Yukon Energy Corporation (YEC) 2022 Tlingit Homeland Energy Limited Partnership (THELP) Electricity Purchase Agreement

Information Requests of YEC
from
John Maissan

Section 2 Overview of the Project

JM-YEC-1-1	Page 2 bottom and page 3 top: "A 92 km 69 kV new transmission line from a new substation at the new hydro facilities to a new interconnection substation at Jakes Corner, YK with interconnection to the YIS at the existing 34.5 kV ATCO Electric Yukon ["AEY"] facilities ["AEY System"] for transmission to YEC's S-150 substation in Whitehorse." Please provide the reliability criteria for this portion of ATCO power line and compare this to similar criteria for YEC's 138 kV and 69 kV power lines.
JM-YEC-1-2	Page 3 Figure 2-1: (a) Please provide a digital higher resolution version of Figure 2-1 so that all the project components can be clearly seen. (b) Will the new Atlin Project have a different penstock than the existing plant, and if so, will they come from the same head pond?
JM-YEC-1-3	Page 4: "…which is more than enough days to cover the 20 or less [sic] days of the PWP period when minus 30°C or lower temperature has been recorded at Whitehorse." (a) Please confirm that this is a 24-hour day, and explain what a day with minus 30°C temperature at Whitehorse is – is it a day in which the temperature reached minus 30°C at any time in the day, or in which the mean or average daily temperature is minus 30°C or lower, or in which the temperature stays below minus 30°C for the entire day? (b) Please confirm that there were no days at minus 30°C or colder outside of the Peak Winter Period in years over which the temperature records were examined by YEC.
JM-YEC-1-4	Page 4 Footnote 7: (a) Is a minus 38°C day defined in a manner consistent with the answer to JM-YEC-1-3? (b) Why is the Yukon Energy (YEC) non-industrial peak load relevant? (c) If it is relevant, is it relevant for the N-1 capacity requirement criterion for the non-industrial peak load only? (d) Are the total peak load and energy requirements <u>with</u> industrial customers not much more relevant for the thermal energy displacements that are calculated in YEC's submission and on which

	the purchase price for energy is based? Please explain in detail.
JM-YEC-1-5	Page 5 top: "Expected Winter Period deliveries to YEC per calendar year are 30.8 GWh LTA energy and 25.2 GWh firm energy during the lowest water year." And: YEC 2021 GRA Table 2.2 on page 2-17 which shows on line 27 long term average (LTA) forecast thermal generation at 15.6% (84,306/538,726) and actual thermal generation on line 21 plus line 22 at 5.6%. (a) Has YEC calculated the correlations of the Atlin Surprise Lake water years with each of the following and if so, please provide the results, and if not please explain why not. i. Whitehorse hydro ii. Aishihik hydro iii. Mayo hydro, and iv. The YIS hydro as a whole (excluding Fish Lake). (b) Please discuss what a correlation or a lack of correlation between the Atlin project and any or all of the YEC hydro plants would mean for thermal energy displacement. (c) If YEC has not used correlations, please explain how YEC has ensured that its thermal energy displacement calculations were as accurate as possible. (d) Does YEC still use weekly time step modelling for potential new projects such as this one? (e) In the YEC 2017-2018 GRA, IR JM-YEC-2-6 and in the transcript at pages 211-212, hourly time step modelling was discussed. Does YEC now have an hourly time step model, and if so, was it used in calculating thermal displacements at times when thermal generation is only used for portions of the day? And if not how did YEC ensure thermal displacement calculations at such times were accurate particularly with the assumed 39.9 GWh per year of intermittent (predominantly solar) IPP SOP generation (page A-3 Table A3-1)?
JM-YEC-1-6	Page 6 Figure 2-4 (a) For the YIS Please provide a table of monthly actual hydro generation, actual other renewable energy generation (microgeneration, IPP SOP, etc.), actual thermal generation, and actual total generation excluding any secondary sales; plus additional columns (or rows) for actual secondary sales generation and "spilled" surplus (potential) generation for each the years 2017 to 2021 inclusive. The months may be placed in rows and the generation sources in columns or vice versa as is most convenient for YEC. (b) Please provide similar tables for the YIS for the years 2024 and 2035

	as forecast and assumed in preparing this EPA.
JM-YEC-1-7	Page 6: "Project capital costs have been estimated to date at approximately $206 million." (a) If YEC were to complete a project identical in all respects to the Atlin Project, including a 40-year life, for $206 million without any grant funding what would be the levelized cost of energy (LCOE) for all energy produced, and for the energy that is forecast to displace thermal generation only. (b) What would be the levelized cost of capacity (LCOC)? (c) Please repeat the calculations provided in (a) and (b) above for a project with a net capital cost of $56 million.

Section 3 Overview of the Electricity Purchase Agreement

JM-YEC-1-8	Page 8 sub-section 3.1 (a) Please provide a copy of the Buyer-AEY System Interconnection Study Report if now concluded. If not yet concluded, please provide a copy when it is concluded. (b) During the Peak Winter Period (PWP): i. what will be the power flows toward Teslin from Jake's Corner and towards Whitehorse? ii. what will be the power flows towards Whitehorse from north of the North M'Clintock road? iii. what will be the power flows towards Whitehorse north of the Carcross cut-off? iv. what will be the power flows at the YEC S150 substation?
JM-YEC-1-9	Page 11 near top: "**Delivery of all Winter Energy available:** while YEC will only pay for winter energy that displaces thermal generation, YEC will take delivery each winter season (Sept-May) of all available energy that the Project is able to generate." and Page 12 "Delivered Energy", and Page 14 Table 3.1 The page 11 reference states that YEC will only pay for winter energy that displaces thermal generation but the page 12 reference and the pricing in Table 3-1 implies that non-firm winter energy (all available energy?) is paid for but at reduces rates. Please clarify this apparent discrepancy.
JM-YEC-1-10	Page 11 "Reliance of forecasts and forecast risk" (a) This section appears a bit confusing. Please provide a table of energy costs by year for each of the 40 years of the Electricity Purchase

	Agreement (EPA) starting in 2024 and finishing in 2065 with YEC forecast loads as in the EPA. Assume no summer energy purchase, no carbon tax, and LTA water availability in each year, i.e. 30.8 GWh per winter energy purchase. Assume an inflation rate and CPI of 2% per year including on the YUB Price of $0.19 per kWh. Please show each cost component (as per Table 3-1 on page 14) separately and the total cost. (b) Please provide a similar table for the 40 years with the mining load continuing to 2044. Assume the same non-industrial load growth as in (a) above. (c) Please provide a similar table for the 40 years with the mining load terminating in 2029. Assume the same non-industrial load growth as in (a) above. (d) For each of (a) to (c) can an LCOE using the total cost be calculated? If so, please provide these calculations.
JM-YEC-1-11	Page 11 bottom: "If YEC requests delivery of energy during the summer months (June-August) YEC pays a 'discounted' price equal to 50% of the last approved YUB blended fuel price." and Page 14 Table 3-1 (a) If the 2021 YEC GRA suggested blended fuel price is approved by the Yukon Utilities Board (YUB) would the approximate summer energy price be about $0.095 per kWh in 2024? (b) This is a higher rate than for winter non-firm winter energy (in 2024), please explain the rationale for this apparent higher pricing in summer. (c) When a pumped hydro storage facility is built on the YIS would this not discourage the use of what might otherwise be a potential benefit?

Section 4 Aspects of the Agreement for Board Review

JM-YEC-1-12	Page 17: "Winter vs Summer Shifts", and Page 21: "…The result is surplus renewable energy generation during summer (which cannot be used or sold to other jurisdictions) …" (a) In YEC's 2024 forecast used for this EPA, what time or times of day is surplus renewable energy available during the Summer Period and during the Winter Period, if any? (b) How many SCADA controlled secondary sales customers does YEC presently have? Can they be turned on and off in relatively short time blocks of say 2 hours for example? If not, what are the practical on and off time blocks? (c) What level of secondary energy sales do these represent in each of the

	months of June, July, August, and September? (d) Has YEC considered marketing secondary sales to other customers to increase secondary sales volumes and reduce greenhouse gas (GHG) emissions in line with the Yukon government's *Our Clean Future* climate change strategy?
JM-YEC-1-13	Page18 second paragraph: "… Without new resources, this shortfall and the requirement for diesel rentals is forecast to increase significantly in subsequent years due to peak load growth and the retirement of existing resources.[22, 23]" (a) Is YEC be considering uprates of WH1, WH3, AH1, AH2, and Mayo A hydro units prior to 2030? Please explain. (b) Does YEC plan to replace retiring thermal generation resources?
JM-YEC-1-14	Page 20 Figure 4-1 (a) What was this winter's (2021-2022) peak demand? (b) What was the non-industrial portion of this peak demand? (c) This Figure 4-1 shows the significant dependable capacity impact of the proposed Moon Lake pumped hydro storage project targeted to come on-stream in 2028, about 4 years into the 40-year EPA. The Moon Lake project would add some new energy (about 10 GWh per year) to the YIS and use surplus summer energy to displace winter thermal energy. Please explain how the price calculations required by the EPA can or will be made for the period following the proposed development of Moon Lake and / or another such pumped hydro facility. (d) Please explain how YEC will ensure that the ratepayer interests will be protected in all eventualities.
JM-YEC-1-15	Page 22 footnote 32: "The thermal generation displacement from IPPs can be constrained due to seasonality of IPP generation options, especially solar projects and run-of-river hydro projects, which will have materially lower winter generation output." and Page 26 last two bullets discussing IPP SOP renewable energy projects. (a) What incentives has YEC put in place to encourage materially higher winter generation from IPP SOP projects? (b) Since wind power generation produces predominantly winter energy, what specifically has YEC done to encourage cost effective wind IPP projects?
JM-YEC-1-16	Page 23 second bullet (a) Please provide the electrical energy forecast that indicated relatively stable non-industrial loads for the last 30-year period of the EPA from 2034 to 2065. What is the annual non-industrial electrical energy load

	growth rate through the 40-year EPA and through the last 30 years in particular? (b) Yukon has been experiencing significant population growth, experiencing the increasing use of electric heat for residential dwellings including switching to electric heat from fossil fuels, and Yukoners are being encouraged to switch to electric vehicles. Using only a low growth forecast and not considering the possibility of higher growth rates due to these factors appears imprudent when considering long-term ratepayer impacts. Please explain. (c) Please prepare an analysis using an annual electrical energy growth rate of 1.5% per year for this 30-year period from 2035 to 2065 inclusive and assume that the YUB Price will increase at 2% per year from $0.19 per kWh in 2024 in order to show what the ratepayer impact will be compared to assumptions in this submission. As part of the analysis please prepare a table of 40 years of energy costs such as those provided in answer to JM-YEC-1-10 for comparison purposes.

Appendix A: Supporting Figures and Tables

JM-YEC-1-17	Page A-3 Table A3-1, and Page 14, Table 3-1 (a) In the 2024 load forecast portion of the table the non-industrial load is listed as 453.3 GWh, the industrial load as 74.6 GWh, and the total load at 527.9 GWh. The YEC 2021 GRA forecast shows an industrial load of about 112.7 GWh (102.9 GWh industrial sales + 9% load losses), non-industrial load of about 427.6 GWh (by difference) and a total load of 538.7 GWh. Please explain the apparent discrepancy between the 2024 forecast and 2021 actual numbers. (b) In the 2024 forecast YEC adds forecasted increased generation of 10.2 GWh for hydro uprates and 39.9 GWh for "IPPs + incremental microgen". Since microgeneration is by definition behind the customers' meters manifesting itself as reduced load, how can such a number be determined or measured when it is a mix of measured and non-measured supplies? (c) The non-industrial load is forecast to be 483.1 GWh per year in 2035 (Table A3-5), please explain the calculation that resulted in a YIS Winter Period generation of 388 GWh per year used in Table 3-1.
JM-YEC-1-18	Pages A-5 Figure A1, and page A-6 Figure A2 (a) In the top half of each of these Figures there are numbers for energy deliveries to Jakes Corner and LTA thermal displacement. By difference we can calculate in Figure A1 a "non-thermal displacement" of 11.2 GWh and in Figure A2 of 15.8 GWh. Do these purchases result directly in an equivalent amount of "spilled" energy

	on the YIS system? Please explain what benefits the purchase of these amounts of energy have for Yukoners. (b) In the lower half of each of these figures the thermal displacement by water storage savings is shown. Do these savings include the potential longer-term benefits of having fuller reservoirs in Yukon should a significant drought occur as well as the season to season savings? (c) Are there any benefits other than thermal displacement, for example environmental, that may be experienced from the timing of the storage?
JM-YEC-1-19	Page A-8 Table A4-2 (a) Please provide the section 3 calculation of Additional Payment at the end of the Winter Period for the year 2035 with the non-industrial load at 483.1 GWh as forecast for 2034 (page A-3 Table A3-1). Assume that the dependable excess capacity payment account is nil. (b) Please provide this calculation for year 2045 with YEC's forecasted load growth and a 2% per year inflation rate on YUB Price. (c) Please provide this calculation for the year 2055 with the same assumptions as in (b) and (a) above. (d) Please provide this calculation for the year 2064 with the same assumptions as in (b) and (a) above. (e) If the above requested information is embedded in response to JM-YEC-1-10, please just reference that response.

Appendix B Summary of KEY EPA Terms and Conditions

JM-YEC-1-20	Page B-3: "YEC's winter peak non-industrial load forecast for assessing N-1 dependable capacity requirements assumes -38°C, with approximately 8 MW load being added by the average daily temperature drop below -30°C." (a) Please confirm that the -38°C referenced is, as the -30°C is stated to be, an average daily temperature. (b) Is the stated 8 MW load increase an increase in peak load or an increase in the average daily load? (c) If peak load increase is different than the average daily load increase, what is the difference between these numbers over this temperature range?

Attachment A Electricity Purchase Agreement

JM-YEC-1-21	Page A1-7 clause 2.1 (d) (ii) (a) Please provide the budgeted costs for the AEY System Upgrades.

	(b) Please provide the YEC upgrade costs.
JM-YEC-1-22	Page A1-7 clause 2.1 (d) (v) Page 1 of the EPA would appear to be page A1-2 of this submission. Please confirm that the date referenced is found on the cover of the EPA (no page number) and page 4 of the EPA (page A1-5 of submission) which is January 14, 2022.
JM-YEC-1-23	Page A1-8 clause 2.1 (d) (vii) Please confirm that the Seller has obtained the consents specified by February 28.
JM-YEC-1-24	Page A1-8 clause 2.1 (d) (ix) Please confirm that YEC has entered into an implementation agreement with AEY and please provide a copy of that agreement.
JM-YEC-1-25	Page A1-8 clause 2.3 Please indicate whether the parties intend the new agreement to take effect immediately upon completion of the renewal or replacement agreement or at the termination of the EPA at the end of May 2065.
JM-YEC-1-26	Page A1-10 clause 3.6 (a) (ii) Please provide a copy of the Buyer-AEY System Interconnection Report.
JM-YEC-1-27	Page A1-18 (top) clause 6.5: "…Buyer will give Seller notice…when it provides its monthly invoices under section 8.8." Section (clause) 8.8 does not refer to "invoices"; should clause 6.5 specify "Notice of the Meter record" as used in clause 8.8 rather than invoice?
JM-YEC-1-28	Page A1-20 clause 8.3 (a) (iii) "Capacity Shortfalls" (a) This clause appears to say that Seller will be paid for a minimum of 50% of the Actual Dependable Plant Capacity Committed in a particular year, is this the correct interpretation? If not please clarify. (b) Is the Actual Dependable Plant Capacity Committed 8 MW to 8.5 MW or can it be different? Please explain.
JM-YEC-1-29	Page A1-22 clause 8.8 (e) The last line appears to have something missing or a typo, should the word "who" come after Party?
JM-YEC-1-30	Page A1-24 clause 9.1 last sentence There appears to be something missing after "…a "material default"…".
JM-YEC-1-31	Page A1-52 clause 1.69: "in Year 2035 and for each subsequent Year $0.107/KWh*Half Inflation Index." Please clarify whether the "Half Inflation Index" begins in year 2024 or 2035.

JM-YEC-1-32	Page A1-66 EXHIBIT B-1 Please provide a higher resolution digital copy of this exhibit so that the content is legible when enlarged.