclear generation facilities that are associated with any one or more of the following activities:*

1. *Activities for carrying out an environmental assessment under the Canadian Environmental Assessment Act.*

2. Activities for obtaining any governmental licence, authorization, permit or other approval.

3. Activities for carrying out a technology assessment or for defining all commercial and technical requirements to, or with, any third parties.

(2) Ontario Power Generation Inc. shall record simple interest on the monthly opening balance of the account at an annual rate of 6 per cent applied to the monthly opening balance in the account, compounded annually.

Nuclear development variance account

***5.4** (1) Ontario Power Generation Inc. shall establish a variance account in connection with section 78.1 of the Act that records, on and after the effective date of the Board's first order under section 78.1 of the Act, differences between actual non-capital costs incurred and firm financial commitments made and the amount included in payments made under that section for planning and preparation for the development of proposed new nuclear generation facilities.*

(2) Ontario Power Generation Inc. shall record interest on the balance of the account as the Board may direct.

Section 5.3 was revoked by Ontario Regulation 312/13 on November 27. 2013. This means that NDDA no longer exists and that NDVA is the only account that deals with nuclear development costs. Unlike a deferral account which can be used for recording all costs, a variance account can only be used to record variances from specific costs. In the case of NDVA, the account can only be used to record "*differences between actual non-capital costs incurred and firm financial commitments made and the amount included in payments made under that section for planning and preparation for the development of proposed new nuclear generation facilities".*

NDVA is for booking variances from costs of "proposed new nuclear generation facilities", OPG did not propose any SMR nuclear generation facilities.[1]

In its response to an undertaking OPG claims that there is no difference between a variance account and a deferral account if the amount in revenue requirement is zero[2]. Energy Probe submits that if that claim is accepted then there would be no purpose in having separate deferral

[1] [1] Tr. Vol. 1. Pages 58-59
[1] Ibid, pages 89-90
[2] Undertaking J1.2

and variance accounts, which is certainly not true. OEB has approved separate deferral and variance accounts over the years for utilities under its jurisdiction.

The only new nuclear generation facilities proposed by the OPG were the facilities proposed by OPG in its EB-2007-0905 application. While the evidence filed by OPG in support of its application does not provide much detail, the evidence that OPG filed with the CNSC in support of its license is very extensive. The environmental assessment report filed by OPG with CNSC in evidence lists three reactor designs, none of which is an SMR.[3]

"Atomic Energy of Canada Limited (AECL) – Advanced CANDU Reactor (ACR-1000), a pressurized heavy and light water hybrid reactor (Hybrid),with 1085 MW(e) net output per unit;
• AREVA NP – US EPR (EPR), a pressurized water reactor (PWR) with 1580 MW(e) net output per unit; and
• Westinghouse Electric Company LLC – AP1000, a PWR with 1037 MW(e) net output per unit."

Although the license that CNSC granted is based on this evidence it does not specify the reactor design[4]. The environmental assessment report discusses at length safety and environmental aspects related to the three reactor designs.

NDVA was set up to record cost variances from the proposed New Nuclear Reactor at Darlington, as Described in the Environmental Assessment Report. SMR is not described in the Environmental Assessment Report.

NDVA should not be used for booking costs of SMR business development activities. According to the evidence, OPG is engaged in SMR business development activities that are not for the benefit of Ontario electricity ratepayers but are aimed at the competitive market for SMRs. Energy Probe believes that the costs of these business development activities should not be booked in the NDVA. In its testimony OPG made a commitment that it will not be booking

[3]https://archive.opg.com/pdf_archive/Nuclear%20Licencing%20Documents/Darlington%20New%20Nuclear/EIS_Report_-_28Sept09.pdf
[4] Exhibit J1.4

any costs of SMR business development activities[5]. Energy Probe supports OPG in its commitment.

There should be a limit on "firm financial commitments" that can be booked into the account. According to OPG, there is no upper limit on what amount can be booked into the account as long as it falls in the category of *"firm financial commitments".* OPG witnesses could not explain what would constitute a firm financial commitment or who would decide that a financial commitment is firm or infirm.[6] The offered to provide an undertaking that would provide an answer.[7] However the undertaking does not provide the answer. So, we still don't know what is a firm financial commitment, or who would decide to book it into the NDVA. There should also be an upper limit on what amount can be booked. As it is, OPG could sign a contract with a nuclear supplier for $5 billion and just book it in the account and start recording interest. Energy Probe submits that there should be a clear definition of what is a firm financial commitment, and rules on how and when it could be booked into the NDVA including a reasonable upper limit.

D2O Project

In this proceeding OPG is requesting a prudence review of the D2O Project. In a prudence review the question is would a prudent manager make the decisions that OPG made in the management of the D2O project.

In the EB-2016-0152 proceeding there was a prudence review of two projects: The Auxiliary Heating System (AHS) and the Operation Support Building (OSB). The final costs of both projects were significantly higher than the costs presented to the OEB in business cases filed in the EB-2013-0321 evidence. In its decision the OEB disallowed *"50% of the variance between the in-service amount set out in the first execution business case and the current proposed in-service amount."*[8]

[5] Tr. Vol. 1, pages 74-77
[6] Tr. Vol.1, pages 61-64
[7] Undertaking J1.2
[8] EB-2016-0152, page 21

In the same decision the OEB directed OPG to file the following evidence:

"For future proceedings, the OEB directs OPG to file, at a minimum, the costs for each major capital project based on the first execution business case and the final proposed amount for which OPG is seeking approval."[9]

Much of what we know about the causes of the cost over-run and the delay in completion of the D2O project come from the oversight reports prepared for the Board of Directors of OPG by Burns Modus, a partnership between Modus Solutions Inc. and Burns &McDonnell. The reports were used by the Auditor General in its audit of the DRP and by the OEB in its EB-2016-0152 Decision. In November of 2020, OPG terminated its contract with Burns Modus and replaced it with a RCRB, Refurbishment Construction Review Board.an oversight board managed by OPG itself.[10] OPG admits that the new oversight board will not be producing the types of reports that Burns Modus produced. Energy Probe submits that this change should be of great concern to the OEB. The OEB in its decision should direct that OPG re-hire Burns Modus or hire a similar independent incorporated entity to provide regular quarterly oversight reports to the OEB.

The first execution business case was the 2013 Full Release Definition Business Case Summary which estimated that the project cost would total $110 million.[11] The current proposed amount is $510 million[12]. If the OEB found that the actions of OPG were not prudent in managing the D2O project it could apply the same reasoning that it used in the EB-2016-0152 decision and disallow 50% of the difference between the final D2O capital cost of $510 million and the Full Release Execution Business Case Summary cost of $110 million, which would be a disallowance of $200 million. Energy Probe believes that the OEB should disallow that amount because the actions of OPG in managing the D2O project were not prudent as explained below. The argument submission follows the chronological progress of the D2O Project.

[9] Ibid, page 22
[10] Tech Conference Tr. Vol.1, pages 28-30
[11] Exhibit D2, Tab 2, Schedule 10, page 108
[12] Exhibit D2, Tab 2, Schedule 10, page 1, Footnote 1

In 2007 Trow Associates prepared a geotechnical report for OPG that indicated soil conditions including the high water table at the site for the future D2O project[13]. Yet OPG claimed that high water table conditions were un-anticipated. Then it changed its position claiming that they were anticipated.[14]

OPG embarked on the D2O Project without engineering design. OPG had only a general idea of what it wanted in a heavy water storage and drum handling facility. Because OPG did not precisely know what it wanted, it decided to hire a contractor under an engineer-procure-construct (EPC) contract that would figure out what OPG actually wanted and build it.

"With the selection of two qualified ESMSA contractors and the cancellation of the engineering 6 RFP discussed above, OPG determined to undertake the D2O Storage Project on an Engineer, Procure, and Construct ("EPC") basis within the ESMSA framework. This approach was 8 chosen to enable OPG to gain operational experience with both EPC contracting and the ESMSA framework on a large and complex project prior to starting unit refurbishment. The D2O Storage Project was OPG's first large and complex EPC project to be executed under the ESMSA."[15]

Bidders were pressured to present unrealistically low bids.[16] Bidders were instructed to submit bids that did not include the cost of dewatering or the cost of removal of soil contaminated with tritium. OPG now claims that it always intended to pay for the costs of dewatering and contaminated soil removal out of contingency.[17] Energy Probe submits that OPG knew about the contaminated soil and the high water table at the time so its use of contingency for that purpose is not prudent. Contingency should only be used for unknown events.

The criteria for evaluating bids gave equal rating to the bid price and the technical capability of the contractor. Considering that this was a first of a kind facility where the contractor was required to provide engineering design, prudent management would have given higher rating to technical capability.

[13] D2-02-AMPCO-094
[14] Tr. Vol. 2, pages 67-69
[15] Exhibit D2, Tab 2, Schedule 10, page 46
[16] Tr. Vol. 2, pages 165-167
[17] Tr. Vol.2, pages 134-135

The contract was awarded to the low bidder, Black & McDonald, a large electrical and mechanical contractor that was already doing other work for OPG under its Extended Services Master Service Agreement (ESMSA) minor plant modifications. There was no target price or a not to exceed price.[18] Energy Probe submits that there should have been a not to exceed price and that OPG was not prudent in not having one.

The bid price of $108.1 million was far lower than the $200 million estimate prepared by OPG's own engineers[19]. The cost of dealing with the high water table and contaminated soil on the site was not included in the $108.1 million estimate. The contractor, Black & McDonald, was not informed of the high water table according to their letter to OPG.[20] Prudent management would have been concerned by the large discrepancy between the bid price and the internal cost estimate. There is no evidence that OPG management was concerned. It believed that $108.1 million was a good estimate and presented it to the OEB as the first execution BCS.

Considering that D2O facility was required for the dewatering of Unit 2, the first unit to be refurbished and was therefore on the DRP critical path, prudent management would have assigned an experienced project manager to the manage the D2O project. OPG did not do that. OPG thought that this project was similar to typical work done under its ESMSA for minor plant modifications managed by young engineers from the Projects & Modifications group as part of their development and training.

The construction started before the engineering was completed. It is now clear that it was not prudent to proceed with construction before engineering was completed. OPG admits that.

"The design complexity and challenging construction caused the project to take far longer than anticipated under the initial EPC contract, but that schedule was never realistic for a project of this complexity. As the project entered construction, it became clear that the early estimates of project cost and schedule, developed before preliminary design was complete, were significantly understated."[21]

[18] Tr. Vol. 3, page 25
[19] Tr. Vol.3. pages 27-28
[20] Tr, Vol. pages 136-137
[21] Exhibit D2, Tab 2, Schedule 10, page 112

One should contrast that with the construction of large residential and commercial buildings where a building permit is not issued, and no construction can take place until engineering is completed and approved by a licensed engineer and reviewed by city engineering department. Why should lower standards apply to construction of nuclear plant facilities?

The contract awarded to Black & McDonald was an EPC contract, but OPG and Black & McDonald lacked experience with EPC contracts. OPG admits that it had no experience with EPC contracts and was going to use the D2O project as a learning experience.

"With the selection of two qualified ESMSA contractors and the cancellation of the engineering RFP discussed above, OPG determined to undertake the D2O Storage Project on an Engineer, Procure, and Construct ("EPC") basis within the ESMSA framework. This approach was chosen to enable OPG to gain operational experience with both EPC contracting and the 9 ESMSA framework on a large and complex project prior to starting unit refurbishment. The D2O Storage Project was OPG's first large and complex EPC project to be executed under the ESMSA."[22]

There were problems from the start. Burns Modus, Auditor General, and Black & McDonald noted that OPG managers in charge of the D2O could not manage their internal stakeholders. Engineering changes continued to be made while the D2O facility was under construction. The inexperience of OPG project managers resulted in scope creep, increased costs, and delays. [23]

OPG kept changing the project managers of the D2O Project while it was under way. Was that because the project was used for management training or because of poor performance? OPG never provided a meaningful explanation. It was not prudent for OPG to assign the management of the D2O project to the Projects & Modifications group that were not experienced in managing projects of this complexity.

The D2O Project fell behind schedule. OPG demanded that the contractor provide "requisite cost or schedule certainty"[24]. When the contractor could not provide that because OPG engineers kept making design scope changes, the contractor was terminated.

[22] Exhibit D2, Tab 2, Schedule 10, page 46
[23] Tr. Vol. 2, pages 158-159
[24] AIC, page 23

"The SOW that formed part of the work request also outlined OPG's required schedule, deliverables and procedures. The schedule showed the Phase 1 contract being awarded in June 2012, the Phase 2 contract being awarded in May 2013, and completion of the project in April 2015. The completion date was timed to have the facility available six months in advance of the earliest potential start date for the refurbishment of Unit 2, which was then considered to be October 2015."[25]

That deadline was not met. The D2O facility was not completed in time to be used during Unit 2 refurbishment. Had OPG prudently managed the D2O project it would have been used for all four units as intended.

OPG then acted as a general contractor of the D2O Project for a short period and then issued a work request for a new general contractor under the ESMSA. This time the selection criteria were changed with 75% assigned to technical factors and 25% to price.[26] Energy Probe believes that this was an admission that the equal weighting used for the selection of Black & McDonald was wrong. OPG awarded the work to CanAtom.

CanAtom encountered the same problems as the previous general contractor, Black & McDonald, namely scope creep and changes requested by the OPG engineers. It threatened to quit but OPG persuaded it to stay and finish the job.[27] The costs continued to climb. The $510 million cost of the D2O Project only became known when the project was completed.

OPG claims that the final $510 million cost of the D2O facility is the only correct cost. OPG claims that all prior cost estimates were wrong because they were based on incomplete engineering. OPG also claims that it learned valuable lessons that it will apply to other DRP projects.

In anticipation of the prudence review, OPG hired Bates White to prepare a supposedly independent cost estimate of the D2O Project. Bates White had access to D2O projects documents including invoices and as built drawings. It is not surprising that Bates White came up with a cost that was very close to the actual final cost. The Bates White cost estimate does not

[25] Exhibit D2, Tab 2, Schedule 10, page 46
[26] AIC, page 25
[27] AIC, pages 25-29

provide any confirmation of prudence since it is an after the fact estimate based on perfect knowledge.[28]

OPG claims that the proof of the prudence of its management of the D2O project will only be known if the entire Darlington Refurbishment Program (DRP) is completed under the $12.8 billion cost[29]. What OPG is suggesting is that the OEB should not make its decision based on the evidence in this case and wait until the entire DRP is completed. It is possible that savings in other DRP projects may offset the cost overruns on the D2O project. According to OPG, the costs of individual projects in the DRP should not matter if the total DRP cost is withing the $12.8 billion total. Energy Probe submits that OEB should reject this "cost is no object" reasoning if it is within the $12.8 billion envelope.

It took OPG many years and several hundred million dollars to find out the true cost of what it wanted. It embarked on the D2O Project without engineering design. OPG had only a general idea of what it wanted in a heavy water storage and drum handling facility, and after many years and hundreds of millions of dollars only found out what it wanted when it was finally built. It was a costly journey of discovery and OPG wants the ratepayers to pay for it. There is no evidence that what was finally built was the least cost solution for OPG's needs, nor is there any benefit / cost analysis that would justify the expenditure of $510 million to meet these needs. Because of many changes in scope, it is possible that what was built included many "nice to have" but unnecessary features. OPG did not present any objective review of the design of the D2O facility.

Energy Probe submits that the D2O Project was not prudently managed from its start to its completion. If OPG's management of the D2O Project is considered to have been prudent, then it is difficult to see what would be considered not prudent.

Respectfully submitted on behalf of Energy Probe.
Tom Ladanyi, TL Energy Regulatory Consultants Inc.

[28] Tr. Vol.3, pages 120-121
[29] Ibid, pages 29-31