UNDERTAKING JT3.21

Undertaking

TO PASS ON MR. POLLOCK'S QUESTIONS TO THE EXPERTS.

Ref: CME Questions for OPG's Experts

CME Questions for Innovative

Question 1

Ref: Exhibit L, A2-02-CME-003

In response to part b) of CME #3, Innovative explained why customer priorities varied between similar questions. Innovative explains that outcomes can have two dimensions, hierarchy and direction.

a) Please discuss what, in Innovative's view, a client (OPG or any client) should take when participants answer differently depending on whether the choice is presented in the abstract, or the specific choice is presented to them. For instance, should the client be guided by one type of answer or the other?

b) To the extent that one type of response provides a better grounding for practical takeaways, why does Innovative ask for customer input using both abstract and specific choices?

c) As CME understands Innovative's answer, the structure or form of the questions/survey can influence the answer provided by participants (in this case, abstract or specific choices). Is Innovative aware of any other factors in the survey design or make-up that influence the answers provided by participants? If so, please list them and provide a brief description of what Innovative did to attempt to mitigate the impact of these factors in this case.

CME Questions for Bates White

Question 2

Ref: Exhibit D2-2-11 Attachment 3

In D2-2-11 Attachment 3, page 17 you discuss the adjustments made to RSMeans costs as a result of collective agreements.

a) Please explain why choosing the RSMeans score was used first and then adjusted for collective agreements, instead of simply using the labour rates set out in the collective agreements as a first step.

b) Were all labour costs adjusted for collective agreements, or only a subset? If it is only a subset, please break out how much of the labour costs were adjusted, and how much are reflective of the RSMeans score.

Question 3

Ref: Exhibit D2-2-11 Attachment 3

In your response to part c) of CME Interrogatory #22, you provided that perfect knowledge includes knowledge of the project scope, final design, and actual site conditions encountered during the execution of the project. At Exhibit D2-2-11 Attachment 3, page 8, the site conditions included weather.

However, in your response at CME #22 you indicated that variability in weather was one of the unknowns that caused uncertainty in the cost estimate.

a) Please further explain the difference between the known weather conditions and the weather conditions that cause uncertainty in the cost estimate.

<u>CME Questions for ScottMadden</u>

Question 4

Ref: Exhibit L, F2-01-CME-015
In your response to part b) of CME 15 Interrogatory #15, you stated that "The outage benchmarking survey scope did not request information on total generating cost and cost performance, as it was unlikely to provide superior information on cost performance compared to the EUCG dataset already available to OPG."

a) With respect to total cost generation cost, could you please explain, in greater detail the process of econometric analysis, and the role played by CANDU reactor data points in the analysis of reactor type on generating costs.

b) Please explain in more detail why it is ScottMadden's view that the existing EUCG dataset would provide comparable information on cost performance compare to the outage benchmarking survey participants' data.

Response

Question 1

The following responses were prepared by Innovative Research.

a) In INNOVATIVE's view, the questions in the final workbook are most relevant since they explore customer reactions to specific investments in order to assess public reaction to specific outcome trade-offs.

b) Abstract choices are asked at the beginning of the planning process before specific investments have been developed. It is not possible to test specific choices at that stage.

c) In a deliberative process, the goal is to take a sample that includes participants with little information and give them enough information to make informed choices. Both the information shared and the order of the information have the potential to impact answers.

   In terms of the information shared, INNOVATIVE tests workbooks to ensure both the quality and the amount of information shared meets customers needs. The workbooks themselves include two types of quality checks: diagnostic questions and comment boxes. The diagnostic questions address customers' overall impression of the workbook, whether there is too much or too little information and whether they have any outstanding questions. In addition, every substantive question has a comment box. If we made an error in the testing process, customers have the freedom to raise concerns about bias and comprehensiveness of the background information, accessibility of language, response options or any other concerns. The diagnostic responses were positive and very few respondents made use of the comment boxes.

   The key concern regarding order is whether information earlier in the workbook might "prime" one outcome over another. This was primarily a potential risk in the second workbook, however there was no content prior to the choices section that address any of the specific outcomes, eliminating any risk of priming.

Question 2

The following responses were prepared by Bates White.

a) Labour costs were calculated by multiplying an estimated task duration (i.e., time to complete a task) to a unit labour rate. Task durations are typically denoted in units of hours (or fractions of hours) and labor rates are usually denominated in dollars per hour. In mathematical terms, (labour cost) = (duration in hours) * (labour cost/hour).

   Bates White chose to use RSMeans first as its source of direct labour construction cost data because those data included benchmark task duration information along with benchmark hourly labour rates. The rates in OPG's collective agreements contained hourly labour rates, but no task duration information. Thus, for computational efficiency, Bates White chose first to calculate benchmark labour costs from RSMeans, then adjust those benchmark costs to reflect more-representative task durations and actual collective agreement labour costs.

b) To reflect OPG's collective agreement wage rates, Bates White applied labour cost adjustments to all contractor direct labor construction costs.

Question 3

a) In section IV.B (p. 8) of the Bates White report, we stated that we had assumed "perfect knowledge of project scope, design requirements (e.g., the need for seismic design), and actual site conditions, including previously contaminated soil, a constrained work area, cold weather, and water ingress." Later in section IV.B of the report (p. 9), we stated that, "[d]espite perfect knowledge, variability in some factors—including labour productivity, weather, and the need for modest rework, inter alia—is an unavoidable part of any construction project," and referred the reader to the probability distributions shown in the report.

   These statements are fully consistent. Bates White incorporated an allowance for cold weather into our cost estimate for erecting the concrete structure, as discussed in Appendix C.3.d.1.a of our report ("Concrete Adjustments 3 and 4," p. C-12). Nonetheless, specific weather conditions—together with the broader potential impacts of actual weather encountered (e.g., delays in transporting materials)—remain residual sources of risk and uncertainty in the Bates White cost estimate, as they do in any similar cost estimate.

Question 4

The following responses were prepared by ScottMadden.

a) In the econometric analysis, ScottMadden analyzed nine years of EUCG data (from 2009 to 2017) and 567 data points across three reactor types (PWR,

BWR, and CANDU) to understand which site characteristics most influence TGC over a sustained period and to what extent. We used multiple linear regression ("MLR") to quantify the relationships between various combinations of reactor type, site capacity, number of units, unit size, and unit age (the independent variables) and the EUCG data for site costs (TGC, the dependent variable). Through this analysis, we were able to develop a powerful predictive model for TGC that explains ~79% of the variability in TGC across the dataset using reactor type, site capacity, and unit age. The model indicates:

- CANDU technology increases predicted TGC by over C$250 million per year relative to non-CANDU plants
- Each MW of site capacity increases predicted TGC by C$261 thousand per year
- Each month of average unit age increases predicted TGC by C$346 thousand per year

Once ScottMadden established a mathematically-sound quantification of the impact these site characteristics have on TGC, we adjusted for all sites in the EUCG dataset to account for these factors. However, to be conservative and ensure adjustments were easy to understand and interpret, we only performed adjustments for reactor type and unit age.

b) The EUCG or Electric Utility Cost Group dataset, originally developed in 1986, is specifically designed to compare nuclear plant costs. EUCG is recognized as the best, most comprehensive source of North American nuclear cost data and its dataset was sufficient for the study on cost. The ScottMadden custom nuclear outage benchmarking study focused only on quantifying and adjusting for the impact of regularly recurring, planned maintenance outages on power generation (i.e., MWhs) by understanding how outage work differs across reactor technologies (BWR, CANDU, and PWR) and operators.