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IN THE MATTER OF THE YUKON ENERGY CORPORATION 2023-2024 GENERAL RATE APPLICATION

Heard before the

YUKON UTILITIES BOARD

March 4 - 7, 2024

FINAL ARGUMENT OF JOHN MAISSAN

Final Argument introductory comments

In the preparation of this written final argument the transcript was referenced in footnotes by volume, date, page, and line numbers. Exhibits, including the YEC GRA Application, interrogatory responses, and other documents are also referenced in footnotes. The Yukon Utilities Board is referred to as "the Board" or the YUB. Yukon Energy Corporation's (YEC) General Rate Application (GRA) is referred to as the Application.

In this argument I address both issues in which I am in agreement with the applicant, YEC, and issues on which I have a differing view or disagree with the applicant. Especially since my limited time during this GRA process limited the issues I could address, my silence on issues and requests of YEC in this argument are not to be interpreted as agreement with, or disagreement with, YEC's request or position. I leave these matters to the Board to address based on the information on the record.

Introduction

1. Growth

In the Introduction to its Application YEC points to Yukon's rapid population growth compared to Canada as a whole[1]. YEC goes on to describe a 23% increase in peak load between 2017 and 2021 and projects a further increase in non-industrial peak load of 36% to 2030. The demand for and development of housing in Yukon continues at a high pace suggesting that YEC's retail and wholesale growth will continue at a steady pace.

However, the closure of the Minto mine in early 2023 has affected the test years. In its Application YEC indicates a decrease of 1.6% in firm load in 2023 compared to 2022 actuals, but a growth in 2024 of 1.1% over 2023[2]. In part the loss of Industrial sales to the mine was offset by the start of the mine site care and maintenance as a General Service customer.

Table 2.1 in the Application[3] describes this sales picture numerically and is consistent with the ATCO Electric Yukon (AEY) recent GRA in which steady retail sales growth has been experienced and continues to be forecast. YEC must thus anticipate a steady growth in retail sales of about 1% or a bit higher beyond the two test years.

Recommendation: That the Board accepts YEC's sales forecast for the test years and considers the high probability of steady retail sales growth in the years immediately following the test years as something YEC must prepare for when considering the Application as a whole.

[1] Exhibit 1 PDF page 4.
[2] Exhibit 1 PDF page 28.
[3] Exhibit 1 PDF page 42.

2. Energy Transition

The energy transition that YEC describes in its Application[4] is real and affecting both of Yukon's regulated utilities. They will need to adapt to a different model of grid control, including the management of generation sources which they will not own (Micro-Generation and Independent Power Producers (IPPs)). This is already creating technical grid challenges requiring new technical solutions such as battery energy storage systems (BESS) to maintain grid stability and to integrate and maximize the benefits of renewable resources including hydro-electric energy and capacity to minimize the use of fossil fuels. Regulating the utilities in this new and changing environment will also be challenging for the Board.

Recommendation: That the Board keeps in mind this changing environment that the utilities must operate in when making their decisions.

3. Timing of rate increases

YEC is again proposing to implement the required rate increases at times when other temporary rate riders expire. This results in fewer rate changes and is less disruptive and confusing to consumers.

Recommendation: That the Board accepts this proposed timing of rate changes.

4. Stabilization mechanisms / deferral accounts

YEC's Application[5] contains three stabilization mechanisms that are continued from past GRAs and Board approvals: Rider F, Low Water Reserve Fund (LWRF), and the defined benefit pension deferral account.

Recommendation: That the Board accepts these three stabilization accounts.

YEC's Application also proposed one new deferral account, an IPP Purchase Cost Deferral Account[6]. I recognize the requirement for this deferral account and have no objection to its establishment. However, I do have some concerns about the calculations that are required to determine the appropriate amounts that should go into this deferral account. This matter was discussed at some length during the hearing[7], and even on re-reading the transcript I am not sure that I fully understand what the possible charges to the account will be. If, as described by Mr. Osler on page 47 line 25 to page 48 line 14, that it covers the timing differences between forecast and actual commercial in-service dates and the difference between forecast and actual production, I can accept that. What I am unsure

[4] Exhibit 1 PDF page 4.
[5] Exhibit 1 PDF page 84.
[6] Exhibit 1 PDF page 7, and pages 85 to 87.
[7] Transcript Vol. 1 March 4, 2024, page 42 line 24 to page 48 line 19

about is whether the difference paid for energy to the IPP and YEC's cost saving based on blended fuel costs only is also included, and this is where my concern lies.

Recommendation: That the Board approve the proposed IPP Purchase Cost Deferral Account to capture the differences between forecast and actual commercial in-service dates and actual vs. forecast energy production volumes only.

Sales and Generation

5. Blended thermal cost calculations

In this GRA, as in the 2021 GRA, YEC requests that the Board approve a blended long-term average thermal fuel blended price based on 90% LNG and 10% diesel[8]. When IPP contracts are signed, it is the blended fuel price most recently approved by the Board that is referenced in OIC 2019-25 as the price at which YEC purchases energy from the IPP. This price is subject to an annual CPI related adjustment.

The only year in which the actual thermal generation consisted of 90% or greater proportion of LNG generation that I could find was 2019, a drought year in which almost 70 GWh of thermal generation was required[9]; that year 94.57% was from LNG. In 2021 the LNG portion was about 53.7% and in 2022 was 58.88%, and the forecast for 2023 is 79.54% and for 2024 is 79.16%[10]. In the GRA hearing we learned that an LNG unit has been down since October 2023 and is not expected to be in service until sometime in March 2024 so the portion is likely to be less than 90% in both years.

The actual track record of LNG generation is thus substantially below the LTA blend requested by YEC. I can understand that YEC would want to be conservative in estimating the LTA blended fuel cost so as to ensure that there are no financial burdens on ratepayers from IPP contracts, however, we should be a bit more realistic about the real blended fuel price. It may be 85% LNG and 15% diesel or even 80% LNG and 20% diesel. Whatever it is the ratepayers are paying for it one way or the other. Please also see discussion under 6 and 7 below.

Recommendation: That the Board seriously consider a more realistic blended fuel price.

6. Grid modelling

The YECSIM grid model was developed for YEC and is updated regularly as required and is still used by YEC[11]. This model uses a weekly time step and is well suited to modelling Yukon's hydro resources which are dispatchable or change only on a seasonal basis. Solar photovoltaic (PV) energy ("solar"), on the other hand has a totally diurnal variation

[8] Exhibit 1 PDF page 7.
[9] YEC 2021 GRA Table 2.2.
[10] Exhibit 1 Table 2.2 PDF page 43, also Undertaking #23 Attachment 1 Table 2.2.
[11] Transcript Vol. 1 March 4, 2024 page 48 line 20 to page 50 line 16.

– it increases from nil to maximum from sunrise to midday and down to nil at sunset while electrical loads are higher and produces nothing during the night when electrical loads are lowest. It is my belief that the value of solar energy to the grid in offsetting thermal generation can only be determined accurately by a model capable of time-of-day inputs of load and solar energy.

Solar energy has been the major renewable energy success story over the past 10 years but now we need to ensure that we further develop this resource in a way that supports our grid's needs.

As discussed in this GRA hearing, YEC was looking at or for a better model in 2018 the 2018 GRA hearing and also that model changes may be considered going forward[12]. Given the now significant portion of solar energy on the grid during the summer months from both the Micro-Generation Program and the IPP Standing Offer Program (SOP), it is important to develop a better knowledge base to help further refine these programs to the benefit of ratepayers.

Wind energy has a bit of a diurnal component during the 6 or 7 warmer months but none during the coldest winter months, and it may be that the YECSIM model in weekly time steps is still adequate for wind energy assessments.

Recommendation: That the Board instruct YEC to explore options to adapt the YECSIM model to be able to fully model the diurnal nature of solar energy or to find a model that can work with YECSIM to do that and bring a viable option forward in the next GRA.

7. IPP Standing Offer and Micro-Generation Programs

The Yukon government's IPP SOP expanded program of 40 GWh per year of renewable energy was said to have been fully subscribed in the past. As part of a response to an IR from the Board[13] YEC submitted a table of IPP SOP projects and their forecast production for 2023 and 2024. An updated version of this table was provided at outset of the GRA hearing as part of YEC's opening statement and updates[14]. During cross examination[15] we learned that some projects had been withdrawn and that the project queue was no longer full. From the updated table of IPP Generation it would appear to me that listed projects would provide about 30 GWh per year, roughly 75% of which would be solar, the remainder being wind.

In late summer of 2023, I heard informally from the Yukon government's Department of Energy Mines and Resources (Energy Branch) that about 7 MW of AC Micro-Generation

[12] Transcript Vol. 1 March 4, 2024 page 49 line 15 to page 50 line 4.
[13] Exhibit 2 PDF page 250, YUB-YEC-1-14.
[14] Exhibit 10 PDF page 9.
[15] Transcript Vol. 1 March 4, 2024 page 36 line 14 to page 37 line 21.

capacity had been installed on the grid by that time. All of this was solar. I also heard for the first time that the utilities had concerns about grid instability. On November 15, 2023, the Minister of Energy Mines and Resources said that the Micro-Generation program would be paused.

When this information became widely known, there was further mention of grid electrical instability being caused, or contributed to, by the amount of solar generation on the grid relative to the grid load. There was discussion of this during the hearing with the assistance of Exhibit 12[16]. Based on the responses of Mr. Murchison, the instability arises at grid loads between 30 MW and 40 MW or from 30 MW but below 50 MW. It is worth noting that daytime grid loads below 30 MW would also be a problem, but I have not observed daytime loads (when solar generation would be active) y dropping below 30 MW.

As mentioned earlier solar has been the big success story of the past 10 years. Globally it now has the reputation of being the lowest cost renewable energy supply available. Solar energy will remain in Yukon's future; however, the grid instability concerns need to be addressed. I was encouraged to hear that YEC is working with the Yukon Government, Yukon Development Corporation (YDC), and AEY in studying the issue. Part of that study purpose being to confirm how much intermittent renewables the BESS project can help our grid accommodate[17] [18]. I have also heard from other sources that the Yukon Government is addressing some of the Micro-Generation related issues through changes in the settings of Micro-Generation inverters.

In my view it is time, now that solar energy in Yukon has proven itself, for the parties that YEC mentions in the above paragraph to work together on adjustments to both the IPP SOP and Micro-Generation programs to both target them to Yukon's specific needs and to make them cost-effective for YEC and ratepayers. This means increasing winter generation and possibly decreasing summer generation. One possible way to do that is to increase winter power purchase rates to better reflect marginal winter thermal generation costs and reduce summer purchase rates (or limit summer production). The parties should keep in mind that at some point in future more summer solar generation may be beneficial, for example to help power a pumped hydro storage project or to supply electricity to potential summer only loads such as agriculture or hydrogen production.

YEC's actual variable thermal costs are higher than the present or proposed blended fuel price that OIC 2019-25 stipulates must be the purchase price in IPP SOP contracts. This provides the capability to adjust prices. Some examples of these variable costs are presented below.

[16] Transcript Vol. 1 March 4, 2024, page 50 line 17 to page 56 line 3.
[17] Transcript Vol. 1 March 4, 2024, page 31 line 1 to page 32 line 18.
[18] Transcript Vol. 4 March 7, 2024, page 584 line 11 to page 586 line 9.

In 5 above the actual mix of LNG and diesel are discussed. YEC has again requested approval to assume a 90% LNG and 10% diesel which at the forecasted costs of $0.3069 per kWh for diesel and $0.1906 per kWh for LNG[19] results in a blended price of $0.2021 per kWh. The forecasted use of LNG and diesel is shown in Table 2.2[20] and the actual forecasted blend is closer to 80% LNG and 20% diesel which at forecasted LNG and diesel fuel costs would yield a blended cost of $0.2138 per kWh about $0.01 per kWh higher than proposed.

Insurance is paid on YEC's assets as outlined in the Application and the costs within the deductible portion are covered by the reserve for injuries and damages (RFID)[21]. The insurance and RFID costs total over $3 million for 2024. YEC's ratepayers pay these costs but IPPs must pay their own insurance and "RFID" type costs. Examples of the RFID costs are costs related to the LNG generator that failed last October and is not expected back in service until sometime in March 2024. As YEC testified, the repair cost and the additional cost for replacing the energy with diesel generated energy will go the RFID[22].

In the Application under deferred studies[23] there is a cost of $413,000 identified for Whitehorse Rapids Generating Station (WRGS) assessment and permitting. This cost is to be capitalized and depreciated[24]. Another cost paid for by ratepayers not in the IPP power purchase cost.

Some repairs or replacements on thermal generating units are capitalized and added to rate base. In Table 5.6 of Exhibit 1(d) there are two repair / maintenance expenses on LNG units ($500,000 for cylinder head swap, and $300,000 for a radiator replacement) which apparently are to be capitalized and depreciated. With the assistance of an aid to cross-examination[25] from the 2021 YEC GRA, various other costs related to thermal generation assets are also said to be depreciated aver an appropriate period. The entire discussion is on the record[26].

Even when thermal costs are charged to the RFID or to a capital expense, any thermal generation displaced by IPP generation will save ratepayers the cost of the actual fuel mix being used at that time. If IPP generation at that time is only credited for the 90% LNG and 10% diesel mix their contribution is not being fully recognized. Any return on rate base only adds to consumer costs.

YEC also incurs labour and maintenance material (oil, filters, and other routine replacement costs) production costs related to thermal generation as included in the

[19] Exhibit 1 PDF page 7.
[20] Exhibit 1 Table 2.2 PDF page 43, also Undertaking #23 Attachment 1 Table 2.2.
[21] Exhibit 1 Table 3.10 PDF page 71.
[22] Transcript Vol. 1 March 4, 2024, page 75 line 10 to page 77 line 3.
[23] Exhibit 1 PDF page 384.
[24] Transcript Vol. 1 March 4, 2024, page 65 line 21 to page 66 line 13.
[25] Exhibit 13.
[26] Transcript Vol. 1 March 4, 2024, page 77 line 25 to page 80 line 21.

Application in Table 3.5[27]. Labour costs in this table, however, are not differentiated between hydro and thermal generation.

Some other benefits of IPPs to Yukon rate payers are also discussed on the record[28].

In summary, there are a number of incremental thermal generation related costs that YEC incurs (and that ratepayers pay for) including insurance, RFID, capitalized costs, production costs, and others, that are not presently being added to the IPP purchase energy price. These costs when added to the fuel costs would assist YEC, YDC, Yukon Government, and AEY working together to redesign IPP SOP program (and possibly Micro-Generation) seasonal and perhaps even time-of-day purchase rates. The goal would be to increase winter generation and make sure that IPP purchases are cost effective for the utilities, the consumers, and government.

Recommendation: That the Board instruct YEC to track all incremental thermal generation costs starting in 2024.

Recommendation: That the Board encourage YEC and partners (YDC, Yukon Government, and AEY) to work together to update the IPP SOP and Micro-Generation programs as necessary to be more cost effective.

Recommendation: That the Board encourage YEC (and recommend to the Yukon Government) that no further IPP SOP program solar applications are accepted until the program has been updated.

8. Secondary sales / summer sales

YEC is concerned about grid instability caused by lower summer loads and increasing amounts of solar energy during these lower load periods. As discussed in 7 above, grid loads below 40 MW are the concern when coupled with a significant percentage of solar generation. With less than 40 MW of load for YEC's hydro plants there is obviously a hydro surplus (Whitehorse Rapids alone is capable of about 40 MW, plus there is the Mayo hydro facility running as well). With IPP solar generation added in (increasing in 2024) there could be several MW of surplus capacity much of the time. Perhaps it is again time for YEC to seriously consider the possibility of ramping up secondary sales.

An alternative would be to explore and target potential summer loads. Agriculture may represent opportunities as might something like hydrogen production for storage and subsequent use as a supplement in YEC's LNG generators or even some third party heating systems.

Recommendation: That the Board encourage YEC to explore additional secondary or summer surplus sales.

[27] Exhibit 1 PDF page 64.
[28] Transcript Vol. 1 March 4, 2024, page 87 lines 6 to 22.

Capital Projects

9. Business in a better way

In response to a response to a Board question YEC describes a process of "doing business a better way" [29]. Given the lack of success in YEC hydro projects and water license renewals over about the past 10 years, I believe that this is a very positive step. Many millions of dollars of ratepayers' money have been written off in efforts like the Next Generation Hydro, Gladstone diversions, Southern Lakes enhanced storage plan, and the Aishihik long-term water license renewal. And other potential projects are stalled. I really feel that this approach has a better chance of success.

This approach is also applicable to projects such as the BESS project and any required back-up thermal generation project.

Recommendation: That the Board encourage YEC in this new approach in hydro and other capital projects and that YEC thereby be encouraged to focus on long-term cost-effectiveness to ratepayers.

10. Battery project (BESS)

Based on the matters discussed in 7 above the project (which is well behind schedule) is of significant importance to the grid. Besides its principal regular function of providing 7.2 MW of firm capacity to displace rental diesel generators, the 2021 BESS proceeding also identified enabling the integration of intermittent renewable energy into the grid and providing spinning reserve for the grid as significant additional grid services.

Recommendation: That the Board encourage YEC to proceed as expeditiously as possible with the installation and the programming / tuning of the BESS to provide these important grid services.

11 Atlin hydro project

The Atlin hydro project wanting to be developed by the Tlingit Homeland Energy Limited Partnership (THELP) is on hold right now due to a funding gap. This project could provide firm winter capacity and winter energy to the Yukon grid. In my opinion the Power Purchase Agreement, which was examined in a Board proceeding, has a power purchase price which is quite advantageous to Yukon consumers. The possibility of a higher purchase price making the project economic was explored briefly in the hearing[30]. Mr. Milner's responses suggest that there are some other factors like permitting which need to be resolved first before such options are considered.

[29] Exhibit 2 PDF page 220, YUB-YEC-1-2.
[30] Transcript Vol. 1 March 4, 2024, page 39 line 1 to page 40 line 5.

Recommendation: That the Board encourage YEC to remain open to the development of this project in light of the fact that it could provide both firm winter capacity and energy. The possibility of an adjustment in power purchase price, if necessary, should also be considered.

12. WH2 and WH4 upgrades

In the 2021 GRA the Board did not allow the full costs incurred in the upgrade projects on WH2 and WH4. YEC has now provided more detailed business cases to justify these expenditures[31]. These upgrades add some additional dependable capacity and add additional renewable energy to the grid and are shown to be cost effective for ratepayers. In my view getting the most out of existing hydro facilities cost effectively should always be a priority supply option.

Recommendation: That the Board now allow the previously disallowed capital costs for these projects into rate base.

13. Demand Side Management (DSM)

YEC's DSM program is described in some detail in the Application and is supported by two attachments[32]. In my view this is a solid and justifiable program, a "no-brainer", in light of rapidly growing peak demands and the cost and complexities of rental diesels required to meet the N-1 planning criterion.

Recommendation: That the Board approve YEC's DSM program and encourages YEC to continue to pursue all cost-effective DSM options.

14. Rent vs. buy diesels for capacity

The need for rental diesel generators to supply the required back-up for the N-1 planning criterion has been covered at length in the Application, in IRs and in the hearing. The need to meet the significant and growing winter peak was addressed in the Application and in Mr. Milner's opening remarks to the hearing[33]. The need for these rental units in the coming years is best illustrated in Table 1 in response to a YUB IR, YUB-YEC-1-1[34]. With the planned addition of YEC owned diesels in various locations, the BESS project, and with DSM there is still a shortfall in dependable capacity of 19.7 MW for the winter of 2025-2026 and the shortfall increases by about 2.5 MW per year. Should the Atlin project get built before 2026-2027 winter the shortfall would be 13.5 MW that winter, but at the present rate of winter peak growth would be in excess of 20 MW by the winter of 2029-2030.

[31] Exhibit 1 PDF pages 184-192 (WH2) and pages 193-197 (WH4)
[32] Exhibit 1 PDF pages 236-259 and pages 262-375
[33] Transcript Vol. 1 March 4, 2024, page 21 line 24 to page 23 line 3.
[34] Exhibit 2 PDF page 216.

The response to IR YUB-YEC-1-48 Attachment 1[35] is an Excel workbook with two spreadsheets. The first analyzes the levelized cost of capacity (LCOC) for three 1.8 MW diesel rental units over 15 years and the second the LCOC for 5 MW of YEC owned diesel capacity over 15 years. The rented diesel option LCOC is $249,944 and the purchase option LCOC $261,659 or about 4.7% higher than the rental option.

In an extensive discussion in the hearing[36], and including a subsequent undertaking response, we learned that there are advantages to the YEC owned diesel option including a higher level of reliability, a higher level of environmental cleanliness, lower maintenance costs with the lower RPM units, and always having reliable dependable capacity available "in the background" for the more reliable integration of intermittent power sources.

Adding to this analysis the uncertainty of the availability of an adequate number of rental units convinces me that a new YEC owned plant of about 20 MW of diesel capacity should be added to the grid as being a better value for ratepayers in the longer-term. Based on YEC's Application such a plant is likely to be composed of modular units[37] making it more saleable than a single large building. A new diesel plant project could be sourced through the "doing business a better way" process.

Recommendation: That the Board strongly encourage YEC to develop a YEC owned diesel plant of about 20 MW capacity.

Return on rate base / return on equity

15. Cost of debt, no cost capital, and capital structure

I have no issues with YEC's applied for cost of debt, nor with YEC's proposed capital structure of 40% equity.

Recommendation: That the Board accepts YEC's application with respect to cost of debt and a capital structure that includes 40% equity.

16. Return on Equity (ROE)

YEC in its opening statement indicated that its ROE would depend on the Board decision for AEY's ROE[38] and that its ROE should be consistent with that decision.

Recommendation: That the Board set YEC's ROE consistent with the Board's decision on AEY's ROE decision as it has done in the past.

[35] Exhibit 2A.
[36] Transcript Vol. 1 March 4, 2024, page 57 line 21 to page 63 line 19; and page 70 lines 14-23.
[37] Exhibit 1 PDF page 93.
[38] Exhibit 10 PDF page 11.

Other matters

16. Terms and Conditions of Service inflation adjustment

In the recent AEY GRA hearing it was stated that AEY did not object to the YUB raising the maximum company investment levels in existing (2011) Terms and Conditions of Service Schedule B parts (a) and (b) but noted that this would increase revenue requirement. Some ratepayers are struggling with the high cost of upgrades to electrical service and even upgrades to transformers should they wish to install electric heat, or heat pumps, or electric vehicle chargers. Inflation since these Terms and Conditions of Service were developed is about 35% and the need to proceed with the necessary energy transition to avoid the worst of the climate crisis is urgent.

Should the Board decide that this is to be done, this decision should also be applied to YEC.

Recommendation: That the Board decision on the maximum company investment levels in Schedule B parts (a) and (b) to the Terms and Conditions of Service in the AEY GRA proceeding also be applied to YEC.

Respectfully submitted,

John Maissan
March 22, 2024