

Schedule 6

Phase 2 Submission Requirements and Evaluation Criteria

Commercial and Schedule Submission and Domestic Content Submission

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Part I

Summary of Submission Requirements and Evaluation Process

SCHEDULE 6 TO THE RFP

PHASE 2 SUBMISSION REQUIREMENTS AND EVALUATION CRITERIA

PART I – SUMMARY OF SUBMISSION REQUIREMENTS AND EVALUATION PROCESS

SECTION 1 - GENERAL

1.1 Sections of the Respondent's Phase 2 Proposal Submission

- (a) Respondents are required to submit a Proposal with the following sections:
- (i) Section A – Proposal Submission Form;
 - (ii) Section B-1 – Financial and Milestone Payments Submission;
 - (iii) Section B-2 – Operating, Maintenance, Refurbishment and Sustaining Investment Costs;
 - (iv) Section B-3 – Fuel Requirements;
 - (v) Section B-4 – Decommissioning;
 - (vi) Section B-5 – Output;
 - (vii) Section B-6 – Schedule to Complete Project;
 - (viii) Section B-7 – Schedule Contingency – Design Readiness;
 - (ix) Section B-8 – Schedule Contingency – Licensing Management;
 - (x) Section B-9 – Schedule Contingency – Supply Chain Management;
 - (xi) Section B-10 – Schedule Contingency – Project Management;
 - (xii) Section B-11 – Supporting Documentation and Scope Book; and
 - (xiii) Section C-1 – Level of Investment in Ontario (Domestic Content).
- (b) Schedule 6 and Schedule 11 to the RFP set out the Phase 2 submission requirements (“Phase 2 Submission Requirements”) and evaluation criteria applicable to Phase 2 of the RFP Process. Only those submission requirements and evaluation criteria applicable to Section B-1 (Financial Submission Milestone Payments Submission) are set out in Schedule 11 to the RFP, all remaining submission requirements and evaluation criteria are set out in this Schedule 6.
- (c) Respondents are advised to note that the organization and structure of the Phase 2 Submission Requirements correspond to the evaluation categories and evaluation approach as set out in more detail in Schedules 6 and 11 to the RFP. The Respondent is, therefore, strongly advised to prepare its Phase 2 Proposal Submission in accordance with the structure and format set out in Schedule 6 and Schedule 11 to the

RFP. The Respondent must complete each part of its Phase 2 Proposal Submission in accordance with the requirements in the RFP and in accordance with Schedule 6 and Schedule 11 to the RFP. Respondents are cautioned to review all instructions included in any Tables that are to be completed by the Respondent.

- (d) Respondents shall organize their Phase 2 Proposal Submissions such that each of Sections A, B-1, B-2, B-3, B-4, B-5, B-6, B-7, B-8, B-9, B-10, B-11 and C-1 are separately bound in discrete and separate volumes of the Phase 2 Proposal Submission.
- (e) Respondents shall submit electronic copies of their Phase 2 Proposal Submissions as follows:
 - (i) for each of the 13 volumes submitted (each volume containing one section of the Phase 2 Proposal Submission, that is Sections A, B-1, B-2, B-3, B-4, B-5, B-6, B-7, B-8, B-9, B-10, B-11 and C-1), attach to each volume, of the original document only, one CD or set of CDs containing an electronic copy of the information included in the applicable volume;
 - (ii) all text documents shall be provided in Microsoft Word, except in circumstances where the text documents are not available in Microsoft Word;
 - (iii) the Level 1 Schedule to be submitted in volume B-6 shall be in MS-Project, Primavera P3 or Primavera P6;
 - (iv) all spreadsheets, including the Financial and Milestone Payment Submission, shall be provided in Microsoft Excel; and
 - (v) the name of the Project, the name of the Respondent, the section contained in the volume and the numbering of the CD set (if applicable) shall be indicated on the case of each CD and on the CD itself.

SECTION 2 - SUMMARY CHART OF SUBMISSION REQUIREMENTS, EVALUATION CRITERIA AND LUEC

- (a) For ease of reference (but not to supersede the terms and conditions of the RFP or this Schedule 6) the following chart summarizes the Phase 2 Submission Requirements and the applicable evaluation criteria.

Summary of Submission Requirements, Evaluation Criteria and the Application of LUEC

Summary of Submission Requirement and Section References (Schedule 6) ¹	Submission Document	Evaluation Criteria	LUEC Elements ²
SECTION A OF THE RESPONDENT’S PHASE 2 SUBMISSION PROPOSAL – PROPOSAL SUBMISSION FORM	Proposal Submission Form contained in Schedule 8 to the RFP	This document is not evaluated but must be completed and signed without amendment.	Not Applicable
SECTION B OF THE RESPONDENT’S PHASE 2 SUBMISSION PROPOSAL –COMMERCIAL AND SCHEDULE SUBMISSION REQUIREMENTS			
Section B-1 - Financial Milestone Payment Submission The Respondent is required to prepare its Financial and Milestone Payment Submission in accordance with Schedule 11 to the RFP.	Financial Model	See Schedule 11 to the RFP	See Schedule 11 to the RFP for details.
Section B-2 – Operating, Maintenance, Refurbishment And Sustaining Investment Costs			
Reference Plant proposed Base Staffing (see Sections 2.1, 2.2 and 2.4)			
Respondent is required to complete Table 1.2 in accordance with the detailed instructions set out in this Schedule 6. Respondent must provide a detailed “Justification” of the delta between the Reference Plant costs and the proposed Facility estimates, in the far right column of Table 1.2. Respondents are permitted (and strongly encouraged) to provide additional supporting documentation in Section B-11 of their Phase 2 Proposal Submissions to support	Table 1.2	Credibility of the justification of the delta between the Reference Plant and proposed Facility by looking at: <ul style="list-style-type: none"> • identified design or regulatory differences in base staffing between the proposed Facility and the Reference Plant • how these design or regulatory differences drive differences in base staffing levels • expected impact of these design or regulatory differences on base staffing levels • how consistent this justification is with other claims made throughout the Phase 2 Proposal Submission <i>Measured by: total annual dollar costs adjusted to reflect</i>	Cost of new build – Lifetime expenditures – Operating costs – Base staffing costs

¹ All Section references are to Part II – Detailed Submission Requirements of this Schedule 6.

² LUEC Elements are listed in the “LUEC Model Elements” in Part III of Schedule 6 to the RFP.

Summary of Submission Requirement and Section References (Schedule 6) ¹	Submission Document	Evaluation Criteria	LUEC Elements ²
their “Justifications”		<i>the quality of the Respondent’s justification</i>	
<p>Reference Plant and proposed Facility Base Non-Labour Costs</p> <p>(See B-2 Sections 2.1, 2.2 and 2.5)</p>			
<p>Respondent is required to complete Table 1.3 in accordance with the detailed instructions set out in this Schedule 6.</p> <p>Respondent must provide a detailed “Justification” of the delta between the Reference Plant costs and the proposed Facility estimates, in the far right column of Table 1.3.</p> <p>Respondents are permitted (and strongly encouraged) to provide additional supporting documentation in Section B-11 of their Phase 2 Proposal Submission to support their “Justifications”</p>	Table 1.3	<p>Credibility of the justification of the delta between the Reference Plant and proposed Facility by looking at:</p> <p>Identified design or regulatory differences in base non-labour between the proposed Facility and the Reference Plant;</p> <p>How these design or regulatory differences between the proposed Facility and the Reference Plant drive differences in base non-labour costs;</p> <p>Expected impact of these design or regulatory differences on base non-labour costs;</p> <p>How consistent this justification is with maintenance and lifecycle plans</p> <p>How consistent this justification is with other claims made throughout the bid</p> <p><i>Measured by: total annual dollar cost adjusted to reflect the quality of the Respondent’s justification</i></p>	<p>Cost of new build – Lifetime expenditures – Operating costs — Base non labour costs</p>

Summary of Submission Requirement and Section References (Schedule 6) ¹	Submission Document	Evaluation Criteria	LUEC Elements ²
<p>Reference Plant and proposed Facility base radioactive waste data (See B-2 Sections 2.1, 2.2 and 2.6)</p>			
<p>Respondent is required to complete Table 1.4 in accordance with the detailed instructions set out in this Schedule 6.</p> <p>Respondent must provide a detailed “Justification” of the delta between the Reference Plant costs and the proposed Facility estimates, in the far right column of Table 1.4.</p> <p>Respondents are permitted (and strongly encouraged) to provide additional supporting documentation in Section B-11 of their Phase 2 Proposal Submission to support their “Justifications”</p>	<p>Table 1.4</p>	<p>Credibility of the justification of the delta between Reference Plant and proposed Facility by looking at:</p> <p>How consistent this justification is with maintenance and lifecycle plans</p> <p>How consistent this justification is with other claims made throughout the bid</p> <p><i>Measured by: total annual dollar cost adjusted to reflect the quality of the Respondent’s justification</i></p>	<p>Cost of new build – Lifetime expenditures – Decommissioning and disposal costs – disposal cost of radioactive waste</p>
<p>Reference Plant and proposed Facility Outage Costs and Outage Days (See B-2 Sections 2.1, 2.2 and 2.7)</p>			
<p>Respondent is required to complete Table 1.5 in accordance with the detailed instructions set out in this Schedule 6.</p> <p>Respondent must provide a detailed “Justification” of the delta between the Reference Plant costs and the proposed Facility estimates, in the far right column of Table 1.5.</p> <p>Respondents are permitted (and strongly encouraged) to provide additional supporting documentation in Section B-11 of their Phase 2 Proposal Submission to support their “Justifications”</p>	<p>Table 1.5</p>	<p>Credibility of the justification of the delta between the Reference Plant and proposed Facility by looking at:</p> <ul style="list-style-type: none"> • Identification of whether the difference of outage costs is driven by design or regulatory differences • Expected impact of these design or regulatory differences on outage costs • How consistent this justification is with maintenance and lifecycle plans • How consistent this justification is with other claims made throughout the bid • Identification of whether the difference in outage days is driven by design or regulatory differences • Expected impact of these design or regulatory differences on outage days • How consistent this justification is with maintenance and lifecycle plans • How consistent this justification is with other claims made throughout the bid 	<p>Cost of new build – Lifetime expenditures – Operating costs –Outage costs</p>

Summary of Submission Requirement and Section References (Schedule 6) ¹	Submission Document	Evaluation Criteria	LUEC Elements ²
		<i>Measured by: total annual dollar cost adjusted to reflect the quality of the Respondent's justification</i>	
Reference Plant and proposed Facility Sustaining Investment Costs (See B-2 Sections 2.1, 2.2 and 2.8)			
<p>Respondent is required to complete Table 1.6 in accordance with the detailed instructions set out in this Schedule 6.</p> <p>Respondent must provide a detailed “Justification” of the delta between the Reference Plant costs and the proposed Facility estimates, in Table 1.6.</p> <p>Respondents are permitted (and strongly encouraged) to provide additional supporting documentation in Section B-11 of their Phase 2 Proposal Submission to support their “Justifications”</p>	Table 1.6	<p>Credibility of the justification of the delta between the Reference Plant and proposed Facility by looking at:</p> <ul style="list-style-type: none"> • Identified design or regulatory differences in sustaining investment between the proposed Facility and the Reference Plant; • How these design or regulatory differences drive differences in sustaining investment; • impact of these design or regulatory differences on base sustaining investment; • How consistent this justification is with other claims made throughout the bid <p><i>Measured by: total annual dollar cost adjusted to reflect the quality of the Respondent's justification</i></p>	<p>Cost of new build – Lifetime expenditures – Operating costs – sustaining investment costs</p>

Summary of Submission Requirement and Section References (Schedule 6) ¹	Submission Document	Evaluation Criteria	LUEC Elements ²
<p>Reference Plant and proposed Facility Refurbishment Costs, Timing and Duration (See B-2 Sections 2.1, 2.2 and 2.9)</p>			
<p>Respondent is required to complete Table 1.7 in accordance with the detailed instructions set out in this Schedule 6.</p> <p>Respondent must provide a detailed “Justification” of the delta between the Reference Plant costs and the proposed Facility estimates, in the far right column of Table 1.7.</p> <p>Respondents are permitted to provide additional supporting documentation in Section B-11 of their Phase 2 Proposal Submission to support their “Justifications”</p>	<p>Table 1.7</p>	<p>Credibility of the justification of the delta between the Reference Plant and proposed Facility by looking at:</p> <ul style="list-style-type: none"> • Scope of work included in refurbishment estimate; • Completeness and level of detail in cost estimate; and • Identification of items not requiring refurbishment. <p><i>Measured by: total annual dollar cost adjusted to reflect the quality of the Respondent’s justification</i></p>	<p>Cost of new build – Lifetime expenditures – Operating costs – Refurbishment costs</p>
<p>Section B-3 – Fuel Requirements (See B-3 Sections 3.1 and 3.2)</p>			
<p>Respondent is required to provide projected fuel costs for remaining years (that is, beyond initial load and three fuel reloads, or for designs that incorporate online refuelling equivalent, projected fuel costs for five years of operations)</p>	<p>Table 2.1</p>	<ul style="list-style-type: none"> • Max fuel gross thermal burn-up; • Average fuel gross thermal burn-up; • Thermal efficiency; • Enrichment levels; • Number of fuel assemblies at each enrichment level required for each reload; • Quantities of irradiated (spent) fuel; • Storage and eventual disposal requirements; • Number of fuel assemblies in the initial core; • Volume of uranium in a fuel assembly; and • Cost of fuel assembly manufacturing. <p><i>Measured by: annual cost of fuel</i></p>	<p>Cost of new build – Fuel costs – Remaining of operating life</p>

Summary of Submission Requirement and Section References (Schedule 6) ¹	Submission Document	Evaluation Criteria	LUEC Elements ²
Section B-4 – Decommissioning (See B-4 Section 4.1)			
Respondent is required to submit decommissioning costs and a description and cost of key decommissioning elements	Submission as per Section B-4 No Table required	Total decommissioning cost <i>Measured by: appropriate payments Client would be obliged to make to a decommissioning fund</i>	Cost of new build – Decommissioning and disposal cost – Decommissioning cost
Section B-5 – Output (See B-5 Sections 5.1 and 5.2)			
Respondent is required to complete Table 3.1 in accordance with the detailed instructions set out in this Schedule 6. Respondent must provide a detailed “Justification” of the delta between the Reference Plant and the proposed Facility estimates, in the far right column of Table 3.1. Respondents are permitted to provide additional supporting documentation in Section B-11 of their Phase 2 Proposal Submission to support their “Justifications”	Table 3.1		
For the purpose of Table 3.1 Output is evaluated by			
Capability Factor (See B-5 Section 5.2(i)(b))		Credibility of the justification of the delta between the Reference Plant and proposed Facility by looking at: Identification of whether the difference in capability factor is driven by design or regulatory differences Expected impact of these design or regulatory differences on capability factor Impact of first of a kind and plant ageing effects How consistent this justification is with maintenance and lifecycle plans How consistent this justification is with outage day information <i>Measured by: (available energy generation) / (net capacity target)</i>	Cost of new build – Lifetime output – Capacity factor

Summary of Submission Requirement and Section References (Schedule 6) ¹	Submission Document	Evaluation Criteria	LUEC Elements ²
B-6 - Schedule to Complete Project (See B-6 Section 6.1)	Level 1 schedule	The Level 1 schedule is not evaluated of its own accord but is used as the baseline for the calculation of schedule contingencies	Not Applicable
Section B-7 - Schedule Contingency – Design Readiness (See B-7 Sections 7.1 to 7.6)			
Respondent is required to submit, in Section B-7 of its Phase 2 Proposal Submission, a response that meets those requirements set out in Sections 7.1 to 7.6 of this Schedule 6.	Submission as per Section B-7 No Table required	Credibility of the justification for dealing with potential regulatory design issues including credibility of Respondent’s submission with respect to: <ul style="list-style-type: none"> • Identified design-related issues of concern for regulators based on stated regulatory expectations; • Expected impact of these issues/concerns from regulators; • Quality of plan for addressing design issues that will be of concern for regulators and potential design changes. <p><i>Measured by: days of schedule delay</i></p>	Cost of schedule delay – Schedule contingency – Design readiness
Section B-8 - Schedule Contingency – Licensing Management (See B-8 Sections 8.1 to 8.6)			
Respondent is required to submit, in Section B-8 of its Phase 2 Proposal Submission, a response that meets those requirements set out in Sections 8.1 to 8.6 of this Schedule 6.	Submission as per Section B-8 No Table required	Client confidence in plan to obtain a Construction Licence by the June 30, 2012; Capability to respond to CNSC requests and changes in CNSC regulations in a timely manner Quality of the licencing team <i>Measured by: days of schedule delay</i>	Cost of schedule delay – Schedule contingency – licensing management

Summary of Submission Requirement and Section References (Schedule 6) ¹	Submission Document	Evaluation Criteria	LUEC Elements ²
Section B-9 - Schedule Contingency – Supply Chain Management (See B-9 Sections 9.1 to 9.4)			
Respondent is required to submit, in Section B-9 of its Phase 2 Proposal Submission, a response that meets those requirements set out in Sections 9.1 to 9.4 of this Schedule 6.	Submission as per Section B-9 No Table required	<ul style="list-style-type: none"> • Current status of key suppliers for the project; • Credibility of plan to further develop supply chain for the project; • Demonstrated supply chain management expertise. <p><u>Measured by:</u> days of schedule delay</p>	Cost of schedule delay – Schedule contingency – supply chain management
Section B-10 - Schedule Contingency – Project Management (See B-10 Sections 10.1 to 10.6)			
Respondent is required to submit, in Section B-10 of its Phase 2 Proposal Submission, a response that meets those requirements set out in Sections 10.1 to 10.6 of this Schedule 6.	Submission as per Section B-10 No Table required	<ul style="list-style-type: none"> • Quality and experience of project team leadership; • Long-term staffing strategy; • Day-to-Day risk management capability; • Quality of information management systems; and • Continuity of project management culture. <p><u>Measured by:</u> days of schedule delay</p>	Cost of schedule delay – Schedule contingency – project management
Section B-11 – Supporting Documentation and Scope Book			
Supporting Documentation – Respondent is required to submit supporting documentation to support its “Justifications” as set out in Section 11.1 of this Schedule 6.	See Detailed Submission Requirements	The Supporting Documentation will not be evaluated of its own accord (nor will it be scored). However, it will support the evaluation of the “Justifications” required throughout the various Tables that the Respondent is required to complete. Also the Scope Book is to be used as Supporting Documentation and is to be evaluated for completeness.	Not Applicable
Scope Book - Respondent is required to submit a draft Scope Book in accordance with the requirements set out, in Section B-11 of its Phase 2 Proposal Submission, a response that meets those requirements set out in Section 11.2(c) and (d) of this Schedule 6.	Scope Book as per the requirements in B-11	The Scope Book will be assessed on its own merits based on its completeness relative to the Client Requirements. It may also be referenced to support other sections of the Respondent’s Phase 2 Proposal Submission. <p><u>Measured by:</u> days of Schedule delay.</p>	Cost of schedule delay – Schedule contingency – project management

Summary of Submission Requirement and Section References (Schedule 6) ¹	Submission Document	Evaluation Criteria	LUEC Elements ²
Section C-1 - Level of Investment in Ontario (See C-1 Sections 12.1 to 12.3)			
Respondent is required to include this information in its Financial and Milestone Payment Submission in accordance with Schedule 11 to the RFP.	Financial Model	Total impact on Ontario GDP <i><u>Measured by: GDP impact</u></i>	Not Applicable

SECTION 3 – SUMMARY OF THE EVALUATION PROCESS EVALUATION

3.1 Categories of Evaluation and General Evaluation Methodology

- (a) The Evaluation Committee will evaluate the Respondents Phase 2 Proposal Submissions in accordance with the following general evaluation categories. Respondents should note that neither the First of Kind Rebate nor the option that is the subject of the Respondent’s “Supplementary Offer” (see the Schedule 8 to the RFP) are evaluated:

Category of Evaluation	Weighting
B-1 Financial and Milestone Payments Submission	80 (Commercial and Schedule Score)
B-2 Operating, Maintenance, Refurbishment, and Sustaining Investment Costs	
B-3 Fuel Requirements	
B-4 Decommissioning	
B-5 Output	
B-7 Schedule Contingency – Design Readiness	
B-8 Schedule Contingency – Licensing Management	
B-9 Schedule Contingency –Supply Chain Management	
B-10 Schedule Contingency – Project Management	
C-1 Level of Investment in Ontario	

3.2 Evaluation Process and the Levelized Unit Electricity Cost

- (a) Each Phase 2 Proposal Submission will be evaluated and scored along two dimensions:
 - (i) the estimated **total cost of power** provided; and
 - (ii) the estimated **economic impact (or GDP impact)** on Ontario’s economy.
- (b) The total cost of power will be evaluated using the Levelized Unit Electricity Cost (“LUEC”), which takes into account the full lifetime costs of power generation. As calculated for each Phase 2 Proposal Submission, LUEC represents the average electricity price required to fund all costs related to the Facility from the beginning of licensing to the decommissioning of the Facility. It is evaluated using a discounted cash flow calculation that equalizes the present value of all future costs and output revenues. A LUEC calculation incorporates the effects of all lifetime costs and revenues, providing a direct comparison among the Respondents’ Phase 2 Proposal Submissions.

3.3 Level of Investment in Ontario

- (a) The domestic economic impact of the Project will be evaluated using an Ontario Gross Domestic Product (“GDP”) impact metric. The GDP impact of a Respondent submission in Section C-1 of its Phase 2 Proposal Submissions will be measured as a function of the percentage of the Final Contract Price a Respondent is committing to spend within Ontario. An economic model designed to measure the impact on Ontario’s GDP of capital investments in various Ontario industries, including empirically derived multipliers for impact on Ontario’s nuclear industry will allow a fair and direct comparison of Phase 2 Proposal Submissions.

3.4 Scoring Methodology:

- (a) The Evaluation Committee will score total cost of power (LUEC) and economic impact dimensions of a Respondent’s Phase 2 Proposal Submission separately and the scores will be added to produce the Final Proposal Score. The maximum Final Proposal Score is 100 points. The LUEC component score will be scored out of a maximum of 80 points, while the GDP impact component score will be scored out of a maximum of 20 points. LUEC and the GDP impact are weighted on an 80/20 basis because the economic benefit of a lower cost of power is more than four times greater than the economic benefit gained through investment in Ontario. The economic impact is based on a comparison of the 60-year impact of the cost of power compared to the direct economic stimulus of a 10-year project.

3.5 Evaluation Assumptions

- (a) The Evaluation Committee shall apply the evaluation assumptions set out in Attachment 5 to Schedule 6 to the RFP when carrying out the Evaluation Process.

A detailed description of the application of the LUEC model and the domestic content evaluation is provided in Part III of this Schedule 6.

Part II
Detailed Submission Requirements

PART II – DETAILED DESCRIPTION OF SUBMISSION REQUIREMENTS

Part A – Proposal Submission Form (Schedule 8 to the RFP)

- (a) Respondent shall complete, sign and submit a Proposal Submission Form in accordance with Schedule 8 to the RFP.

Part B – Commercial and Schedule Submission Requirements.

B-1 Financial Submission and Milestone Payment Submission (Section B-1 of the Respondents Phase 2 Proposal Submission)

1.1 Content of Section B-1 of the Respondents' Phase 2 Proposal Submissions

- (a) The submission requirements with respect to Section B-1 are set out in Schedule 11 to the RFP.

B-2 Operating, Maintenance, Refurbishment and Sustaining Investment Costs (Section B-2 of the Respondents' Phase 2 Proposal Submission)

2.1 Content of Section B-2 of the Respondents Phase 2 Proposal Submission (Tables 1.1 to 1.7)

- (a) Respondents' submissions with respect to the operating, maintenance, refurbishment and sustaining investment costs (Section B-2 of the Respondent's Phase 2 Proposal Submission) shall consist of completed Tables 1.1 to 1.7 which are contained in Attachment 1 to this Schedule 6. In completing the Tables, the Respondent shall provide detailed operating, maintenance, refurbishment and sustaining investment costs associated with the Facility.

2.2 General Instructions for the Completion of Tables 1.1 to 1.7

- (a) Reference Plant Data

Respondents shall select an operating Reference Plant within the United States or Canada and shall submit the Reference Plant and the reference year.

Respondents shall submit the names of their Reference Plants in advance of the RFP Submission Deadline as set out in the Timetable. This advance submission is only to identify the Reference Plant, and does not include the Reference Plant operations and maintenance data.

Respondents shall collect actual operations and maintenance cost data for the Reference Plant, using the following rules:

- (i) Reference Plant data must be from the Reference Plant submitted to Infrastructure Ontario in accordance with this Section 2.2(a);
- (ii) Reference Plant data shall be representative and current (reference year is most recent available and more recent than 2004). Ideally, a Reference Plant should be 2 units and of similar size to the proposed Facility. If a 1-unit plant is used, Reference Plant costs shall be multiplied

by 1.7 to approximate a 2-unit plant. If a 4-unit plant is used, Reference Plant costs shall be multiplied by 0.6 to approximate a 2-unit plant;

- (iii) Operations and maintenance data shall be obtained for that Reference Plant for the reference year, if available, either from the Reference Plant utility or from an industry utility dataset (UD). If data for some cost elements is not available for the reference year, the closest year to the reference year shall be used; and
- (iv) If data is not available or cannot be obtained for the Reference Plant, data shall be obtained for a similar plant.

(b) Proposed Facility Estimates and “Justifications”

Proposed Facility Estimates

Each Respondent shall provide operating, maintenance, refurbishment and sustaining investment cost estimates for its proposed Facility by completing Tables 1.2 to 1.7 of this Schedule 6 and, in the far right column of each of Tables 1.2 to 1.7, provide a description of the technical basis, assumptions and rationale for the differences between the proposed Facility estimates and the Reference Plant data. This rationale is referred to in each Table as the “Justification”. The Respondent is required to provide operations and maintenance costs and Justifications for differences between the Reference Plant data and the proposed Facility estimates in the following categories:

- (i) Base staffing costs (Table 1.2);
- (ii) Base non-labour costs (Table 1.3);
- (iii) Radioactive waste management volumes (for the purpose of calculating costs) (Table 1.4);
- (iv) Outage days and outage costs for each unit and for each year of the service life of the proposed Facility operation (Table 1.5);
- (v) Annual sustaining investments required to sustain the proposed Facility capability (above and beyond base, outage, and refurbishment costs) (Table 1.6); and
- (vi) Refurbishment costs during the operating lifetime of the proposed Facility (Table 1.7).

Justifications

In addition to completing Tables 1.2 to 1.7, Respondents shall provide whatever supporting information and documentation that the Respondent believes will demonstrate the credibility of its explanations or “Justifications” of the differences between the Reference Plant data and the proposed Facility estimates. The Respondent shall compile this supporting information and documentation and place it in Section B-11 (“Supporting Documentation and Scope Book”) of its Phase 2 Proposal

Submission. Respondents are strongly cautioned that it is the Justifications themselves that are scored, not the supporting documentation.

For the purpose of the Justifications for Tables 1.2 to 1.7, Respondents shall include the following information in Section B-11 (Supporting Documentation and Scope Book) of their Phase 2 Proposal Submissions:

- (i) Identification of major components and expected lifetime. For the major components, Respondents shall identify when the component is replaced (by year), when the work is completed (for example, during an outage, refurbishment outage or while the plant is on-line) and the associated costs. This type of information could be provided as part of a lifecycle plan or a similar document;
 - (ii) A description of the design features that are included in the proposed Facility to make surveillance, testing, sampling and similar functions convenient and optimized (include human factors and ALARA considerations); and
 - (iii) For projected maintenance costs for the proposed Facility,
 - (A) Identify the portions that are predictive, preventive and corrective;
 - (B) Identify the design features that are included to facilitate predictive maintenance (for example, features for diagnostic measurements or evaluations);
 - (C) Identify the design features that are included to facilitate preventive and corrective maintenance (for example access provisions and work space; and
 - (D) Identify (with respect to the base staffing profile) any years with abnormal base staffing levels (and provide an explanation for these abnormal levels.
- (c) Assumptions

Respondents shall make the following assumptions when completing Tables 1.2 to 1.7 and determining the costs for the proposed Facility:

- (i) The proposed Facility will be a two unit, stand alone plant (no interactions with Existing Facilities);
- (ii) The proposed Facility will operate with 5 crews on a 12-hr shift schedule;
- (iii) Base costs shall represent a mature operating organization and plant (within 36-48 months of plant in-service);
- (iv) Operations and maintenance and refurbishment costs may reflect potential fleet size economies of scale only where contracts have been

signed prior to the Submission Deadline for the same design in Canada or the United States, to be in-service by 2023;

- (v) The data provided by the Respondent shall reflect the full cost for operating and maintaining the proposed Facility and be consistent with the Project Agreement and Schedule 29 – Client Requirements, with the following exceptions:
 - (A) Respondent shall not include estimate of taxes, licensing fees, and insurance;
 - (B) Depreciation and interest are captured elsewhere in the LUEC model and therefore Respondent shall not include them in any estimates submitted;
 - (C) Due to the sensitive nature of security requirements, security costs (labour, non-labour) will not be included in the evaluation process or in the LUEC model;
 - (D) Respondent to provide radioactive waste volumes only (no costs), excluding nuclear fuel.
 - (E) The nuclear fuel operations and maintenance support costs shall be included, but the cost of nuclear fuel itself shall not be included in Tables 1.2 to 1.7 because it is dealt with elsewhere in the Phase 2 Proposal Submission. However, the operations and maintenance costs associated with providing fuel management services, providing and transporting fuel, and handling and storing fuel (prior to long term storage) shall be included by the Respondent; and
 - (vi) Respondents shall incorporate INPO AP-913 “Equipment Reliability Process Description” in development of operations and maintenance cost estimates.
- (d) Template Instructions for Completing the Tables
- (i) All costs shall be submitted in thousands of Canadian dollars (2008). Where historical costs are provided in U.S. dollars, the Respondent shall convert the US dollars by applying an average \$USD to \$Cdn exchange rate between 2004 and October 2008 of \$1.00 Cdn equal to \$0.873 USD. For the purpose of escalating historical costs for Reference Plants, Respondents shall use a 2 per cent annual escalation factor to convert to 2008 \$Cdn values; and
 - (ii) Justifications shall focus on differences in design, including the difference in size (MWe), differences in regulatory requirements (For example, Canada versus the United States) and reliability of first of a kind features which justify the difference between the data supplied with respect to the Reference Plant and the estimates provided with respect to the proposed Facility.

2.3 Additional Instructions for Completing Table 1.1 (a) and (b) - Reference Plant Selection and Proposed Facility Estimate Methodology

- (a) Identify the reference year used for the Reference Plant costs and source of Reference Plant costs;
- (b) Identify fleet size assumptions and rationale for those assumptions; and
- (c) Describe the methodology used for developing estimates for the Proposed Facility;

2.4 Additional Instructions for Completing Table 1.2 - Base Staffing

- (a) Map all base staffing labour costs (level of effort in full-time equivalents (FTEs)) to the categories shown in Table 1.2 of Attachment 1 to this Schedule 6 and provide justifications at that level;
- (b) Respondent's proposed Facility estimate shall take into account minimum staff complement and 5-year authorization period for licensed staff in Canadian jurisdiction;
- (c) Describe staffing as "level of effort" (Full-Time Equivalents) required (no breakdown by regular staff, augmented staff, overtime, etc.). Staff shall include on-site and off-site utility staff that provide all services required to operate and maintain the proposed Facility (including supporting services). On-site staff shall include all individuals who are direct employees of the utility who perform core or baseline activities at the proposed Facility. Off-site staff includes all individuals assigned to or supporting multiple locations, such as off-site utility staff and corporate headquarter activities;
- (d) Full-Time Equivalent (FTE) means a unit of measure for an accumulation of work time that adds up to the equivalent of one person working full-time for one year. FTE includes only direct productive hours, not sickness, vacation, holiday, etc hours. Where there is a need to convert from working hours to FTEs (e.g. overtime), assume 1 FTE is equivalent to 1,700 working hours per year; and
- (e) Using the labour rates provided in the template, the Evaluation Committee will convert FTEs into cost \$Cdn.

2.5 Additional Instructions for Completing Table 1.3 - Base Non-Labour

- (a) Map all base non-labour costs to the categories show in Table 1.3 of Attachment 1 of this Schedule 6, by cost type: Materials and Equipment, Outside Services and Other. Provide justifications for each line item. For items under "Other", a description of what is included shall also be provided in the justification;
- (b) For all base non-labour costs, provide average annualized estimate; and
- (c) Costs shall represent the full base non-labour operating and maintenance costs, with the exception of taxes, licensing fees, and insurance, and nuclear fuel, while including but not limited to, tritium removal services, heavy water make-up, boron processing, and similar functions, as applicable.

2.6 Additional Instructions for Completing Table 1.4 - Radioactive Waste Volumes

- (a) Provide the average annualized volumes of unprocessed radioactive waste (excluding nuclear fuel) that are generated throughout the operating life of the proposed Facility (excluding refurbishment) in m³ by low and intermediate level waste (as defined in standard CSA N292.3); and
- (b) Using the radioactive waste handling rates provided in the template, the Evaluation Committee will convert radioactive waste handling volumes into cost \$Cdn.

2.7 Additional Instructions for Completing Table 1.5 - Outage Costs (incremental to base) and Outage Days:

- (a) Outages shall include all plant shutdowns after plant in-service, excluding unplanned forced outages and refurbishment outage;
- (b) Provide estimate for each year of the service life of the proposed Facility. For simplicity in completing Table 1.5, assume Unit 1 is placed in-service on January 1 Year 1 and Unit 2 is placed in-service on January 1 Year 2. If the service life is 60 years, Unit 1 end-of life is December 31 Year 60 and Unit 2 end-of-life is December 31 Year 61;
- (c) Provide number of outages days per year for each unit. Annual outage days per year over the lifecycle shall be consistent with any maintenance and lifestyle plan submission as per Section 2.2(b) – Justifications;
- (d) Outage costs are incremental to base costs;
- (e) Average Reference Plant outage costs shall be typical and representative. Reference Plant outage costs shall be the average of the outage costs over a consecutive 6-year period (reference year and preceding five years). Respondent shall provide a description of the major outage work included in that 6-year period; and
- (f) Provide outage costs by Labour (FTEs), Materials & Equipment (\$), Outside Services (\$) and Other resources (\$) and provide justifications for each line item. Using the labour rates provided in the template, the Evaluation Committee will convert FTEs into cost (\$);

2.8 Additional Instructions for Completing Table 1.6 - Sustaining Investment

- (a) Sustaining investments include all annual investments (capital and operations and maintenance) to sustain plant capability (above and beyond base, outage, and refurbishment costs); and
- (b) Provide sustaining investment costs for each year of the service life of the proposed Facility and provide a justification for the delta between the Reference Plant and the proposed Facility describing what sustaining investments are being made.

2.9 Additional Instructions for Completing Table 1.7 - Refurbishment Costs, Timing, and Duration:

- (a) Refurbishment costs must include all major incremental costs associated with refurbishment during the operating lifetime, including, but not limited to, steam generator replacement, feeders and fuel channel assemblies replacement/reactor vessel head replacement (not including managing nuclear waste associated with refurbishment);

- (b) Provide the number of total refurbishment days required for the Reference Plant and proposed Facility and indicate how these refurbishment days are allocated over the course of the operating life of the proposed Facility. If applicable, justification of refurbishment schedule differences must include an explanation of why refurbishments at the proposed Facility are not carried out on the same schedule as in the Reference Plant;
- (c) Provide the refurbishment outage timing (for example, indicate in which year of the operating life the refurbishment occurs);
- (d) List the major refurbishment items and provide estimates and descriptions of the associated costs for the proposed Facility. Cost estimates shall include all labour, materials and equipment, outside services and other costs associated with refurbishment work; and
- (e) Refurbishment cost estimates have been provided for both PHWR and PWR designs based on industry experience. Respondent shall provide justifications of the difference in the total cost of refurbishment between the provided industry experience (PHWR or PWR, as appropriate) and the proposed Facility, including consideration for differences in size.
- (f) Provide total quantities of low, intermediate, and high (excluding fuel) level radioactive waste (in m³) produced during all refurbishments for both the Reference Plant and proposed facility. Provide justifications for any differences in the amount of radioactive waste generated.

B-3 Fuel Requirements (Section B-3 of the Respondents' Phase 2 Proposal Submission)

3.1 Content of Section B-3 of the Respondents Phase 2 Proposal Submission (Table 2.1)

- (a) Respondents' submissions with respect to Fuel Requirements (Section B-3 of their Phase 2 Proposal Submissions) shall consist of a completed Table 2.1 which is contained in Attachment 2 to this Schedule 6.
- (b) In completing Table 2.1, Respondents are required to provide fuel requirements for the Respondent's design for lifetime operation following the initial load and three fuel reloads (or equivalent fuel requirements for 5-years of operations with respect to designs that incorporate on-line refueling).

3.2 Instructions for Completing Table 2.1

- (a) The fuel requirements submitted by the Respondent must be consistent with the cycle life and performance described in the Respondent's responses to Sections B-2 and B-5 of the Respondents Phase 2 Proposal Submissions. The fuel requirements submitted by the Respondent must also be consistent with (i) the Fuel Assembly Charge (as defined in the Fuel Agreement) and (ii) the Fuel Performance Guarantee (as defined in the Fuel Agreement) (for example, the average fuel gross thermal burn-up (GWd/tonne U) must be the same value as the Fuel Performance Guarantee).

- (b) All additional instructions for the completion of Table 2.1 appear in the Table itself and include a requirement to set out:
- (i) Max fuel gross thermal burn-up (GWd/tonne U);
 - (ii) Average fuel gross thermal burn-up (GWd/tonne U);
 - (iii) Thermal efficiency (%);
 - (iv) Enrichment level(s) (%);
 - (v) Number of fuel assemblies at each enrichment level that are required for each reload;
 - (vi) Quantities of irradiated (spent) fuel including,
 - (A) Quantity of uranium (tonnes U);
 - (B) Number of fuel assemblies;
 - (C) Description of fuel type (physical dimensions, weight); and
 - (D) Estimated decay heat after 10 years removed from core;
 - (vii) Number of fuel assemblies in the initial core;
 - (viii) Reload fuel assembly requirements sufficient for Client to operate the unit at its Net Capacity for a period of 5 years after reaching Substantial Completion (number of assemblies per unit) for units and Fuel Assemblies that incorporate on-line reloading, such quantity shall be sufficient so that at any time up to and including the end of such five year period there is an inventory of Fuel Assemblies sufficient to operate the Unit at its Net Capacity for a period of 180 days;
 - (ix) Quantity of Uranium in a fuel assembly (tonnes U); and
 - (x) Cost of fuel assembly manufacturing (do not include the cost of enriched uranium).

B-4 Decommissioning Cost (Section B-4 of the Respondents Phase 2 Proposal Submissions)

4.1 Content of Section B-4 of the Respondents Phase 2 Proposal Submissions (no Tables to be Completed).

- (a) In Section B-4 of their Phase 2 Proposal Submissions, Respondents shall provide an estimate of the cost of power plant decommissioning (excluding storage, disposal of used and low and intermediate level waste), including a detailed description of each element. The estimate must be in 2008 Canadian dollars and assume a 30-year deferred decommissioning strategy.

- (b) Respondents should not that there is no Table to be completed for Section B-4 of the Respondents' Phase 2 Proposal Submissions.
- (c) Respondents are to submit all detailed list of all cash flows from station shutdown to completion of deferred decommissioning, including:
 - (i) preparation for safe storage;
 - (ii) Cost to operate and maintain the fuel bay for 10-years after plant shutdown;
 - (iii) annual cost to maintain the plant in a safe storage state; and
 - (iv) Cost to dismantle and restore the site to a Greenfield state.
- (d) Respondents are to submit the quantities of low and intermediate level waste generated during decommissioning (m³) for 2 units.

B-5 Output (Section B-5 of the Respondents' Phase 2 Proposal Submissions)

5.1 Content of Section B-5 of the Respondents' Phase 2 Proposal Submissions (Table 3.1)

- (a) Respondents' submissions with respect to output shall consist of a completed Table 3.1 which is contained in Attachment 3 to this Schedule 6.

5.2 Instructions for Completing Table 3.1 - Gross Output, Net Output, Capability Factor and Service Life

- (1) The Respondent shall provide the expected lifetime output performance associated with the proposed Facility as required by Table 3.1 in Attachment 3 of Schedule 6, including,
 - (a) with respect to gross and net output:
 - (i) Proposed gross and net output for each year of the service life of the proposed design for each of the two following cases:
 - (A) Net output assuming that cooling is achieved by once-through lake source cooling; and
 - (B) Net output assuming that cooling is achieved by natural-draft or mechanical-draft cooling; and
 - (ii) Reference Plant gross and net output.
 - (b) with respect to capability factor:
 - (i) a proposed capability factor for each year of the service life of the proposed Facility design taking into account how the reliability impacts of first of a kind features have been accounted for and providing the technical basis, assumptions and rationale for estimates;

- (ii) a list of all active components required for the production of electricity whose failure would cause less than rated output and explain how such failures can be mitigated to achieve the required capacity factor;
- (iii) a list of all active components required for nuclear safety whose failure or unavailability would cause the curtailment of power generation and explain how such failures or unavailability can be mitigated to achieve the required capacity factor;
- (iv) a breakout of the projected unavailability contributions that are associated with meeting the projected capacity factor (planned outages, forced/unplanned outages, major equipment replacement outages);
- (v) a list of reference Plant capability factor with average annualized planned and unplanned outage days indicated; and
- (vi) in the Justification of the proposed Facility capability factor, a detailed explanation of the rationale for the differences in planned and unplanned outage days for the proposed Facility versus the Reference Plant.

(2) Justification

- (a) The Respondent shall ensure that the Justifications for the delta between the Reference Plant after Proposed Facility net output and capability factor in the completed Table 3.1 includes a description of,
 - (i) how the impacts of first of a kind features and plant aging have been accounted for;
 - (ii) the identification of all major equipment that must be replaced within the 60 year design life, the design provisions for the equipment to be replaced and the frequency of replacement including provisions for inspection and maintenance of equipment to ensure that it is suitable for continued service;
 - (iii) the identification of how lessons learned from obsolescence issues and ageing management programs at existing plants are incorporated into the design for 60 year life expectancy;
 - (iv) based on operating experience, an explanation of the basis of a 60 year design life for equipment and components that comprise important parts of the plan, which have not met their original design life in existing plants (steam generator tubing, heat transport system feeder piping, reactor vessel heads); and
 - (v) a description of the service life of the Reference Plant.

B-6 Schedule to Complete Project (Section B-6 of the Respondents' Phase 2 Proposal Submission)

6.1 Content of Section B-6 of the Respondents' Phase 2 Proposal Submissions (No Tables to be Completed)

- (1) Section 6 of the Respondents' Phase 2 Proposal Submissions shall consist of a Level 1 schedule (in an electronic format such as MS-Project, Primavera P3 or Primavera P6) starting from execution of the Project Agreement and continuing to Substantial Completion of both Unit 1 and Unit 2. This will be the base case against which the Evaluation Committee will evaluate schedule contingencies. The Respondents' Level 1 schedules shall comply with the following:
- (a) Respondents shall provide a Level 1 schedule from execution of the Project Agreement to Substantial Completion of both Units, including,
- (i) all discrete work packages;
 - (ii) interdependencies between work streams;
 - (iii) all major milestones;
 - (iv) dates for applying for and obtaining major Permits, Licences and Approvals; and
 - (v) contingencies built into schedule (timing and duration).
- (b) Respondent's Level 1 schedule must include the following dates:
- (i) Issuance of CNSC Construction License on or before June 30, 2012;
 - (ii) Substantial Completion of Unit 1 on or before June 30, 2018;
 - (iii) Substantial Completion of Unit 2 on or before June 30, 2019;
 - (iv) CEAA Joint Review Panel submits its Recommendations in respect of the EA Approval to the Minister of the Environment on a date that is no earlier than September 30, 2011;
 - (v) Client receives the CNSC Site Preparation Licence on a date that is no earlier than September 30, 2011; and
 - (vi) commencement of the Works on the Site on a date that is no earlier than September 30, 2011.
- (c) Respondents should note that there is no Table to be completed for Section B-6 of the Respondents' Phase 2 Proposal Submissions.
- (d) Respondents may include other dates than those listed in Section 6.1(1)(b) in its Level 1 Schedule, but to the extent that such dates set out deadlines for Client, such dates shall not be binding on Client and do not supersede Client's review of the Detailed Project Schedule in accordance with the Project Agreement.
- (e) For clarity, the dates required by Section 6.1(1)(b)(i) to (vi) are the dates that are to be inserted into the Project Agreement (through the insertion of the Level 1 Schedule). If a

Respondent includes any date in its Level 1 Schedule that does not comply with the requirements of Section 6.1(1)(b)(i) to (vi), that date,

- (i) shall be subjected to further schedule contingencies (in addition to those schedule contingencies otherwise applied in accordance with this Schedule 6) as part of the RFP evaluation process (to account for the divergence from the established rules for setting the dates); and
- (ii) shall not be incorporated into the Project Agreement in any way whatsoever (except to the extent that Section 6.1(1)(b) explicitly permits the Respondent to establish earlier or later dates).

B-7 Schedule Contingency – Design Readiness (Section B-7 of the Respondents’ Phase 2 Proposal Submission)

7.1 Content of Section B-7 of the Respondents’ Phase 2 Proposal Submission (No Tables to be Completed)

- (a) Section B-7 of the Respondents’ Phase 2 Proposal Submissions shall include the information set out in Section 7.2 and shall follow the same organizational structure.

7.2 General Instructions for the Completion of Section 7 of the Respondents’ Phase 2 Proposal Submission

- (a) For each part of Section B-7 of the Respondents Phase 2 Proposal Submission, Respondents shall describe past actions and/or future plans to address each issue. Each response shall be sufficiently comprehensive to demonstrate the likelihood of successfully resolving the issue in a timely manner that supports the Respondent’s Level 1 schedule. Respondents are encouraged to provide additional supporting material, including but not limited to topical reports, technical reports, licensing submissions, regulatory dispositions, test plans and reports, and schedules where appropriate. Respondents must address each question individually and not just provide a set of documents in response to questions.

The Respondent shall include all Supporting material for B-7 in Section B-7 itself.

- (b) In all cases, Respondents must indicate how plans and schedules for addressing issues related to design readiness are incorporated into the overall Project schedule as detailed in Section B-6 and the licensing schedule detailed in Section B-8 of the Respondent’s Phase 2 Proposal Submission.

7.3 Part 1 of Section B-7 of the Respondents Phase 2 Proposal Submission – Plan to Address Potential Differences Between the Proposed Design and CNSC Expectations

- (a) For each of the CNSC RD337 (November 2008) expectations listed in Section 7.3(d)(i) to (xii), provide:

EITHER

- (i) Confirmation that the design currently and explicitly meets the expectation as stated in RD337 with a brief technical explanation that supports the confirmation;

OR

- (ii) A description of the strategy or plan that would be used to resolve the difference to achieving a Construction and/or Operating Licence in accordance with the Project Agreement timelines. Strategies or plans might include, but are not limited to, any of the following:
 - (A) Demonstrating that similar or related expectations in other countries' regulations have been met by the design;
 - (B) Demonstrating that the underlying intent of the RD337 expectation is met;
 - (C) Demonstrating that the risk of not meeting the expectation is acceptably low; and
 - (D) Modifying the design to meet the expectation.
- (b) Identify any anticipated impact on the schedule for submitting the PSAR and the CNSC's acceptance of the PSAR associated with the described strategy or plan described in response to Section 7.3(a). Describe contingency plans to mitigate any licencing risk associated with that strategy or plan.
- (c) Describe contingency plans to mitigate any risk associated with the described strategy or plan described in response to Section 7.3(a).
- (d) The CNSC RD337 (November 2008) expectations that are to be considered in response to Section 7.3(a) are:
 - (i) Anticipated Operational Occurrences (RD Section 7.3.2)
“The response of the plant to a wide range of AOOs allows safe operation or shutdown, if necessary, without the need to invoke provisions beyond defence-in-depth Level 1 or, at most, Level 2.”
 - (ii) Single Failure Criterion (RD Section 7.6.2)
“All safety groups function in the presence of a single failure. The single failure criterion requires that each safety group perform all safety functions required for a PIE in the presence of any single component failure, and:
 1. *All failures caused by that single failure;*
 2. *All identifiable but non-detectable failures, including those in the non-tested components; and*

3. *All failures and spurious system actions that cause (or are caused by) the PIE.*

Each safety group is able to perform the required safety functions under the worst permissible systems configuration, taking into account such considerations as maintenance, testing, inspection and repair, and equipment outage.”

- (iii) Small Release Frequency (RD Section 4.2.2)

“The sum of frequencies of all event sequences that can lead to a release to the environment of more than 10^{15} becquerel of iodine-131 is less than 10^{-5} per reactor year.”

- (iv) Guaranteed Shutdown State (RD Section 7.11)

“The design authority defines the guaranteed shutdown state (GSS) that will support safe maintenance activities of the NPP.

The design provides two independent means of preventing recriticality from any pathway or mechanism during the GSS.”

- (v) Means of Shutdown (RD Section 8.4)

“The design provides means of reactor shutdown capable of reducing reactor power to a low value, and maintaining that power for the required duration, when the reactor power control system and the inherent characteristics are insufficient or incapable of maintaining reactor power within the requirements of the OLCs.

The design includes two separate, independent, and diverse means of shutting down the reactor.

At least one means of shutdown is independently capable of quickly rendering the nuclear reactor subcritical from normal operation, in AOOs, and in DBAs by an adequate margin, on the assumption of a single failure. For this means of shutdown, a transient recriticality may be permitted in exceptional circumstances if the specified fuel and component limits are not exceeded.

At least one means of shutdown is independently capable of rendering the reactor subcritical from normal operation, in AOOs, and in DBAs, and maintaining the reactor subcritical by an adequate margin and with high reliability for even the most reactive conditions of the core.

Redundancy is provided in the fast-acting means of shutdown if, in the event that the credited means of reactivity control fails during any AOO or DBA, inherent core characteristics are unable to maintain the reactor within specified limits.

While resetting the means of shutdown, the maximum degree of positive reactivity and the maximum rate of increase are within the capacity of the reactor control system.

To improve reliability, stored energy should be used in shutdown actuation.

The effectiveness of the means of shutdown (i.e., speed of action and shutdown margin) is such that specified limits are not exceeded, and the possibility of recriticality or reactivity excursion following a PIE is minimized.”

(vi) Dose Acceptance Criteria (RD Section 4.2.1)

“The committed whole-body dose for average members of the critical groups who are most at risk, at or beyond the site boundary is calculated in the deterministic safety analysis for a period of 30 days after the analyzed event.

This dose is less than or equal to the dose acceptance criteria of:

*0.5 millisievert for any anticipated operational occurrence (AOO);
or*

20 millisievert for any design basis accident (DBA).”

(vii) Common-Cause Failures (RD Section 7.6.1)

“Where space sharing is necessary, services for safety and for other important process systems are arranged in a manner that incorporates the following considerations:

- 1. A safety system designed to act as backup is not located in the same space as the primary safety system; and*
- 2. If a safety system and a process system must share space, then the associated safety functions are also provided by another safety system to counter the possibility of failures in the process system.”*

(viii) Shared Instrumentation for Safety Systems (RD Section 7.6.5)

“Instrumentation is not typically shared between safety systems.”

“The design provides for periodic testing of the entire channel of instrumentation logic, from sensing device to actuating device.”

(ix) Reactor Trip Parameters (RD Section 8.4.1)

“For each credited means of shutdown, the design specifies a direct trip parameter to initiate reactor shutdown for all AOOs and DBAs in time to meet the respective derived acceptance criteria. Where a direct trip

parameter does not exist for a given credited means, there are two diverse trip parameters specified for that means.

For all AOOs and DBAs, there are at least two diverse trip parameters unless it can be shown that failure to trip will not lead to unacceptable consequences.

There is no gap in trip coverage for any operating condition (i.e., power, temperature, etc.) within the OLCs. This is ensured by providing additional trip parameters if necessary. A different level of effectiveness may be acceptable for the additional trip parameters.”

(x) Classification of SSCs (RD Section 7.1)

“In addition, all SSCs are identified as either important or not important to safety. The criteria for determining safety importance are based on:

Safety function(s) to be performed;

Consequence of failure;

Probability that the SSC will be called upon to perform the safety function; and

Time following a PIE at which the SSC will be called upon to operate, and the expected duration of that operation.

SSCs important to safety include:

Safety systems;

Complementary design features;

Safety support systems; and

Other SSCs whose failure may lead to safety concerns (e.g., process and control systems).”

(xi) Reactor Core (RD Section 8.1)

“The shutdown margin for all shutdown states is such that the core will remain subcritical for any credible changes in the core configuration and reactivity addition.”

(xii) Any other aspects of the design that do not currently and explicitly meet the expectations of RD337.

7.4 Part 2 of Section B-7 of the Respondents Phase 2 Proposal Submission – Plan to Meet the Client Requirements and CNSC Expectations Regarding Computer Based Control and Safety Systems.

- (a) Describe the current status of computer-based control and safety systems in the Respondent's proposed design, including a description of the approach to demonstrating that the computer-based control and safety systems will be consistent with CNSC requirements. Describe the standards used in the Respondent's proposed design for the software development process for the control and safety systems.
- (b) For the standards described in response to this question provide:

EITHER

- (i) Confirmation that these standards are currently and explicitly consistent with standards previously accepted by the CNSC;

OR

- (ii) A description of the proposed approach and strategy for the Client review and CNSC acceptance of the alternative approach used in the proposed software development process and the software itself. Describe any contingencies in the plan in the event the Client or the CNSC requests additional activities to confirm the adequacy of the software.

7.5 Part 3 of Section B-7 of the Respondents Phase 2 Proposal Submission - Plans to Address Any Issues Due to Potential Differences Between the Proposed Design and Non-CNSC Canadian Standards

- (a) Describe the extent to which the Respondent's design and design process meets Canadian standards. Describe the documents that will demonstrate compliance with these codes and standards. Describe the timing of preparation, review and submittal of these documents relative to Construction Licence target dates. This description shall include, but is not limited to, the following standards:
- (i) **CSA N285.0 - 06;**
General Requirements for Pressure Retaining Systems and Components in CANDU Nuclear Power Plants;
- (ii) **CSA N286 - 05**
Management system requirements for Nuclear Power Plants;
- (iii) **CSAN288.4 – M90**
Guidelines for Radiological Monitoring of the Environment;
- (iv) **CSA N289 Series**
General Requirements for Seismic Qualification, Ground Motion determination for Seismic qualification, Testing Procedures for Seismic Qualification and seismic instrumentation Requirements for CANDU Nuclear Power Plant;
- (v) **CSA N290.13 – 05**

Environmental Qualification of Equipment for CANDU Nuclear Power Plants;

(vi) **CSA N293 – 07**

Fire Protection for CANDU Nuclear Power Plants;

(vii) **CSA N290.4 - M82**

Requirements for the Reactor Regulating Systems of CANDU Nuclear Power Plants;

(viii) **CSA S269 Series**

Falsework and Access Scaffolding for Construction Purposes, and Concrete Formwork;

(ix) **CSA B214**

Installation Code for Hydronic Heating Systems;

(x) **CSA B72 – M87**

Installation Code for Lightning Protection Systems;

(xi) **CSA Z460**

Control of Hazardous Energy – Lockout & Other Methods;

(xii) **Canadian Electrical Code – Part 1**

Electrical Installation Code;

(xiii) **Canadian Electrical Code – Part 2C**

Construction, testing and making of electrical Equipment;

(xiv) **National Building Code of Canada;**

(xv) **IESO Market Rules;**

(xvi) **IEEE C37.90.1-1989;** and

(xvii) **ISO 14001.**

- (b) If the Respondent's proposed design does not currently and explicitly meet the standards set out in Section 7.5(a), describe how the design or design process will be modified or how equivalency of the codes or standards used will be demonstrated, and timing for the completion of such equivalency demonstration.
- (c) Describe the status of engineering and safety analysis computer codes and the extent to which they meet applicable quality assurance standards, in line with CSA Standard

N286.7 “Quality Assurance of Analytical, Scientific, and Design Computer Programs for Nuclear Power Plants”. Include a description of the extent to which:

- (i) the standards used in computer code development for codes used in engineering and safety analysis are consistent with CSA N286.7, and
 - (ii) the work to demonstrate compliance with N286.7 is complete, and if further work is remaining describe the scope and schedule.
- (d) Describe the nature of documents that will be made available to demonstrate the adequacy of computer codes used in design and safety analysis with respect to the CSA standard. Describe the timing of when these documents will be available to the Client.
- (e) If the documents are based on requirements in other jurisdictions or approved by other regulators (other than the CNSC), describe the process for obtaining Client and CNSC acceptance of the equivalency of these requirements and standards and for any instances where the standards cannot be readily shown to be equivalent, the mitigation that may be taken to achieve such equivalence. Describe the impact this mitigation may have on the timing of completion of the design and achievement of the construction licence.

7.6 Part 4 of Section B-7 of the Respondent’s Phase 2 Proposal Submission

- (1) Describe the extent to which design work will be sufficiently advanced to support a complete PSAR for a construction licence application consistent with construction start date in mid-2012, meeting CNSC requirements along with any outstanding design issues that may impact the Project schedule following the granting of the construction licence. Assume Site specific information will be provided in a timely manner that will not affect Site specific aspects of the PSAR. Describe design work that will be outstanding at the time of the PSAR submission and which may affect the timing of the granting of the construction licence, and the schedule for the completion of such design work. This description shall include, but not be limited to the following information:
- (a) Where the PSAR is supported by research and development and testing that has not previously been reviewed or accepted by the CNSC, a description of the strategy and schedule for obtaining Client and CNSC acceptance;
 - (b) Description of the state of the fuel design and qualification with respect to sufficiency for a PSAR, including testing and research and development. Description of the extent to which the fuel design has been proven (qualified) and any remaining work and the schedule for completion. A description of how the Respondent would address the following:
 - (i) In Section 8.1.1 of RD-337, the CNSC staff state their expectation that “Fuel design limits are established to include, as a minimum, limits on fuel power or temperature, limits on fuel burn-up, and limits on the leakage of fission products in the reactor cooling system.” Indicate what fuel design limits would be established for the Respondent’s plant design in Ontario. Detail the experience, including operation in power reactors and/or Research and Development results, and supporting documentation that are currently available to support CNSC acceptance of these fuel design

limits. Include consideration of power changes the fuel may undergo during normal operation and assurance of fuel clad integrity. If further Research and Development is planned to support the fuel design limits, detail the nature of the tests and the test schedule, specifically including projected test completion dates, and dates when final test reports will be issued;

- (ii) In Section 8.1.1 of RD-337, the CNSC staff state their expectation that “Fuel design and design limits reflect a verified and auditable knowledge base. The fuel is qualified for operation, either through experience with the same type of fuel in other reactors, or through a program of experimental testing and analysis, to ensure that fuel assembly requirements are met.” Further to the response in Section 7.5(1)(b)(i), question related to fuel design readiness, detail the content of the irradiated fuel knowledge base, including power and burn-up levels to which the fuel design has been tested, and the supporting documentation currently available, which would be used to convince the CNSC staff that the fuel design is well qualified. If further in-reactor testing is planned to support the proposed fuel design performance, detail the nature of the tests and the test schedule, specifically including projected test completion dates, dates when post-irradiation results would be available, and dates when final test reports will be issued;
 - (iii) Describe any documented feedback received to date from the CNSC on the acceptability of the fuel design. Provide details of any plans to submit information to the CNSC staff on the fuel design in the future, including projected dates for Client Review of this material; and
 - (iv) Summarize the data that is available, including power reactor experience and/or Research and Development testing, to support “defect-free” operation of the fuel under potential load following conditions as defined in the Client Requirements (RFP Schedule 29). Detail any fuel design limits the proposed fuel design may have with respect to power change during load following (i.e., maximum rate of power change, maximum power change, effect of burn-up). If future test results and/or power reactor operating experience is expected to be obtained in the time-frame of obtaining construction and operating licences from the CNSC, detail the nature of the additional data/experience expected and the dates by which the information would be documented for review by the Client;
- (c) With respect to design readiness for severe accidents:
- (i) Describe the progression of core behaviour, and any core interactions with equipment and/or structures, through to the expected final “safe state”, for severe accidents in the proposed plant design. Detail the knowledge base that exists to support the key behavioural phenomena that dominate the expected progression of severe accident core behaviour in the proposed plant. Summarize the current Research and Development knowledge base and any further work planned that supports the proposed understanding of these key severe accident core behaviour

phenomena. Provide expected completion dates for any further work, including completion of testing and completion of report preparation; and

- (ii) Describe what information has been submitted and/or is planned for submission to the CNSC to demonstrate that the proposed design meets their expectations associated with severe accident behaviour as cited in RD-337. Provide dates for future submissions. Summarize any feedback that has been received to date from the CNSC on severe accidents for the proposed reactor design;
- (d) The adequacy of ECC strainers and screens with respect to debris accumulation and potential impact on the effectiveness of ECC has been an internationally recognized issue. Describe the readiness of the proposed design, the extent to which it has been accepted by the CNSC or other regulators, and steps the Respondent will take to ensure this issue does not adversely affect the licensing schedule. Include consideration of the impact of coatings and other chemicals in containment;
- (e) Description of the design readiness for aspects of the design for which the basic engineering program, or the design submitted for certification in other jurisdictions, adopted a design acceptance criteria or similar approach. In this approach, acceptance criteria are specified and assessed for acceptability, and the design work is deferred to a later time when a project is defined and project timelines are established. Describe the extent to which the design work for such topics will have been completed for a Client review of the PSAR submission, and plans for completing the design work, including schedule. The response shall explicitly address the following: piping design and leak before break (the extent to which the design is complete and the extent to which Canadian requirements are met), instrumentation and control including computers, and human factors engineering. The response shall also address other topics for which a design acceptance criteria or similar approach has been adopted;
- (f) Provide a brief technical summary describing the basic nuclear design (key reactor core characteristics such as coolant, fuel design as it pertains to reactor physics, reactor internal structures and devices, spacing) and identify significant changes relative to currently operating plants.

EITHER confirm through a technical summary that there are no significant changes;

OR if there are significant changes, provide the following information (include a description of the work done to date and remaining work to be done including schedule):

- (i) Describe the extent to which each new feature has been proven. In particular, describe the extent to which the reactor core design work (including physics design, thermalhydraulic design, and mechanical design) is complete with respect to sufficiency for a PSAR, including testing and research and development;
- (ii) Include the state of computer code development, supporting analysis, testing, and research and development, including but not limited to the

considerations listed below. Describe the plan and schedule for completing outstanding work;

- (A) Describe the validation for the neutronics parameters related to the key safety analysis cases and the specific criteria for the acceptability of the code performance for each case;
 - (B) Describe the experimental basis for the validation of the power coefficient, and any research reactor experimental methods used to quantify the uncertainty in the prediction of the key neutronics parameters over the full range of burnup conditions;
 - (C) Describe whether the reactor physics validation plan of the Respondent's design includes experimental data from a reactor with similar neutronic and fuel characteristics as the proposed design. Describe the status and results to date of this assessment. Describe how any significant differences between the two designs will be addressed;
 - (D) Describe the use of Monte Carlo models in the Respondent's reactor physics validation, including any plans to utilize a full core Monte Carlo model at power conditions as part of the Respondent's validation; and
 - (E) Describe the availability of test facilities and any issues that may impact schedule;
- (iii) Describe work done to confirm that internal reactor clearances, if smaller than in previous designs, are still adequate for reliable operation of in-core devices. Describe the plan and schedule for completing outstanding work; and
 - (iv) Describe work done and the schedule for remaining work to confirm the adequacy of spatial control and resistance to spatial control instabilities (due to xenon and/or void effects);
- (g) Describe whether the design incorporates significant changes (compared to operating stations) to reactor internal components (except fuel, which is addressed in another question), materials, working fluids, chemistry or operating conditions such as pressure and temperature;
- EITHER** confirm through a description that there are no significant changes;
- OR** describe the status of development and testing and the plan and schedule for completing any outstanding work. The response need not address nuclear design/reactor physics aspects, as those are covered in the previous question. The response should address other aspects, such as but not limited to mechanical performance, corrosion, aging effects, equipment access, etc.
- (h) Describe the proposed turbine design and whether there are significant differences between the proposed turbine design and 60 Hz turbines currently in operation (for

example, the proposed turbine electrical output is greater than any 60 Hz turbine currently in operation);

EITHER confirm through the description that there are no significant differences between the proposed turbine design and 60 Hz turbines currently operating;

OR if the differences are significant, describe the extent to which the design of the turbine will have been completed and demonstrated to meet performance and reliability requirements by the time the turbine order must be placed. Describe the residual performance and reliability risk and the plans for risk mitigation. Provide a clear definition with regard to the reference facility or facilities on which the new turbine design will be based and confirmation that any design modifications and advances will be incorporated into the Ontario proposed Facility. Where the design deviates from the reference facility or facilities (for example, with respect to turbine blading) provide clarification of what is different and how these differences have been or will be confirmed to be acceptable and avoid schedule risk;

- (i) Describe the role of passive mixing in the Respondent's containment design.

EITHER confirm through the description that the containment design does not rely on passive mixing;

OR describe the current status and plan to address open regulatory issues on this topic with other regulators. Describe steps the Respondent will take to ensure this issue will not adversely affect the licensing schedule for the Ontario project; and

- (j) Describe the extent to which all testing and research and development, and documentation thereof, needed to be included in or to support the PSAR and not covered in previous questions, will be completed as of the Phase 2 Proposal Submission;

EITHER confirm through the description that there will be no outstanding testing or research and development or documentation thereof as of the Phase 2 Proposal Submission Deadline;

OR describe plans for ensuring that, in light of any outstanding testing or research and development, the PSAR is reviewed by Client and accepted by the regulator on a timeframe to achieve a construction licence in accordance with the deployment schedule. Describe contingency plans (e.g., impact on schedule, cost, plant performance) if the timing or outcome of the tests and research and development is different from that anticipated. Specifically describe the availability of testing facilities and issues that may impact meeting the target schedule.

B-8 Schedule Contingency – Licensing Management

8.1 Content of Section B-8 of the Respondents' Phase 2 Proposal Submissions (No Tables to be Completed)

- (a) Section B-8 of the Respondents' Phase 2 Proposal Submissions shall include the information set out below (with respect to Section B-8) and shall follow the same organizational structure.

8.2 Part 1 of Section B-8 of the Respondents' Phase 2 Proposal Submissions - Respondent's Plan to Manage the Licensing Process in Preparation for a Construction Licence

- (a) Provide a schedule for development and submission of the materials required for the CNSC Construction Licence application, for CNSC staff review of the CNSC Construction Licence application, and for the conduct of the hearings, in support of obtaining the CNSC Construction Licence by June 30, 2012.
- (b) Provide information supporting the schedule set out in accordance with Section 8.2(a), including:
- (i) Description of interactions with the CNSC that have occurred or are planned to occur prior to submitting the CNSC Construction Licence application. Description of the scope (areas of focus), objectives, progress and expected outcome of such pre-submittal interactions. Describe the documents that have been or will be provided to the CNSC in support of the pre-submittal interactions and the timing for completion of any outstanding review by CNSC staff. As supporting documentation, provide copies of any correspondence or formal agreements with the CNSC related to the pre-submittal interactions;
 - (ii) The rationale for the CNSC Construction Licence application material submissions, for example, if there are staged submissions in support of the CNSC Construction Licence application include a description of the content of each submission package, the basis for assumed CNSC acceptance of the approach, and how the staged submissions will not delay receipt of the CNSC Construction Licence;
 - (iii) The documentation currently complete for submission to the CNSC;
 - (iv) If the CNSC Construction Licence application and/or other submissions will be based on documents provided to other regulators, a description of the process and timing of conversion of the documents to Canadian requirements or for demonstrating equivalency to the Canadian requirements, including the timing for conversion of the documents or demonstration of equivalency to Canadian codes and standards;
 - (v) A description of the assumptions made in the schedule respecting the time required to complete the CNSC staff reviews, a description of the basis for the assumption, a description of any contingency included in the schedule to address CNSC staff review or comment resolution that is longer than the assumed duration;
 - (vi) A description of any portions of the CNSC Construction Licence application materials that would be submitted after the initial CNSC

Construction Licence has been issued, or that will be included in the application for the CNSC Operating Licence;

- (vii) A description of the assumptions included in the schedule respecting Client Reviews and other efforts to be undertaken by the Client in support of obtaining the CNSC Construction Licence. Responses shall also take into account the expectation in Section 5.6 of CNSC document RD 337, “Design of New Nuclear Power Plants”, that, “Before the design is submitted, an independent peer review of the safety assessment is conducted by individuals or groups separate from those carrying out the design.” Respondent must take into account the need to provide sufficient information on a schedule that permits this review to be completed prior to the design being submitted to the CNSC as part of the construction licence application;
- (viii) If the schedule is predicated on review and acceptance of the design by regulators in other jurisdictions in pre-licensing or licensing processes, provide a description of the current status of the efforts underway in those other jurisdictions and the schedule for their completion. Also provide a description of the licensing concerns or issues that have been identified by the regulators in the other jurisdictions which have not yet been resolved and the plans for achieving such resolution. including, but no limited to, issues raised but not yet closed in US NRC pre-application reviews, US NRC design certification reviews, and applicable open COL items, as well as issues raised in the UK licensability review conducted in 2007/08. Describe the assumptions included in the proposed schedule respecting harmonization of the CNSC staff reviews with the reviews underway or to be performed by the regulators in the other jurisdictions; and
- (ix) A description of the planned actions to resolve design differences, as described in Section B-7 of the Respondents’ Phase 2 Proposal Submissions, within the licensing schedule. Description must include details regarding how the planned actions fit in and are consistent with the proposed licencing schedule, and not re-describe the planned actions.

8.3 Part 2 of Section B-8 of the Respondents’ Phase 2 Proposal Submissions - Resource Allocation to Licensing Process

- (a) Submit projected Respondent resource loading against the schedule provided pursuant to Section 8.2 of this Schedule, including,
 - (i) person-hours, resource type, qualifications and relevant experience (e.g. design engineering, licensing, etc.) required;
 - (ii) evidence of resource availability against resource loading (e.g. already available, already on staff, accessible or planned hire); and
 - (iii) resource availability for unplanned additional design, engineering, and/or testing required to fulfill CNSC licensing requirements described in Part 6 of Section B-8 of the Respondents’ Phase 2 Proposal Submissions -

Description of the Experience and Capability of the Respondent's Licensing Team.

- 8.4 Part 3 of Section B-8 of the Respondents' Phase 2 Proposal Submissions - Respondent's Project and Risk Management Program for CNSC Review of the Construction Licence Application
- (a) Describe the program and procedures that will be used by the Respondent during CNSC staff review of the CNSC Construction Licence application , including,
- (i) Key risks that may result in extended CNSC staff review and mitigation strategies.;
 - (ii) CNSC Construction Licence application review tracking metrics; and
 - (iii) Processes for clarification, tracking and resolution of CNSC staff comments and concerns.
- (b) Provide copies of any reports, or other documents that demonstrate the effectiveness of the programs and procedures described.
- 8.5 Part 4 of Section B-8 of the Respondents' Phase 2 Proposal Submissions - Demonstration of Recent (Within the Past 5 Years) Interactions with CNSC, US NRC, or Other Similar Nuclear Licensing Authorities (Directly or On Behalf of An Operator) In Respect to New Build of Nuclear Power Reactors.
- (a) Describe all recent (within the past 5 years) interactions with CNSC, US NRC, or other similar nuclear licensing authorities (directly or on behalf of an operator) in respect of new reactor design or facility licensing, including a description of past planned versus realized licensing schedules, with explanation of discrepancies and actions taken to ensure delays do not reoccur.
- (b) As supporting documentation for Part 5 of B-8, provide copies of any reports or other documents that are illustrative of the initial and final schedules for the efforts and the lessons learned from these recent interactions.
- 8.6 Part 5 of Section B-8 of the Respondents' Phase 2 Proposal Submissions - Description of the Experience and Capability of the Respondent's Licensing Team.
- (a) Describe the licensing team, in the context of the Project, which will coordinate the CNSC licensing effort, including preparation of the Canadian safety case that is the basis for licensing approval. Respondents shall include,
- (i) resumes of all key licensing personnel (including head of licencing and his or her direct reports), including a detailed description of their relevant new build nuclear licensing experience; and
 - (ii) proposed interfacing model with the CNSC throughout the Project.
- B-9 Schedule Contingency – Management of Supply Chain (Section B-9 of the Respondents' Phase 2 Submission Proposals)**

9.1 Content of Section B-9 of the Respondents' Phase 2 Proposal Submissions (No Tables to be Completed)

- (a) Section B-9 of the Respondents' Phase 2 Proposal Submissions shall include the information set out below (with respect to Section 9) and shall follow the same organizational structure.

9.2 Part 1 of Section B-9 of the Respondents Phase 2 Proposal Submissions - Current Status of Key Subcontractors for Project

- (a) Provide a Project organization chart outlining planned sub-contracting structure. Clearly identify all Key Subcontractors roles. "Key Subcontractors" are defined in the Project Agreement.

- (b) For all Key Subcontractor roles, provide the following:

- (i) current status of relationship with designated suppliers;
- (ii) current orders and spots in the order queue;
- (iii) previous experience with designated suppliers;
- (iv) lead time requirements to procure equipment;
- (v) contingency plan for late arrival of each component; and
- (vi) supporting evidence and documentation for item (i) to (v) of this Section 9.2(b).

- (c) Respondents should note that identifying specific suppliers is not required, and individual suppliers will not be evaluated.

- (d) Key Components are defined in Schedule 7 – Subcontractors to the Project Agreement.:

9.3 Part 2 of Section B-9 of the Respondents Phase 2 Proposal Submissions - Plan to Fully Develop Project Supply Chain

- (a) Provide a comprehensive plan for fully developing the domestic and global supply chains necessary to complete the Project, including,

- (i) a description of the 15 largest items (by cost) for which no supplier is yet confirmed;
- (ii) including suppliers of commodities;
- (iii) a description of the current status of relationships with prospective suppliers for those items;
- (iv) timelines for developing firm contracts and placing orders with those suppliers; and

- (v) a description of current and planned resource loading for supply chain development and management.
- (b) The supply chain plan must include a detailed and comprehensive trades Construction Labour strategy for the Project, including,
- (i) a Construction Labour Availability Profile, which includes
 - (A) a detailed breakdown across labour craft levels over the life of the Project;
 - (B) a target organizational structure of labour (foreman, sub-foreman, journey persons and apprentices);
 - (C) the corresponding labour availability by year;
 - (D) labour trend forecasts and risk analysis;
 - (E) the identification of gaps in labour availability; and
 - (F) any other documents in support of the Construction Labour Availability Profile;
 - (ii) description of trades labour recruitment and retention strategies to ensure requirements are met, gaps are eliminated and availability risks are mitigated;
 - (iii) description of the potential impact of major construction projects, in the immediate region (across Ontario and Canada), on the Project and the proposed strategies to mitigate those impacts. As supporting documentation, provide copies of formal supply chain development plans used in previous nuclear power reactor projects.

9.4 Part 3 of Section B-9 of the Respondents Phase 2 Proposal Submissions - Previously Demonstrated Supply Chain Management Experience

- (a) Provide a detailed and specific description of supply chain management practices that the Respondent intends to use for the Project, including,
- (i) supply chain tracking systems;
 - (ii) key mitigation strategies for preventing and mitigating supply chain bottlenecks;
 - (iii) contingency plans for late arrival of Key Components; and
 - (iv) Plan for ensuring adequate QA programs exist with Subcontractors.
- (b) Describe the Respondent's experience in using similar supply chain management practices in previous nuclear projects, including examples of the execution of a mitigation plan to overcome bottlenecks.

- (c) Provide copies of any formal policies, procedures, reports, or supply chain management tools used in previous nuclear power reactor projects.

B-10 Schedule Contingency – Project Management (Section B-10 of the Respondents’ Phase 2 Submission Proposals)

10.1 Content of Section B-10 of the Respondents’ Phase 2 Proposal Submissions (No Tables to be Completed)

- (a) Section B-10 of the Respondents’ Phase 2 Proposal Submissions shall include the information set out in Section 10.2 and shall follow the same organizational structure.

10.2 Part 1 of Section B-10 of the Respondents’ Phase 2 Proposal Submissions - Project Leadership

- (a) Provide a detailed description of the Project leadership including,
- (i) a description of the Respondent’s internal governance structure (for example, internal steering committee and governance structure for oversight of the Project);
 - (ii) the Respondent’s proposed Project leadership organizational chart (for the Respondent’s team) including each of the positions of “Key Individuals” set out in Schedule 6 of the Project Agreement;
 - (iii) resumes of the Key Individuals (see Schedule 6 to the Project Agreement) already identified and a description of the procedure for selecting Key Individuals for those positions where an individual has not yet been identified;
 - (iv) a description of the number and experience of project managers within the Respondent’s organization with the level of experience to serve as project head of the Project; and
 - (v) a description of the process of selecting and transitioning new leaders into the Project if necessary.
- (b) The resumes referenced in Section 10.2 (a) must describe for each individual,
- (i) roles and experiences with mega-capital construction projects;
 - (ii) roles and experiences with nuclear projects;
 - (iii) roles and level of experience with first-of-a-kind nuclear construction projects; and
 - (iv) roles and experiences working on construction projects in Canada.

10.3 Part 2 of Section B-10 of the Respondents’ Phase 2 Proposal Submissions - Respondent Long-term Strategy to Develop Project Managers

- (a) Provide information that demonstrates that the Respondent organization has a long-term strategy to develop project managers within the Respondent team organization. Describe the processes and procedures the Respondent organization has in place, including,
- (i) details of the project management development program;
 - (ii) resource allocation to project management development;
 - (iii) types of capabilities that are the focus of the development strategy; and
 - (iv) any procedures in place to develop or transfer project management best practices within subcontractors or sub team member organizations.

10.4 Part 3 of Section B-10 of the Respondents' Phase 2 Proposal Submissions - Details of the Respondent's Current Monitoring and Risk Management Strategy

- (a) Describe the Respondent's current monitoring and risk management, including,
- (i) key risk mitigation strategies;
 - (ii) details of risk-management framework;
 - (iii) risk management leadership and subject matter experts;
 - (iv) Project tracking and reporting systems and processes; and
 - (v) management of interfaces between members of the Respondent's team or consortium.
- (b) Describe the Respondent's experience implementing day-to-day risk management programs for mega-capital projects in the five years immediately prior to the Submission Deadline and how these experiences are incorporated into current practice.
- (c) Provide copies of any formal policies, procedures, reports, or risk management tools used in previous nuclear power reactor projects.

10.5 Part 4 of Section B-10 of the Respondents' Phase 2 Proposal Submissions - Details of the Information Management Systems Currently in Use by the Respondent

- (a) Describe the information management systems that the Respondent intends to use for this Project, including,
- (i) type of system and use within the organization, including,
 - (A) schedule management;
 - (B) material management;
 - (C) integrated ordering;
 - (D) cost management;

- (E) qualification and training management;
 - (F) supply chain management;
 - (G) performance management;
 - (H) configuration management;
 - (I) documentation management; and
 - (J) corrective action management;
- (ii) a description of the amount of time each of these information management systems has been in use by the Respondent;
 - (iii) examples of use of systems on previous projects (e.g. for scheduling, planning, tracking and correcting project performance);
 - (iv) a plan to further develop information management systems from the present through to the start of construction of the Project; and
 - (v) a description of the interface between each of these systems for use on the Project.

10.6 Part 5 of Section B-10 of the Respondents' Phase 2 Proposal Submissions - Details of Institutional Learning Program Within the Respondent Organization

- (a) Describe the process by which lessons learned from previous projects are shared and developed within the organization to expand the expertise and quality of project managers, including,
 - (i) resources allocated to learning within the Respondent's organization (for example, knowledge transfer, mentorship programs and similar programs);
 - (ii) details of the process currently in place; and
 - (iii) examples of the how the process has been used in the past and for how long it has been in use.
- (b) Provide copies of any formal policies, procedures, reports, or institutional learning tools used in the last five years.

B-11 Supporting Documentation and Draft Scope Book

11.1 Content of Section B-11 of the Respondents Phase 2 Proposal Submission

- (a) All supporting documentation in respect of Tables 1.1 to 1.7 shall be included in Section B-11 of the Respondent's Phase 2 Proposal Submission.
- (b) Respondent shall provide a summary Scope Book for the Project, which adheres to the Table of Contents in Attachment 5 to this Schedule 6, or to a similar standard.

- (c) Respondents may use specific references to the content of this Scope Book to support any parts of their Phase 2 Proposal Submissions. References to the Scope Book are most relevant for the following Phase 2 Proposal Submissions sections:
- (i) Operating, Maintenance, Refurbishment, and Sustaining Investment Costs (Section B-2), Tables 1.1 through 1.7 - proposed Facility data technical basis, assumptions, and rationale;
 - (ii) Output (Section B-5), Table 3.1 – Justification; and
 - (iii) Schedule Contingency - Design Readiness (Section B-7), Parts 1-4.
- (d) Respondents shall also submit a chart with two columns. Column 1 shall set out a list of the Client Requirements headings and Column 2 shall set out the references to the location in the Scope Book where the Client Requirement is dealt with (the “Completeness Chart”). This Completeness Chart will be used to assess the completeness of the Scope Book relative to the Client Requirements.

C-1 Level of Investment in Ontario

12.1 Content of Section B-12 of the Respondents Phase 2 Proposal Submission (Table 4.1)

- (a) Respondents' submissions with respect to Level of Investment in Ontario shall consist of,
- (i) a completed Financial and Milestone Payment Submission Form; and
 - (ii) the description of any additional ways that the Respondent will add value to the Ontario economy as more particularly described below.

12.2 Additional Ways That The Respondent Will Add Value To The Ontario Economy Beyond The Scope Of The Project.

- (a) Describe any additional ways that the Respondent will add value to the Ontario economy beyond the scope of the Project (e.g., establishment or expansion of fuel fabrication plant, research plant), including,
- (i) Timeline of capital investment;
 - (ii) Total and domestic spend of capital cost distributed into NAICS (North American Industry Classification System) categories; and
 - (iii) Domestic spend from operations, distributed into NAICS categories (average annual and total up to 2023).
- (b) Any proposed activity or arrangement shall only be included in this section if it meets the following conditions:
- (i) The additional expenditures must be beyond what was included in the previously detailed capital cost of the Project as submitted in Schedule 11 of the RFP;

- (ii) The additional expenditures must be as a direct result of being selected as the Preferred Vendor for this Project; and
- (iii) Additional spend must be measurable and enforceable, and the respondent must be prepared to commit to them either as part of the Project Agreement or through another binding agreement with Ontario.

**Part III Detailed Description of the LUEC Model
and Domestic Content Evaluation**

PART III - DETAILED DESCRIPTION OF THE LUEC MODEL AND DOMESTIC CONTENT EVALUATION

SECTION 1 - CALCULATION OF POINTS USING THE LUEC MODEL

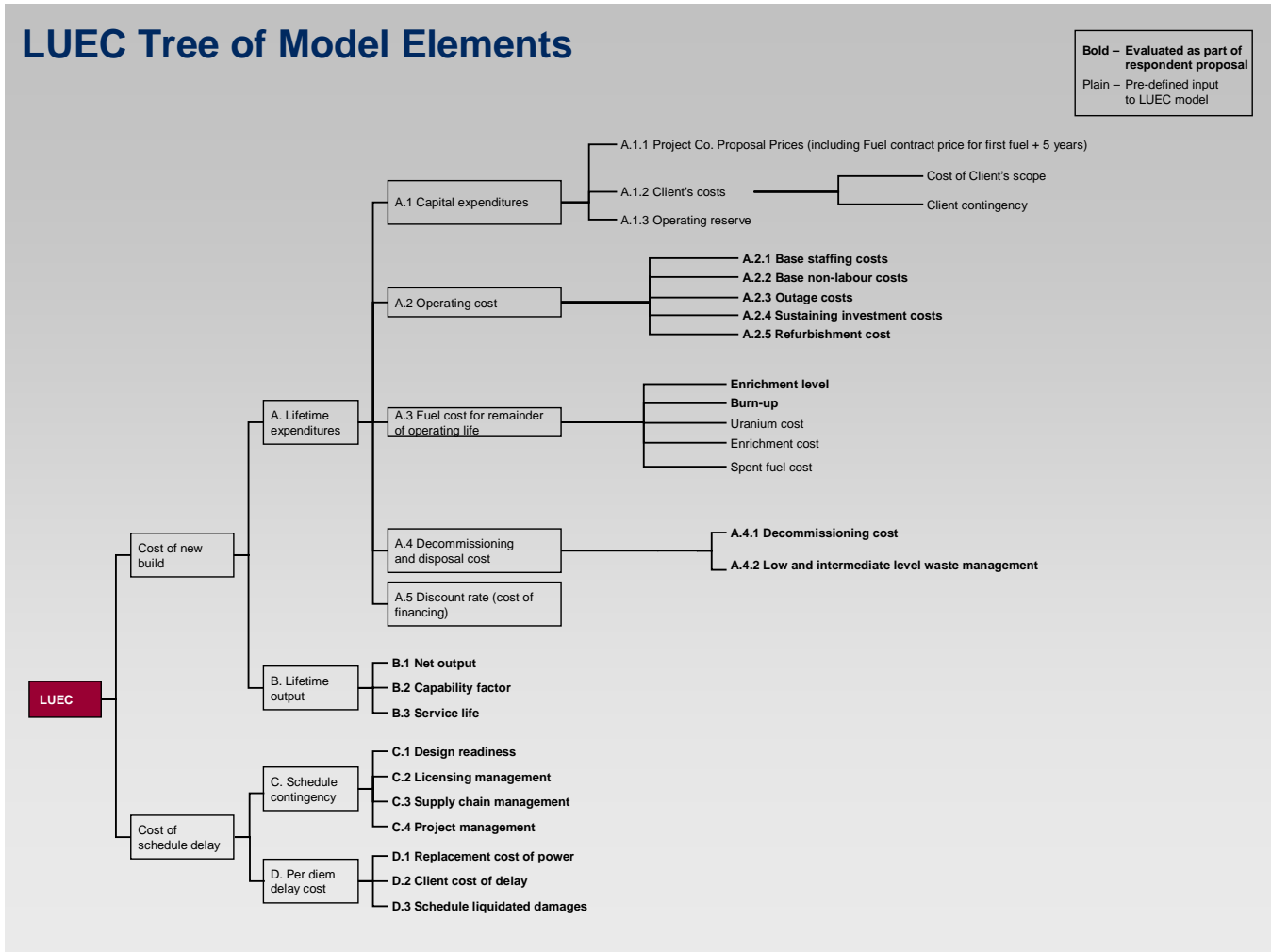
(a) The maximum of 80 points will be assigned to the Phase 2 Proposal Submission with the lowest calculated LUEC. The remaining Phase 2 Proposal Submissions will receive a LUEC component score for their Phase 2 Proposal Submissions that is lower than the top score of 80. The score assigned to a Respondent's calculated LUEC will be a percentage of 80, equal to the lowest LUEC as a percentage of the Respondent's calculated LUEC. This is expressed by the following formulas:

- $LUEC_{Lowest}$ = the lowest calculated LUEC among all the Respondents' Phase 2 Proposal Submissions
- Score for $LUEC_{Lowest} = 80$
- $LUEC_{Respondent X}$ = the calculated LUEC for Respondent X
- Score for $LUEC_{Respondent X} = 80 \times (LUEC_{Lowest} / LUEC_{Respondent X})$

(b) The maximum score of 20 points will be assigned to the Phase 2 Proposal Submission with the highest GDP impact per megawatt. The remaining Respondent Phase 2 Proposal Submissions will receive a GDP Impact component score for their Phase 2 Proposal Submissions that is lower than the top score of 20. The score assigned to a Respondent's calculated GDP Impact will be a percentage of 20, equal to the Respondents' calculated GDP impact as a percentage of the highest GDP impact. This is expressed by the following formulas:

- $GDP_Impact_{Highest}$ = the highest calculated GDP impact per megawatt among all the Respondents' Phase 2 Proposal Submissions
- Score for $GDP_Impact_{Highest} = 20$
- $GDP_Impact_{Respondent X}$ = the calculated GDP impact per megawatt for Respondent X
- Score for $GDP_Impact_{Respondent X} = 20 \times (GDP_Impact)_{Respondent X} / GDP_Impact_{Highest}$

SECTION 2 – CALCULATION OF LUEC – 80 POINTS



- (a) A LUEC model will be used to calculate the lifetime cost of power of each Phase 2 Proposal Submission. The inputs to this model are identified in the LUEC model elements shown in this Section. Most of these inputs are requested from the Respondents as part of the Phase 2 Proposal Submission. The remaining inputs have been predefined by Infrastructure Ontario. Cost inputs are tabulated as nominal values for the year in which they are incurred. A present value calculation discounts the resulting cash flows back to 2009 dollars using the fixed Discount Rate set by the Client to assess the Project.
- (b) The output of the LUEC model is an electricity price per megawatt that results in the net present value of all lifetime cash flows (both revenues and costs) to equal zero. This is also the price per megawatt that would result in the complete recoupment of the total lifetime costs of the Project.
- (c) The LUEC model applies the following principles:

1. COST OF NEW BUILD

The cost of new build is defined and modeled as the sum of all **lifetime expenditures**, normalized by the **lifetime output** of the Facility.

A. Lifetime Expenditures consist of all direct costs to the Client from initial Project licensing and permitting until end of decommissioning as follows:

- **Capital Expenditures (A.1)** – The total capital cost of the Project, including the Client's stream of payments to Project Co over the duration of the Project. The cost of the first fuel load and refueling for the first 5 years of operation, the cost of Client's scope and Client's contingency on Client's scope and Project Co's scope.
- **Operating cost (A.2)** – The schedule of operations and maintenance, refurbishment and sustaining investment costs over the life of the Facility.
- **Fuel cost (A.3)**– The evaluation of the cost of fuel over the full plant lifecycle including enrichment, fabrication, transportation and disposal.
- **Decommissioning and disposal cost (A.4)** – The projected cost of decommissioning the Facility at the end of its service life, including disposal of radioactive waste.
- **Discount rate (cost of financing) (A.5)** – The Project's required return on debt and equity. This is also equivalent to the cost of financing.

B. Lifetime output is the product of:

- **Net output (B.1)**
- **Capability factor (B.2)**
- **Service life (B.3)**

A. Lifetime Expenditures Details

A.1 Capital Expenditures

The components of Capital Expenditures are:

A.1.1 - Project Co Proposal Prices

This is set out in detail in Part II of Schedule 11 to the RFP.

A.1.2 - Client Costs

Capital expenditures will include an estimate of Client's variable costs and contingency specific to a Respondent's Phase 2 Proposal Submission, such as:

- Client's operational readiness team responsible for hiring and training of the operations and maintenance (O&M) staff; and

- Client's evaluated contingency for Unforeseen Regulatory Requirements risk.

Other than the Respondent-submitted percentage of the Unforeseen Regulatory Requirements risk the Respondent is willing to bear and the number of full-time equivalents (FTEs) in the Base Staffing Costs, these Client costs are inputs that are not submitted by the Respondent.

Contribution to LUEC:

Client's costs will be included as an amount in the capital cost of the Project, incremental to the Respondent's Phase 2 Proposal Submission.

A.1.3 Operating Reserve

Commercial operation of new nuclear units with greater capacity than the current Darlington units (which represent the first and second contingents) will materially increase reserve requirements.

Contribution to LUEC:

The additional cost for maintaining this reserve for 20 years will be incorporated in the LUEC model.

A.2 Operating Costs

The full lifetime operations and maintenance costs of the plant will be evaluated. This components of Operating Cost are:

A.2.1 Base staffing costs

A.2.2 Base non-labour costs

A.2.3 Outage costs

A.2.4 Sustaining investment costs

A.2.5 Refurbishment costs

Contribution to LUEC (All Operating Cost Categories):

For each operating cost category, Respondents will submit a detailed cost breakdown (as set out in Tables 1.1 to 1.7) for the Reference Plant and for the proposed Facility. In addition, a detailed justification for the difference between the proposed Facility and Reference Plant will have been submitted by the Respondent.

The Evaluation Committee will independently verify the Respondent's submitted Reference Plant operating and maintenance cost data. If, in the Evaluation Committee's Opinion, there is a significant cost discrepancy, the Respondent's submitted Reference Plant data will be scaled to the higher estimate.

Using pre-defined scorecards (one for each operating cost category), a panel of evaluators will evaluate the justification for the difference in operating costs between proposed Facility and the Reference Plant, and reach a consensus level of confidence in the ability of the proposed

Facility to achieve the proposed operating cost. This score will determine the operating cost value to be inserted in the LUEC model and will range between (i) the Reference Plant values and (ii) the proposed Facility values submitted by the Respondent. This “adjusted operating cost value” will be entered into the LUEC model.

Labour rates provided by the Client for each labour category will be used to convert FTEs into annual dollar costs, represented as cash outflows for each year of the plant’s service life.

A description of each operating cost category is as follows:

A.2.1 Base Staffing

This category includes all direct on-site operations and maintenance employees who perform core or baseline activities at the plant and all off-site staff assigned to or supporting multiple locations.

The information required for LUEC will be taken from the Respondent’s completed Table 1.2.

A.2.2 Base Non-labour

Base non-labour costs represent the full base non-labour operating and maintenance costs, with the exception of taxes, licensing fees, insurance, and nuclear fuel.

The information required for LUEC will be taken from the Respondent’s completed Table 1.3.

A.2.3 Outage Costs

Costs related to all Facility shutdowns after plant in-service, excluding unplanned forced outages and refurbishment outage, and incremental to base operating costs for each year of the service life of the proposed Facility.

The information required for LUEC will be from Table 1.5.

A.2.4 Sustaining Investment Costs

Sustaining investments includes all annual investment (capital and operations and maintenance) to sustain plant capability (above and beyond base staffing, base non-labour, outage, and refurbishment costs).

The information required for LUEC will be taken from Table 1.6.

A.2.5 Refurbishment Costs

Refurbishment costs include all major incremental costs such as (but not limited to) steam generator replacement, feeders and fuel channel assemblies replacement/reactor vessel head replacement during the operating lifetime.

The information required for LUEC will be taken from Table 1.7.

A.3 **Fuel Costs**

The initial fuel load and three fuel loads (or, for designs that incorporate on-line refuelling, equivalent information, for five years of operations) are provided through the Fuel Agreement.

For the remainder of the Facility's service life, Respondents provide, in Table 2.1, all of the fuel requirements, including full lifecycle cost of fuel, including enrichment, fabrication, transportation and disposal.

Contribution to LUEC:

Estimated fuel lifecycle costs for the remainder of the Facility's service life will be entered into the LUEC model as cash outflows in the year they are incurred. These estimates are constructed using information provided by Respondents in Table 2.1 and Client forecasts for enrichment and uranium costs. Used fuel disposal costs will be present valued at a discount rate of 5.15%, and included as a cost in the LUEC model.

A.4 Decommissioning and Disposal Costs

Decommissioning and disposal costs consist of:

A.4.1 Decommissioning cost

Decommissioning cost includes all costs associated with planning for and decommissioning the Facility.

An estimate of the cost of the Facility decommissioning (excluding storage and disposal of used fuel) will be provided by Respondents in Section B-4 of the Phase 2 Proposal Submission.

Contribution to LUEC:

Respondent submitted estimates for total decommissioning cost are present valued at a discount rate of 5.15%, and included as cost in the LUEC model.

A.4.2 Low and Intermediate Level Waste Management

Includes all costs related to management of low and intermediate level radioactive waste.

The volume of radioactive waste is provided by the Respondent in Table 1.4.

Contribution to LUEC:

Waste handling rates provided by the Client (i.e., unit rates for the storage and disposal of low and intermediate level waste) will be used to convert radioactive waste volumes into annual dollar costs.

A.5 Discount Rate

In the LUEC Model, cash flows during the construction phase (that is, cash flows prior to the in-service date) will be discounted based on an estimated grossed-up discount rate of 8.4% (the "Discount Rate"). This Discount Rate is derived from the OEB's November 3, 2008 findings regarding existing assets and is computed by multiplying the required rate of return on equity and debt (cost of equity and cost of debt) by their proportional weight in the capital structure

(debt/equity ratio) and then summing them and grossed-up by the tax rate. The cost of equity and debt along with the debt/equity ratio are calculated in the following manner:

A.5.1 Cost of equity

According to the OEB's findings released on November 3, 2008 the cost of equity applicable for OPG is 8.65%. There will be no adjustment made for a nuclear only portfolio as the cash flows in the LUEC model are risk-adjusted based on the profile of the project.

A.5.2 Cost of debt

The cost of debt is calculated by taking the *Government of Canada marketable bonds, average yield, over 10 years rate* of 4.00% (as of November 26, 2008) and a risk premium of 130 bps that was deemed acceptable by the OEB. The cost of debt with no tax shield benefit is 5.3%.

4.5.3 Debt/equity ratio

Based on the OEB's findings regarding existing assets, a long term equity ratio of 47% will be assumed.

8.5.4 Taxes

The tax rate assumption is 27% which assumes proposed government tax cuts are phased in.

B. Lifetime Output Details

Lifetime output is comprised of three factors: net output, capability factor and service life

- **Net output (B.1)** – Gross power output minus the power required for plant operation
- **Capability factor (B.2)** – Percentage of time the plant is running and producing electricity over a given time period (versus downtime due to maintenance and/or unforeseen outages)
- **Service life (B.3)** – Number of service years for proposed Facility

The information required for LUEC will be taken from Table 3.1.

Contribution to LUEC:

Using pre-defined scorecards (one for each factor), a panel of evaluators will evaluate the justification for the difference between the proposed Facility and the Reference Plant, and reach a consensus level of confidence in the ability of the Facility to achieve the proposed levels of output. For net output, the proposed Facility value will equal the average of the outputs for once-through cooling and draft cooling configurations, as per Table 3.1. This score will determine the value for each factor ranging between the Reference Plant values and proposed Facility values that will enter into the LUEC model.

2. COST OF SCHEDULE DELAY

The two components of the cost of schedule delay are the **schedule contingency** and the **cost of delay**.

C. Schedule Contingency is the total estimated potential schedule delay in the Project. These schedule contingencies will be estimated by evaluation of Respondent capabilities along four major dimensions (the “**Schedule Delay Dimensions**”):

- **Design readiness (C.1)** – Readiness of the Respondent’s design for licensing and construction in Canada, on a timeline that meets the Ontario new build deployment schedule
- **Licensing management (C.2)** – Respondent’s ability to support a successful construction license application
- **Supply chain management (C.3)** – Respondent’s demonstrated ability to develop, maintain, and manage a robust supply chain for the Project
- **Project management (C.4)** – Respondent’s demonstrated project management capabilities

D. Per Diem Cost of Delay is made up of:

- **Replacement cost of power (D.1)** – The cost to make up the shortfall in satisfying Ontario’s power needs in the event that there is a schedule delay in the Project.
- **Client’s cost of delay (D.2)** – Additional cost of delay, largely the run rate of the Client’s team during the schedule delay.
- **Schedule Liquidated Damages (D.3)** – Schedule Liquidated Damages payable to the Client in the event of a schedule delay. These amounts will be netted against the sum of replacement cost of power and Client’s cost of delay.

C. Schedule Contingency Details

The scoring of Respondent capabilities along the four Schedule Delay Dimensions will be done through a consensus scoring system. A panel of evaluators will review all Respondent Phase 2 Proposal Submissions along the Schedule Delay Dimensions using pre-established evaluation criteria. Application of these evaluation criteria will result in an overall score for each Schedule Delay Dimension.

A detailed analysis was conducted to benchmark a large number of current and historical mega-capital construction projects that were known to be delayed. This analysis disaggregated the root causes behind each project delay and established a range of delay lengths caused by each of the Schedule Delay Dimensions across all projects. This distribution of possible delay periods is used to assign schedule contingencies.

C.1 Design Readiness

Readiness of the Respondent's design for licensing and construction in Canada, on a timeline that meets the Ontario new build deployment schedule, will be evaluated according to the following evaluation criteria:

- Level of CNSC and regulator concern for gap with CNSC or non-CNSC regulations;
- Respondent plan for addressing the gap between their design and CNSC or non-CNSC regulations;
- Significance or magnitude of the design change being proposed compared to past designs; and
- Credibility of the Respondent plan for implementing the design change.

C.2 Licensing Management

Respondent's ability to support a successful construction licence application will be evaluated and scored according to the following evaluation criteria:

- Ability to prepare a high-quality construction licence application in time for start of construction by mid-2012;
- Capability to respond to CNSC requests and/or changes in CNSC expectations in a timely manner; and
- Quality of the licensing team.

The information for this evaluation will be provided in Section B-8 of the Respondent's Phase 2 Proposal Submission.

C.3 Supply Chain Management

Respondent's ability to develop, maintain and manage a robust supply chain for the project will be evaluated according to the following evaluation criteria:

- Current status of key suppliers;
- Credibility of plan to further develop supply chain for the Project; and
- Demonstrated supply chain management experience.

The information for this evaluation will be provided in Section B-9 of the Respondent's Phase 2 Proposal Submission.

C.4 Project Management

Respondent's project management capabilities will be evaluated according to the following evaluation criteria:

- Quality and experience of project team leadership;
- Long-term staffing strategy;
- Day to day risk management capability;
- Quality of information management systems for project;
- Ability to maintain continuity in project management culture; and
- Completeness of Scope Book with respect to Client Requirements.

The information for this evaluation will be provided in Section B-10 of the Respondents Phase 2 Proposal Submission.

D. Per Diem Delay Cost Of Delay Details

Schedule contingencies will be manifested in the LUEC model as delays of all cash flows, immediately prior to Substantial Completion of Unit 1. During the delay period, a per diem cost of delay will be included which is equal to:

- Replacement cost of power, plus
- Client's cost of delay, less
- Schedule Liquidated Damages

D.1 Replacement cost of power

This cost represents the additional cost to the province for meeting Ontario's baseload energy demand, without access to the new Facility's capacity.

The Respondent is not required to Submit any information with respect to this cost.

Contribution to LUEC:

The replacement cost of power is based on a supply/demand power model for Ontario and adjacent markets with the following assumptions:

- (a) Supply - Based on Ontario government predictions (IPSP – Integrated Power System Plan);
- (b) Demand - Based on the historical trend in demand growth;
- (c) Commodity Prices – Based on five-year NYMEX futures prices and projected for an additional five-years by inflation; and
- (d) Other fuel cost – assumed to grow at inflation.

The model simulates the total cost to supply Ontario's electricity demand in mid-2018 for two scenarios:

- Scenario 1: New nuclear online on time
- Scenario 2: New nuclear delay and replacement imported power is needed

The replacement cost of power is set to the difference of these two scenarios.

D. 2 Client's Cost of delay

This cost represents the additional cost to the Client for carrying the Client's team for the additional time represented by the schedule delay

Contribution to LUEC:

Estimated Client's team run rate will be entered into the LUEC model as cash outflows in the construction year they are incurred.

D. 3 Schedule Liquidated Damages

These values are taken from the Project Agreement.

Contribution to LUEC:

Schedule Liquidated Damages that are to be paid by Project Co ,as set out in the Project Agreement, are treated as funds received by the Client to offset the Client's losses for Schedule delay.

SECTION 3 - CALCULATION OF PROJECT'S GDP IMPACT – 20 POINTS

Output of the GDP impact model is a single number that measures the total GDP impact the Project will have on Ontario's economy. The three main elements that make up the total GDP impact are the following:

1. Immediate Project impact – this is the GDP benefit that directly results from the project-related investments made in Ontario.
2. Long-term Project impact – this is the estimated long-term GDP benefit to Ontario that results from the Project.
3. Alternative investment impact – this is the GDP impact of capital costs and operating costs of any alternative investments in Ontario that the Respondent commits to making.

Immediate Project Impact

The immediate impact of the Project relies on the local Ontario Spend that is related to the construction phase. To calculate this:

- Respondents will submit the percentages of total project cost that will be spent in Ontario broken down by the four Sub-Category groups.
- The GDP impact per Sub-Category Group is calculated as the evaluated Ontario Content Spend per Sub-Category Group, which is the product of the Respondent's submitted Ontario Content Spend Percentage and the total evaluated cost of each Sub-Category Group, multiplied by pre-defined GDP impact factors as set out in Attachment 5 to Schedule 6 to the RFP (that is, dollars of GDP per dollar of Actual Ontario Content Spend).

Long-term Project Impact

The Ontario spend committed to by the Respondent will help develop the local Ontario nuclear industry, resulting in a long-term benefit of the Project. The long-term impact of this benefit would:

- Be realized through participation of Ontario's nuclear industry in future reactor sales outside Ontario
- Calculated as an additional GDP impact for each Respondent submitted percentage point of Ontario Content Spend Percentage for the Group 2 Sub-Category as follows:
 - \$50 million GDP impact for each percentage point of Group 2 Ontario Content Spend Percentage, up to 25 percentage points; and
 - \$120 million GDP impact for each percentage point of Group 2 Ontario Content Spend Percentage, beyond 25 percentage points.

Alternative Investment Impact

Additional impacts from any alternative economic offsets the Respondent proposes.

- This includes evaluating any additional investment the Respondent will commit to making that add value to the Ontario economy beyond the scope of the Project (e.g., establishment or expansion of fuel fabrication plant, research plant).
- The Ontario Spend across NAICS categories for these alternative investments will also be input into the Statistics Canada Ontario Provincial model to estimate their total Ontario investment impact.
- The GDP impact of these alternative investments will be discounted by a 5% social discount rate.

Attachment 1 to Schedule 6

**Operations, Maintenance, Refurbishment, and Sustaining Investment
Costs and Lifetime Output Submission Form**

TABLE 1.1(a) REFERENCE PLANT SELECTION

Reference Year and Information Source for Reference Plant Data:	
Reasons for Selecting this Reference Plant:	

TABLE 1.1(b) PROPOSED FACILITY – ESTIMATE METHODOLOGY

PROPOSED FACILITY ESTIMATE METHODOLOGY	
Fleet size assumption (number of units in-service by 2023 in Canada or the United States) (This does not include the proposed Units for the Project)	
Rationale for fleet size assumption (list site, describe contract status):	
Methodology for developing estimates for the proposed Facility:	

TABLE 1.2 BASE STAFFING

Staffing Definition	Annual Cost per FTE (CDN\$ x 1,000 /Year per FTE)	Level of Effort - Regular, Temporary and Contract Staff (FTEs)		Delta between Reference Plant and proposed Facility	Justification
		Reference Plant (2 units)	Proposed Facility (2 units)		
Design/Modification/Technical Engineering	130				
Plant Computer Engineering	130				
Configuration Management Administrative Support	80				
Configuration Management - Management	200				
Total - Design Engineering and Configuration Management					
Plant Engineering	130				
Non-destructive Examination - NDE	120				
Equipment Reliability Administrative Support	80				
Equipment Reliability Management	200				
Total - Plant Engineering and Equipment Reliability					
Security (DO NOT FILL IN)					DO NOT INCLUDE
Quality Assurance	130				
Quality Control	120				
Corrective Action Program and Operating Experience	130				

Staffing Definition	Annual Cost per FTE (CDN\$ x 1,000 /Year per FTE)	Level of Effort - Regular, Temporary and Contract Staff (FTEs)		Delta between Reference Plant and proposed Facility	Justification
		Reference Plant (2 units)	Proposed Facility (2 units)		
Safety/Health	130				
Licensing	130				
Emergency Preparedness	130				
Dedicated Fire Responders	130				
Loss Prevention Administrative Support	80				
Loss Prevention Management	200				
Total - Loss Prevention					
Materials Management/Warehousing	120				
Contracts & Purchasing	120				
Procurement Engineering	130				
Materials & Services Administrative Support	80				
Materials and Services Management	200				
Total - Materials & Services					
Nuclear Fuels/Reactor Engineering	130				
Nuclear Fuel Administrative Support	80				
Nuclear Fuel Management	200				
Total - Nuclear Fuel (operations and					

Staffing Definition	Annual Cost per FTE (CDN\$ x 1,000 /Year per FTE)	Level of Effort - Regular, Temporary and Contract Staff (FTEs)		Delta between Reference Plant and proposed Facility	Justification
		Reference Plant (2 units)	Proposed Facility (2 units)		
maintenance Support)					
Operations	150				
Operations Support	150				
Environmental	130				
Chemistry	130				
Radiation Protection	120				
Radwaste	130				
Operations Administrative Support	80				
Operations Management	200				
Total - Operate Plant					
Information Technology	120				
Business Services	120				
Records Management & Procedures	80				
Human Resources	120				
Housekeeping & Facilities Management	120				
Communications & Community Relations	130				
Management Assistance / Industry Assoc	130				

Staffing Definition	Annual Cost per FTE (CDN\$ x 1,000 /Year per FTE)	Level of Effort - Regular, Temporary and Contract Staff (FTEs)		Delta between Reference Plant and proposed Facility	Justification
		Reference Plant (2 units)	Proposed Facility (2 units)		
Nuclear Officers and Executives	200				
Support Services Administrative Support	80				
Support Services Management	200				
Total - Support Services					
Training - Develop and Conduct	150				
Training Administrative Support	80				
Training Management	200				
Total - Training					
Planning	130				
Maintenance & Construction Support	120				
Scheduling	120				
Outage Management	130				
Project Management	130				
Electrical Maintenance	130				
I&C Maintenance	130				
Mechanical Maintenance	130				
Other Craft/Toolroom/Calibration	130				

	Annual Cost per FTE (CDN\$ x 1,000 /Year per FTE)	Level of Effort - Regular, Temporary and Contract Staff (FTEs)			
Staffing Definition		Reference Plant (2 units)	Proposed Facility (2 units)	Delta between Reference Plant and proposed Facility	Justification
Work Management Administrative Support	80				
Work Management - Management	200				
Total - Work Management					
Capital Dedicated Workforce	130				
Total - Capital Dedicated Workforce					
TOTAL - BASE STAFFING					

TABLE 1.3 BASE NON-LABOUR

Cost Type	Base Non-Labour Cost Category	Reference Plant (2 units) (CDN\$ x 1,000)	Proposed Facility (2 units) (CDN\$ x 1,000)	Delta between Reference Plant and proposed Facility	Justification
Materials & Equipment	Design Engineering and Configuration Management				
Materials & Equipment	Plant Engineering and Equipment Reliability				
Materials & Equipment	Loss Prevention (excluding Security)				
Materials & Equipment	Materials & Services				
Materials & Equipment	Nuclear Fuel (operations and maintenance Support, excluding cost of fuel)				
Materials & Equipment	Operate Plant				
Materials & Equipment	Support Services				
Materials & Equipment	Training				
Materials & Equipment	Work Management				
Total Materials & Equipment					
Outside Services	Configuration Mngt				
Outside Services	Equipment Reliability				
Outside Services	Loss Prevention				
Outside Services	Materials & Services				

Cost Type	Base Non-Labour Cost Category	Reference Plant (2 units) (CDN\$ x 1,000)	Proposed Facility (2 units) (CDN\$ x 1,000)	Delta between Reference Plant and proposed Facility	Justification
Outside Services	Nuclear Fuel (operations and maintenance Support)				
Outside Services	Operate Plant				
Outside Services	Support Services				
Outside Services	Training				
Outside Services	Work Management				
Total Outside Services					
Other	Configuration Mngt				
Other	Equipment Reliability				
Other	Loss Prevention				
Other	Materials & Services				
Other	Nuclear Fuel (operations and maintenance Support)				
Other	Operate Plant				
Other	Support Services				
Other	Training				
Other	Work Management				
Total Other					

Cost Type	Base Non-Labour Cost Category	Reference Plant (2 units) (CDN\$ x 1,000)	Proposed Facility (2 units) (CDN\$ x 1,000)	Delta between Reference Plant and proposed Facility	Justification
TOTAL BASE NON-LABOUR (excluding handling of non-fuel radioactive waste)					

TABLE 1.4 RADIOACTIVE WASTE

Waste Type	Reference Plant (2 units) (m³/yr)	Proposed Facility (2 units) (m³/yr)	Delta between the Reference Plant and the proposed Facility	Justification
Low Level Waste				
Intermediate Level Waste				

TABLE 1.6 SUSTAINING INVESTMENT

Annual Investment to Sustain Plant Capacity (excluding base and outage costs) (CDN\$ x 1,000 /Year)													
Reference Plant Average Annualized (2 units) Sustaining Investment Costs:													
Proposed Facility (2 units)													
Year 1:		Year 11:		Year 21:		Year 31:		Year 41:		Year 51:		Year 61:	
Year 2:		Year 12:		Year 22:		Year 32:		Year 42:		Year 52:			
Year 3:		Year 13:		Year 23:		Year 33:		Year 43:		Year 53:			
Year 4:		Year 14:		Year 24:		Year 34:		Year 44:		Year 54:			
Year 5:		Year 15:		Year 25:		Year 35:		Year 45:		Year 55:			
Year 6:		Year 16:		Year 26:		Year 36:		Year 46:		Year 56:			
Year 7:		Year 17:		Year 27:		Year 37:		Year 47:		Year 57:			
Year 8:		Year 18:		Year 28:		Year 38:		Year 48:		Year 58:			
Year 9:		Year 19:		Year 29:		Year 39:		Year 49:		Year 59:			
Year 10:		Year 20:		Year 30:		Year 40:		Year 50:		Year 60:			
Proposed Facility Average Annualized Sustaining Investment Costs:													
Delta between annualized Reference Plant data and proposed Facility sustaining investment costs													
Justification:													

TABLE 1.7 REFURBISHMENT COSTS

	Proposed Facility (2 units)														
	Total Refurbishment days (2 units)	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14
Reference Plant															
Proposed Facility															
Delta between Reference Plant and Proposed Facility															
Justification															
Refurbishment Item	Refurbishment Costs (2008 CDN\$ x 1000 / year)														
	Lifetime Refurbishment Costs (2 units)	Proposed Facility (2 units)													
		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14
Steam Generator Replacement, if applicable (industry experience: \$800M) ³															
Proposed Facility TOTAL REFURBISHMENT COST (\$ x 1,000)															
TOTAL REFURBISHMENT COSTS (\$ x 1,000)	PHWR: \$3,400,000⁴ PWR: \$993,000⁵														
Delta between Reference Plant and Proposed Facility															
Justification															

³ Based on replacement cost for steam generators at Diablo Canyon (2200MWe) of \$706M, San Onfre (2254 MWe) of \$680M, excluding financing costs, and Bruce Unit 4 (769 MWe) of \$350M.
⁴ Based on cost estimate (18-Apr-08) for the refurbishment of Bruce A units 1 & 2 (1538 MWe), including pressure tube and calandria tube replacement, steam generator replacement, electrical system upgrades, main condenser refurbishment, feedwater heater refurbishment, and other maintenance to nuclear and balance of plant equipment.
⁵ Based on refurbishment cost for the replacement of steam generators and refurbishment of low pressure turbines, the main output transformer, reactor vessel head and the pressurizer at Fort Calhoun (478 MWe) (\$417M) in 2006. The estimate was determined by multiplying by 2 (2 units) and escalating by 2% (to convert to 2008 \$).

		Proposed Facility (2 units)					
	Total Refurbishment Days (2 units)	Year 57	Year 58	Year 59	Year 60	Year 61	Year 62
Reference Plant							
Proposed Facility							
Refurbishment Item	Refurbishment Costs (2008 CDN\$ x 1000 / year)						
		Proposed Facility (2 units)					
		Year 57	Year 58	Year 59	Year 60	Year 61	Year 62
TOTAL OUTAGE COSTS (\$ x 1,000)							

Quantity of Radioactive Waste Volumes Generated During Refurbishment				
Waste Type	Reference Plant (2 units) (m ³)	Proposed Facility (2 units) (m ³)	Delta between Reference Plant and Proposed Facility Radioactive Waste Volumes generated during refurbishment	Justification
Low Level Waste				
Intermediate Level Waste				
High Level Waste				

Attachment 2 to Schedule 6

Fuel Requirements Submission Form

TABLE 2.1 – FUEL REQUIREMENTS

See instructions in Schedule 6 to the RFP.

Fuel Requirement	Response
Max fuel gross thermal burn-up (GWd/tonne U)	
Average fuel gross thermal burn-up (GWd/tonne U)	
Thermal efficiency (%)	
Enrichment level(s) (%)	
Number of fuel assemblies at each enrichment level that are required for each reload	
Quantities of irradiated (spent) fuel including <ul style="list-style-type: none"> • Quantity of Uranium (tonnes U); • Number of fuel assemblies; • Description of fuel type (physical dimensions, weight) • Estimated decay heat after 10 years removed from core 	
Number of fuel assemblies in the initial core	
Reload fuel assembly requirements sufficient for Client to operate the unit at its Net Capacity for a period of 5-years after reaching Substantial Completion (number of assemblies per unit)	
Quantity of Uranium in a fuel assembly (tonnes U)	
Cost of fuel assembly manufacturing (do not include the cost of enriched uranium)	

Attachment 3 to Schedule 6

Output Submission Form

Attachment 4 to Schedule 6

Draft Scope Book Table of Contents

Attachment 4 is posted to the Data Room as a separate document.

Attachment 5 to Schedule 6

Summary of Evaluation Assumptions

Attachment 5 is posted in the Data Room as a separate document.