YUKON UTILITIES BOARD

Report to Yukon Minister of Justice on

Yukon Energy Corporation Electricity Purchase Agreement with

Tlingit Homeland Energy LP

under Section 18 of the *Public Utilities Act*

October 18, 2022

1 INTRODUCTION

On May 18, 2021, the Minister of Justice directed the Yukon Utilities Board (Board), pursuant to Subsection 18(1) of the *Public Utilities Act*, to perform a detailed review of the Energy Purchase Agreement (EPA) being developed between Yukon Energy Corporation (YEC) and Tlingit Homeland Energy LP (THELP) to acquire power from the Atlin Hydro Expansion project.

The letter included Terms of Reference, which set out the purpose and the specific aspects of the Energy Purchase Agreement to be reviewed and stipulated that the Board hold a public review and submit its report within 180 days of when the EPA was finalized and provided to the Board by YEC. The Minister noted that Section 50 of the *Public Utilities Act* requires ministerial approval in advance of any inquiry or public hearing under the Act and, with the May 18, 2021 letter, granted approval for the public review.

The Board received a cover letter and application from YEC, dated January 20, 2022, regarding the YEC-THELP EPA. On February 1, 2022, the Board issued Board Order 2022-01, which gave notice of the Application and set out the process schedule for the Application.

Board Order 2022-01 indicated that parties intending to participate in the proceeding register in writing with the Board by February 14, 2022. The Board received requests for intervener status from ATCO Electric Yukon (AEY), the City of Whitehorse (CW), John Maissan (JM), Nathaniel Yee (NY), and the Utilities Consumers' Group (UCG). All requests for intervener status were granted in Board Order 2022-02 dated February 17, 2022.

In addition, in accordance with the proceeding schedule set out in Board Order 2022-01, a public information workshop was held, Information Requests (IRs) were sent to YEC and IR responses were received from YEC. No intervener evidence was received by the March 22, 2022 deadline.

On April 8, 2022, YEC filed a letter with the Board requesting a postponement of the oral hearing scheduled for April 20 to 22, 2022 due to project design changes and required amendments to the EPA. The Board issued a memorandum on April 14, 2022 granting YEC's request and placing the proceeding in abeyance until YEC provided the revised EPA.

YEC submitted its Amended EPA to the Board on April 20, 2022. The Board issued Board Order 2022-05 on April 28, 2022, providing the revised process

schedule for the remainder of this proceeding. In accordance with the revised process schedule, Round 2 IRs were issued to YEC and Round 2 IR responses were received from YEC. No submissions were received by the Board from members of the public by the July 4, 2022 deadline. A virtual public hearing was held July 19 and 20, 2022, written final argument was received by July 28, 2022, and written reply argument was received by August 4, 2022. The Board considers the record for this proceeding closed as of August 4, 2022.

1.1 Overview of the project, EPA and Amended Application

In its Amended Application, YEC stated the purpose of the Atlin Hydro Expansion project is to expand the Taku River Tlingit First Nation (TRTFN) existing 2.1 MW hydro facility. The expansion project would add a 9.3 MW hydroelectric facility that will provide the Yukon Integrated System (YIS) at Jakes Corner with 8.75 MW of dependable winter capacity and 42 GWh/year of long-term average renewable hydro energy if operated throughout the year. The expansion will be dedicated to supplying the YIS during the term of the Amended EPA. The expansion project includes:

- A Surprise Lake intake structure to control inflows from Surprise Lake into the new penstock and to increase Surprise Lake storage within existing water licence levels;
- A new 18.8 km penstock to connect the Surprise Lake intake structure to the new powerhouse, with a tap to connect the penstock to the existing plant;
- A new 9.3 MW powerhouse located in the lower reaches of Pine Creek, approximately 4 km below the existing plant; and
- 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 with interconnection to the YIS at the existing 34.5 kV AEY facilities for transmission to YEC's S-150 substation in Whitehorse.[1]

The expansion project will include upgrades to the YIS to accommodate the capacity and energy deliverables.

The EPA is for a term of 40 years from the commercial operation date and full production is planned to be available by December of 2025. The EPA contains a renewal provision that allows YEC to renew or replace the Agreement to continue to receive electricity until the end of the project's useful life.

[1] YEC's Amended Application, page 3, PDF page 7.

The EPA used an amalgam of the YEC Standing Offer Program (SOP) EPA and the BC Hydro Independent Power Producer (IPP) Large Project EPA as a starting template. The EPA also includes other commercial principles and basic terms, such as delivery of dependable capacity, that are relevant to both parties.

The EPA includes Schedule B which describes THELP's hydro-generation and related transmission components, defined as the "Sellers Plant" plus upgrades to the YIS that are required.

Article 2 of the EPA identifies the Conditions Precedent which must be completed and agreed to by the parties to the Agreement to give the Agreement legal force. These include completion of other related agreements such as a project funding plan, environmental authorizations, TRTFN approval and any required Government of Yukon approvals. The EPA provides for discussions on a renewal or replacement of the EPA to begin on the 30th anniversary with the objective to finalize the renewal or replacement of the EPA before the 35th anniversary.

Articles 3-5 of the EPA set out terms regarding construction and operation responsibilities, commercial operation dates and targets and special operation terms regarding THELP's project facilities including outage provisions, the annual dependable plant capacity test and operating rules for the seller's plant.

Commercial terms are enumerated in Articles 6-8 of the EPA. These include such items as payments for energy and capacity, thermal benchmark pricing, reliance of forecasts and forecast risk and sharing the benefit of upside opportunities.

2 TERMS OF REFERENCE

The Minister stated that the general purpose of the review and hearing of the Board was to "obtain the YUB's report and any recommendations on the potential benefits, costs, risks and customer impacts that influence whether the Agreement should proceed as proposed by YEC."[2] In the Terms of Reference, the Minister requested that the Board review the following specific aspects of the Agreement:

> The YUB shall report on, and make recommendations about, the necessity for the Agreement, its timing and proposed terms and conditions, with particular regard to:

[2] Minister of Justice's Terms of Reference, May 18, 2021, PDF page 4.

a. The public need for the Agreement under various reasonable electric load forecasts.

b. The effect of the proposed commitments on the rates of customers and the reliability of electricity service provided to customers.

c. The capability of existing and currently committed and expected generation and transmission facilities including thermal generation facilities to provide reliable electric power generation to meet the forecast load requirements in (a) and the effect of the Agreement on this capability.

d. The risks associated with the Agreement, including its potential impacts on YEC and rates for customers and on the reliability of electricity service provided to customers.

e. Evidence that all reasonable alternative options have been considered, and that proposed spending commitments have been selected on reasonable grounds.

f. Whether it is prudent to enter into the Agreement as proposed at this time.[3]

Also, the Board may make any other recommendations or provide any other information that it considers advisable in the circumstances.

Further, the Minister indicated that the Board shall submit its report and recommendations no later than 180 days from the date that the YUB receives a final version of the Agreement from the YEC.

3 REPORT OF THE BOARD

In this Report, as requested, the Board addresses each of the specific Terms of Reference in the order set out above, having regard to the necessity for the Agreement, its timing and proposed terms and conditions.

[3] Minister of Justice's Terms of Reference, May 18, 2021, PDF pages 4-5.

3.1 Public need for the Agreement under various reasonable electric load forecasts – Term of Reference 3.a.

YEC

YEC referenced its updated 10-Year Renewable Electricity Plan that showed the YIS non-industrial peak load continuing to grow between 2021 and 2030 and a growing capacity shortfall absent reliance on rental diesel units.[4] The following was noted from the Board's report on YEC's Battery Energy Storage System (BESS):

> The Board agrees with YEC's and Mr. Maissan's submissions that new load growth is anticipated due to: new industrial mine loads at the Minto, Alexco and Victoria Gold mines; an increase in residential housing in Yukon and an associated increase in demand for electric heat; and government electrification policy initiatives resulting in, for example, a projected increase in zero-emission vehicles.
>
> In the circumstances detailed by YEC in its Application, supporting documents, and testimony, the Board finds sufficient evidence on the record to reasonably accept that load will continue to grow and that a large capacity shortfall gap will exist until YEC connects additional supply options. One of these options is the BESS Project, and removing it from the supply mix would keep the system at a capacity shortfall.
>
> Currently and into the future, unless a permanent thermal option is pursued, YEC will need to continue relying on rented diesel units to address the capacity shortfall. The BESS Project is expected to operate in lieu of, and eliminate the need to rent, four 1.8 MW diesel units. In its Application, YEC mentioned the challenges of finding these rental units and locating and connecting these units safely to the YIS. YEC provided the Board with its competitive process
> for sourcing rented diesel units in 2018-19, 2019-20, and 2020-21. During the years 2018-19, 2019-20, and 2020-21, YEC ran a one-year public competitive tender process for six 2-MW units for placement at the Whitehorse Rapids Generation Station, a three-year tender process for up to eight 2-MW units, and is searching the market for cost-effective options for rental units, respectively. YEC also confirmed at the hearing that rented

[4] YEC Amended Application, page 19, PDF page 23, including references to Table 4-1 and Figure 4-1 (Amended Application, page 21, PDF page 25).

> diesel units are not as reliable as more permanent solutions. The Board is persuaded that only relying on rented diesel generators would be challenging and would not be a reliable way of closing the capacity shortfall gap.[5] (footnotes removed)

In summary, YEC stated:

> In considering new dependable capacity resources for the YIS in this long-term context it is important to re-iterate that the requirement is based on non-industrial load forecasts. Unlike energy resources, where loss of mine loads can quickly create surplus resource conditions, the forecast non-industrial load peak winter load requirement continues to grow during the next 10 to 20 years regardless of actual mine loads.[6]

YEC added that for long-term planning and ratepayer cost estimates, YEC relies on long-term average (LTA):

- Electricity demand on the YIS is highly variable, with seasonal mismatch between the timing of maximum electricity availability from renewable generation and maximum customer demand resulting in summer surplus renewable generation and reliance on winter thermal generation to meet peak demand.
- Hydro generation systems similar to the YIS are vulnerable to drought.
- LTA forecasts and related thermal energy requirements are sensitive to the level of industrial loads.

In its Amended Application, YEC indicated:

> In summary, based on the available load forecasts and assumed development of other new renewables by 2024, the Project is expected over its 40-year Amended EPA operating Term to displace between 17.3 and 24.2 GWh/year of LTA thermal energy generation otherwise expected to be required on the YIS to supply forecast electric load.
>
> As shown above, this estimated LTA thermal energy displacement benefit is sensitive to changes in YIS load forecasts and in the quantum of other new

[5] Yukon Utilities Board Report to Yukon Minister of Justice, Yukon Energy Corporation Application for Energy Project Certificate and Energy Operation Certificate Regarding the Proposed Battery Energy Storage System (BESS) Project, page 11.
[6] YEC Amended Application, page 22, PDF page 26.

> renewable energy resources actually developed and connected to the YIS. The Project's hydro storage and related dependable capacity capability, however, result in an enhanced capability relative to other potential near-term additional new renewable resource options to displace LTA thermal energy generation for any given load and new renewable energy scenario.[7] (footnote removed)

Further, YEC's Amended Application stated that its 10-Year Renewable Electricity Plan includes updated firm generation load forecasts for 2020 to 2030 and beyond. The updated firm load forecasts include the expected impacts of several electrification policies being introduced by the Government of Yukon to achieve emission reduction targets.[8]

From a capacity perspective, YEC forecasts for 2021-22, based on the N-1 Capacity Planning Criteria, after the expected effects of DSM and the WH2 uprate, a capacity shortfall of 26.96 MW.[9] Without further new resources, the capacity shortfall would grow to 61.2 MW by 2030-31.[10]

Table 4-1 of the Amended Application forecasts non-industrial peak capacity of 104,102 kW in 2021-22, growing to 138,676 kW by 2030-31.[11]

YEC indicated that LTA thermal displacement benefits estimated for 2024 are assumed to apply for the years from 2024 through 2034 (assumes the continuation of existing mines for this time period), and the LTA thermal displacement benefits estimated for 2035 and beyond did not include any mine loads.[12]
YEC argued that the primary need for the EPA is to contribute to YEC's ability to meet N-1 dependable capacity requirements and to displace thermal generation with renewable energy. This primary need was not challenged during IRs or at the oral hearing.[13]

[7] YEC Amended Application, page 24, PDF page 28.
[8] YEC Amended Application, page 17, PDF page 21.
[9] YEC Amended Application, page 18, PDF page 22.
[10] YEC Amended Application, page 19, PDF page 23, footnote 23.
[11] YEC Amended Application, page 21, PDF page 25, Table 4-1.
[12] YEC Amended Application, page 24, PDF page 28.
[13] YEC Final Argument, page 2, PDF page 4.

YEC concluded that:

> The reduction in thermal generation requirements provided by the EPA addresses the public need to reduce YIS thermal generation in support of Yukon's climate change objectives in "Our Clean Future" and specifically the 93% renewable portfolio standard in the anticipated Clean Energy Act.[14]

John Maissan

Mr. Maissan stated that peak non-industrial load has been growing and that another mine non-grid connected load has been given a green light by the Yukon and federal governments. Housing needs and supply is continuing to grow at a rapid pace and the peak non-industrial electric loads that the N-1 criterion requires that the grid must be able to supply will continue to increase steadily. Mr. Maissan added that policies of all levels of government will add to both peak and energy load growth.[15]

In terms of load growth, Mr. Maissan said that the total energy load forecast for 2024 is 527.9 GWh (453.3 GWh non-industrial), acknowledging YEC's position that this forecast represents load growth of about 2% per year from the 2021 GRA non-industrial load forecast of 426.7 GWh (with losses). Mr. Maissan added that actual 2021 non-industrial load was 428.7 GWh with losses (about 0.5% above forecast).

Present grid-connected mines are operating in a favourable economic climate and it appears unlikely that there will be shutdowns in the near term. This supports YEC's load forecasting as being sound and that the EPA forecast for 2024 to 2034 is reasonable. This includes both the non-industrial energy and peak load required to meet the N-1 planning criterion.[16]

For the EPA period starting in 2035 to the end of the 40-year agreement, Mr. Maissan opined that to not include any mine loads for that period was unrealistic but added that the EPA does balance the forecast for 2035 and thereafter with provision for up to 68 GWh per year of additional electric load during the winter period, with provision for additional payments to THELP for 12.9% of this energy. Overall, Mr. Maissan was of the view that the forecast is reasonable for negotiating the EPA and is conservative from a ratepayer perspective.[17]

[14] YEC Final Argument, page 4, PDF page 6.
[15] John Maissan Final Argument, page 1, PDF page 2.
[16] John Maissan Final Argument, page 2, PDF page 3.
[17] John Maissan Final Argument, page 2, PDF page 3.

Nathaniel Yee

Mr. Yee stated that there does seem to be a need for the Agreement and that he liked both the EPA and BESS.[18]

Board views

The Board finds that a need for the EPA has been established. The Board agrees with submissions of the parties that new load growth is likely due to continued growth in residential home heating via electricity, increase in residential units and government policy supporting lower greenhouse gas emissions and addressing climate change issues.

In the circumstances detailed by YEC in its Amended Application, supporting documents and testimony, the Board finds sufficient evidence on the record to accept that load will continue to grow and that a large capacity shortfall gap will exist until YEC connects additional supply options. One of these options is the EPA, and removing it from the supply mix would exacerbate the system capacity shortfall. However, YEC has not forecast any industrial loads past 2034. For this forecast of no mine loads, tertiary effects should be expected, namely, reduced residential and commercial load (as businesses that supported the mine, local mine employees and employees of local businesses will likely decline). YEC has not shown a reduction in either commercial or residential load due to the decline of the mine load. The YEC response to this was that the forecast represented conservative growth.

Currently and into the future, unless other options are pursued, YEC will continue to rely on rented diesel units to address the capacity shortfall. The EPA is expected to eliminate the need to rent five 1.8 MW diesel units. In its BESS application, YEC referred to the challenges of finding these rental units and locating and connecting these units safely to the YIS.[19] YEC also confirmed at the hearing that rented diesel units are not as reliable as more permanent solutions.[20] The Board is persuaded that only relying on rented diesel generators would be challenging and would not be a reliable way of closing the capacity shortfall gap.

[18] Nathaniel Yee Final Argument, paragraph 29, PDF page 5.
[19] YEC BESS Application, Section 4.2, PDF page 33, footnote 40. This issue has been communicated in the BESS proceeding, YEC's 2021 GRA and this proceeding and has also been cited in YEC's Final Argument for this proceeding, page 4, PDF page 6.
[20] YEC BESS Application, Transcript Volume 1, page 123, PDF page 123, line 21 to line 23.

YEC indicated that one alternative to meeting the capacity shortfall would be to connect a permanent thermal (diesel) plant. However, in the BESS proceeding, YEC stated that this option was less popular with stakeholders in public consultations and was rejected by its Board of Directors.[21] In this proceeding, YEC stated that BESS and the EPA, aside from new thermal generation, have the capability to remove some forecast N-1 dependable capacity shortfalls and reliance on rented diesels.[22] YEC added that the additional permanent thermal generation alternative is not supported by stakeholders and is not in line with Government of Yukon goals.[23] However, YEC has been renting diesels since 2016 and expects to be renting diesels past 2030. Renting for at least 14 years is not a short-term event or solution. YEC has not shown the rentals to be a least-cost solution on a short-term or long-term basis. Although these costs were accepted in the 2021 GRA, YEC will need to show the least cost thermal alternative of rentals versus permanent thermal at the time of its next GRA or risk finding that those diesel rental costs were imprudently incurred.

3.2 The effect of the proposed commitments on the rates of customers and the reliability of electricity service provided to customers – Term of Reference 3.b.

YEC

YEC stated that the Amended EPA is to maintain and likely enhance current service reliability. "Hydro generation that expands on existing operations with appropriate storage and a good water year record (as is the case for the Amended EPA) is viewed as a reliable renewable service option for the YIS."[24]

YEC submitted that the effect on customer rates of energy and capacity purchases is constrained by the agreed price and payment terms and what will actually be delivered to AEY[25] through the EPA.[26] A permanent thermal generation option is used by YEC to establish the basis for cost impacts on YEC and customer rates for the dependable capacity and delivered energy expected from the EPA.

[21] YEC BESS Application, YEC responses to YUB information requests, YUB-YEC-1-43, PDF page 159.
[22] Amended Application, page 24, PDF page 28.
[23] Amended Application, page 24, PDF page 28.
[24] Amended Application, page 25, PDF page 29.
[25] The delivery point for the EPA purchases is in AEY territory.
[26] Amended Application, page 25, PDF page 29.

For this, the EPA has a dependable capacity payment to THELP for its dependable plant capacity committed to YEC. The dependable capacity payment price starts at $200/kW[27] in 2024 dollars and is escalated at 50% of CPI after 2024.

Regarding the Amended EPA, for winter delivered energy, YEC will pay a price based on the expected thermal blended fuel (90% LNG and 10% diesel) cost of $0.19/kWh in 2024 and escalated at 50% of CPI each year thereafter. The price is limited to forecast LTA thermal energy volumes that will be avoided by deliveries through the EPA.

YEC noted that the extent to which the Amended EPA energy price equals thermal fuel costs displaced throughout the Amended EPA term will depend upon approved fuel prices in rates, changes in the forecast fuel mix (LNG versus diesel), YIS actual load and other connected renewable energy sources. YEC added that any potential carbon tax will increase the benefits of the EPA over the thermal alternative.[28]

In terms of pricing, YEC stated:

> The principle #2 at page 11 is that the EPA price is based on YEC only paying for forecast thermal generation displaced by winter energy (e.g., LTA displacement of 24.2 GWh for 2024). Principle #3 then states that YEC purchases all available winter energy that THELP provides (LTA deliveries of 34.0 GWh).[29]

In comparison to the SOP for IPPs, YEC claimed that for similar volumes and pricing assumptions, the SOP IPP option would cost more and not provide any dependable capacity.[30]

Balance sheet impacts and therefore the effects on rate base had some uncertainty, but YEC's position was that the EPA is not a capital lease for its financial reporting purposes.[31]

[27] YEC has stated that the starting capacity price is based on the levelized cost of capacity for a 12.5 MW new diesel-generation facility escalated to 2024 dollars.
[28] Amended Application, page 26, PDF page 30.
[29] Amended JM-YEC-1-9, PDF page 34.
[30] Amended Application, page 27, PDF page 31.
[31] Amended Application, page 27, PDF page 31.

When asked about total costs to customers, YEC responded:

> YEC can only provide the relevant costs for YEC – developing costs "to a customer" is not feasible without spelling out as specific customer's load requirements and rates. Review of impacts on overall costs for YEC addresses the overall impact of the EPA on Yukon utility customer rates (given that rates for YEC and AEY are consolidated).
>
> YEC also has developed costs only based on incremental changes due to the EPA, based on reasonable specified assumptions. It is not practical or cost effective to develop full YEC system costs for scenarios with and without the EPA.[32]

In argument, YEC stated that the dependable capacity payment is required and forms an integral and material part of the revenue relied upon by THELP for this project to proceed (from a financing perspective). Because of YEC's forecast need for firm capacity, YEC added that without the dependable capacity element, the project would not be of interest to YEC.[33]

The dependable capacity from the EPA enables YEC to displace fixed cost requirements for equivalent new thermal generation capacity that would otherwise be required (for example, diesel rentals or other permanent thermal generation alternatives).[34]

YEC's position was that the dependable plant capacity test, which occurs annually in December, would address basic risks related to plant conditions and, with hydro units being reliable, the established capacity from the test should endure for the remainder of the peak winter period.[35] YEC added that the review of available water confirmed the ability to meet contracted levels of energy and capacity delivery for over 85% of the peak winter period days. If any disruption did occur affecting THELP's facilities, it would be both brief and infrequent.[36] The EPA also included provision to recover excess dependable capacity payments if any shortfalls occurred through the dependable capacity excess payment mechanism.

[32] CW-YEC-1-4 (a and b), PDF page 9.
[33] YEC Final Argument, page 7, PDF page 9.
[34] YEC Final Argument, page 7, PDF page 9.
[35] YEC Final Argument, page 8, PDF page 10.
[36] YEC Final Argument, page 9, PDF page 11.

YEC submitted that it will pay the winter energy price for all energy delivered over the entire winter period, including payments for any energy being delivered that does not provide LTA displacement benefits.[37]

In terms of applying an escalation factor, YEC argued that:

- THELP's financing required this;
- It is consistent with the existing YEC SOP IPP; and
- The quantum of the escalator was agreed to by the parties early in the negotiation process.[38]

In its argument, YEC concluded that the EPA pricing is not based on the levelized cost of energy (LCOE) and that it is not based on THELP's costs, but that it is based on LTA thermal displacement benefits. All capital and maintenance costs for the transmission system from Atlin to Jakes Corner (the interconnection point between Yukon utility assets and THELP assets) will be borne by THELP.[39]

For reliability, YEC submitted that:

- The hydro option expands on existing operations, an expected unplanned downtime of 2% and available storage at Surprise Lake.
- In conjunction with the BESS, there would be minimal impact to the YIS of a generator trip.
- System upgrades will remove the AEY 6L 11 power line from under-frequency system load shedding.
- The EPA will provide N-1 capacity backup.[40]

John Maissan

Mr. Maissan stated that the current actual fuel prices for LNG and diesel and the current thermal mix of LNG and diesel are higher than the prices and fuel mix approved in YEC's last GRA. Mr. Maissan concluded that this provided a significant margin of conservatism in favour of rates and ratepayers.[41]

[37] YEC Final Argument, page 11, PDF page 13.
[38] YEC Final Argument, page 12, PDF page 14.
[39] YEC Final Argument, pages 13-15, PDF pages 15-17.
[40] YEC Final Argument, pages 16-17, PDF pages 18-19.
[41] John Maissan Final Argument, page 3, PDF page 4.

Mr. Maissan's views were that the EPA (in conjunction with the BESS) will not negatively impact YIS reliability and that rates will be lower than the thermal alternative.

Nathaniel Yee

Mr. Yee posited that based on what YEC has provided, the effect on rates is both unknown and not relevant, unknown because the benchmark against which the EPA is based will not exist. This does not give a realistic picture of the effect on rates. In his view, a better comparison is one between the EPA as proposed versus not having or significantly delaying the EPA or other projects, irrelevant if the capacity shortfall has no other viable projects in the near term.[42]

Noting that YEC did not undertake any new analysis regarding the diesel rental option and dependable capacity was benchmarked against other permanent diesel options rather than the rented diesel option, Mr. Yee questioned the reasonableness or prudency of comparing the EPA with the only option that YEC has stated will not happen.[43]

In terms of reliability, Mr. Yee focused on the testimony of YEC that reliability was linked to commercial imperative. Mr. Yee concluded by stating:

> Relying on commercial imperative means that if THELP has difficulties running the plant at full capacity or finds it financially burdensome to do so, the capacity numbers would not be considered reliable. You are only charged for what you get, but if the shelves are empty you get nothing. A customer willing to pay encourages but does not guarantee a reliable supply.[44]

In reply, Mr. Yee stated that "between the imaginary permanent thermal plant and the impossible up to 37 rental diesels, the EPA does not appear to be the best option for customer rates." Mr. Yee did find it reasonable that reliability for southern YIS customers would be enhanced.[45]

[42] Nathaniel Yee Final Argument, paragraphs 30-31.
[43] Nathaniel Yee Final Argument, paragraphs 32-33.
[44] Nathaniel Yee Final Argument, paragraph 40.
[45] Nathaniel Yee Final Argument, paragraphs 4-6.

UCG

UCG argued that the annual purchase cost of the energy and capacity ($6.5 million) compared to the projected revenues from the sale of the purchased energy ($4.964 million) provides a financial shortfall of $1.5 million per year. UCG did not think this was in the public interest.[46]

UCG questioned how the Board and public could have confidence that YEC has negotiated the best deal for ratepayers when YEC does not have estimates of the variable impact of operation and maintenance costs or when YEC presents that the relative effects on customer rates are unknown when the benchmark for the pricing is for a greenfield plant that has been stricken down by boards and the public as a realistic alternative.[47]

YEC reply

In reply to Mr. Yee, YEC stated YEC's decision to not proceed with permanent diesel at this time does not disqualify its use in setting a reasonable benchmark dependable capacity price that is paid to THELP. The proposed price is accepted to reflect, if anything, a low-cost, permanent option (i.e., no other permanent option has been suggested with a lower dependable capacity cost), and the sole issue for this proceeding is whether there is some lower permanent cost option to use for setting the EPA price. YEC reviewed in detail many factors beyond THELP's financial incentives to provide reliable service, including the available water resource, the utility controls on YIS uprate requirements and other information supporting the expected reliable service that the EPA will provide.[48]

YEC disagreed with the assertions of UCG, concluding that the numbers only reflect that average thermal fuel costs per kWh exceed overall average revenues per kWh. Thermal fuel costs per kWh are one of the highest cost components for YEC. YEC further added that the difference between the thermal costs and related revenues would be increased when diesel rental costs are added to address the dependable capacity requirements.[49]

[46] UCG Final Argument, PDF page 3.
[47] UCG Reply Argument, PDF page 2.
[48] YEC Reply Argument, page 3, PDF page 5.
[49] YEC Reply Argument, pages 4-5, PDF pages 6-7.

Board views

Effect on rates to customers

The Board notes that the value of this project lies in its ability to offset expensive thermal. As noted above, this project is a necessary part of the supply portfolio for YEC to achieve the 93% renewable generation standard expected to be set by the government. Further, it is thermal displacement opportunities that open up the federal funding. Thermal generation is the cheapest alternative available if environmental issues were not a consideration.[50] The Board accepts these submissions.

The Board finds that the following YEC submissions are mathematically consistent. A benefit to customers exists in the case where energy deliveries exceed thermal displacement volumes, the price per unit of energy reduces. YEC referred to Table A3[51] to support this. The price for the winter delivered energy is fixed as calculated in Table A3 and as defined in the EPA[52]. If actual winter delivered energy is greater than the volume used in Table A3 (assuming the load forecast is accurate), then customers and rates are harmed as customers could pay more than the LTA-displaced thermal energy benefits. Conversely, assuming the load forecast is accurate and winter delivered energy is less than the volume used in Table A3, customers benefit as customers would pay less than the LTA displaced thermal energy benefits.

However, in the Board's view, the benefit of the reduced winter energy price is a phantom benefit. YEC has stated and shown in Table A3 that it is paying $0.19/kWh[53] for displaced thermal energy based on LTA forecast. Energy delivered beyond the thermal displacement level and in excess of that used for storage purposes is of no value to YEC.[54] This extra energy creates an opportunity cost to YEC of hydro-generation foregone due to spilled water.

The Board is concerned that within the EPA, a term that can affect customer rates is the embedded 50% of CPI escalation rate. YEC stated that the 50% CPI escalation was agreed upon by THELP and YEC at an early stage of the

[50] Transcript Volume 1, starting at page 65, line 21, to page 67, line 24.
[51] Amended Application, page A-3, PDF page 41.
[52] Amended Application, page A-58, PDF page 124.
[53] Amended Application, line 8 of Table A3, PDF page 41.
[54] Transcript Volume 2, page 215, lines 14-19.

negotiations.[55] The testimony of YEC was that 50% of CPI was the norm in northern BC IPPs as well as the SOP IPP in Yukon and was generally accepted by the parties without discussion.[56]

Samples of three agreements were put into evidence in this proceeding. The Yukon SOP IPP[57], the BC Hydro Large project EPA[58], and the Electricity Purchase agreement for the Pine Creek project (the EPA between BC Hydro and Taku Land Corporation)[59]. The Board notes the following in these agreements. The SOP IPP is a template for an energy-only EPA and uses an escalator of 50% of CPI. The BC Hydro Large project EPA is for projects greater than 10 MW and uses a bid process to determine price, with a small factor affected by CPI. The Pine Creek project EPA has pricing based on energy only and an escalator of 12.5% of CPI plus a project financing charge based on energy rate that de-escalates over time.

The Board is of the view that the Atlin EPA does not qualify as part of the SOP.[60] It is outside Yukon and its size exceeds the limit for the Yukon SOP. The SOP does not have a capacity payment component, while the Atlin EPA has such a component. Further, the Atlin EPA does not meet the size requirements to qualify for the BC Hydro Large project EPA as its capacity is less than 10 MWs. The Board considers that the Pine Creek EPA is the only EPA on the record of this proceeding that, on a project basis, more closely matches the Atlin EPA. Although YEC has stated that the BC Hydro Large project EPA and the Yukon SOP were the starting templates for the negotiations, the negotiating parties quickly moved away from those templates. In the Board's view, relative to the Pine Creek EPA, YEC started its negotiation high by using the CPI term of 50% of CPI instead of 12.5% of CPI as in the Pine Creek EPA. Therefore, the Board finds that customer rates are likely adversely affected by this term because it is at 50% of CPI instead of at a lower rate set in the Pine Creek EPA.

The Board considered YEC's statements that it was unaware of the Pine Creek EPA and that it was not provided by THELP and was not known to YEC until after

[55] YEC Final Argument, page 12, PDF page 14 (this is a quote)
[56] Transcript Volume 1, page 132, line 19, to page 133, line 14.
[57] YUB-YEC-1-19, Attachment 1, PDF page 206.
[58] YUB-YEC-1-19, Attachment 2, PDF page 264.
[59] YUB-YEC-1-8, Attachment 1, PDF page 126.
[60] Transcript Volume 1, page 35, lines 6-13.

the energy price was substantially drafted and agreed to by the negotiating parties. YEC also stated it did not have a copy of the Pine Creek EPA at the hearing. [61]

However, the Board is of the view that YEC should have known of the existence of this document and its terms and conditions. YEC has been examining the Atlin project since the 1990s.[62] The fact that it was not aware of it may have been harmful to YEC's starting negotiation position. As such, in the end, it likely results in higher rates to Yukon electricity customers.

The issue of RFPs/calls for power was brought forward by Mr. Maissan. YEC has stated that it has not issued any RFPs/calls for power under the IPP policy to date.[63] As this project is considered as an unsolicited proposal and is in an advanced state, it is no longer at this initial stage and the Board thus considers this issue moot. However, as discussed elsewhere in this report, had YEC made a Call for Power, it may have been in a stronger negotiating position with respect to the EPA negotiations.

The Board notes that YEC determined the thermal displacement based on LTA results and then derived the winter energy price bases on that result.[64] In its LTA forecast, YEC, on a go-forward basis, included hydro uprates from WH2/WH4 and assumed IPP and microgeneration energy deliveries in its forecast. As discussed in the next section, YEC did not include the BESS or Moon Lake projects in that determination. In the Board's view, had YEC included these two projects in its LTA analysis, the expected thermal displacement benefits of this Atlin EPA would have been lower and therefore the non-summer energy delivered price would have been lower. The Board concludes that customer rates will effectively be higher because of the exclusion of BESS and Moon Lake projects from the forecast.

Moon Lake

The Board took note of Figure 4-1 and Table 4-1 of the Amended Application which show the forecast non-industrial peak and dependable capacity under the N-1 capacity criterion for the winter periods of the years 2021-22 to 2030/31.[65] The committed and planned supply options in Figure 4-1 and Table 4-1 include a

[61] YEC Final Argument, page 12, PDF page 14; Transcript Volume 1, page 129, line 9, to page 130, line 6; Transcript Volume 1, page 131, lines 13-15; Transcript Volume 2, page 252, line 14, to page 254, line 5.
[62] John Maissan Final Argument, page 8, PDF page 9.
[63] Transcript Volume 1, page 35, lines 16-25.
[64] Amended Application, Appendix A, Table A3, page A-3, PDF page 41.
[65] Amended Application, page 21, PDF page 25.

forecast for the Moon Lake project. In response to JM-YEC-1-6, Table 2 - Revised Amended shows forecast generation for 2024 and 2035.[66] The Table 2 forecast generation numbers do not include a forecast for the Moon Lake project.[67] According to YEC, Moon Lake is expected to be in service for the 2028 winter period. In testimony, YEC has stated that the project is a little bit behind schedule and could not comment on what the end date may look like.[68]

However, the Board considered that Table 4-1 shows a capacity surplus starting in the year 2028-29 of 11.5 MW and then dropping to a surplus of 2.2 MW for the winter of 2030/31. Table 2, as noted above, forecasts thermal generation of 4.53 GWh for the year 2035, not including Moon Lake.

The Board is of the view that, based on YEC's load forecast and its submissions, when the Moon Lake project comes online, YEC will be paying for, through the Atlin EPA, capacity it does not require and for thermal displacement benefits that will not be realized. As the Moon Lake project is within the planning horizon and certainly in the operating period of the Atlin EPA, there appears to be no accommodations for this in the Atlin EPA, especially since the price for winter delivered energy was locked in for a 10-year period starting in 2024 and escalated annually. Although YEC has stated that its load forecast is conservative, it is this forecast that they are using to establish prices and the need for the EPA. No other forecast has been provided with better information. With the Moon Lake project, the Board expects those thermal displacement benefits to diminish. This can be harmful to customer rates. Given that YEC said it will not pay more than the LTA displaced thermal benefits and will take all energy delivered, it is highly likely that YEC will be paying a price that covers more than the LTA thermal displacement benefits. In a GRA setting, the prudency of this may an issue.

The Board accepts YEC's submissions that an impact on rates or costs to specific customers cannot be determined at this time and that this EPA will not cost more than a new permanent thermal alternative. However, the Board is of the view that, due to YEC's approach to the negotiations (not researching the Pine Creek EPA before starting negotiations), a negative impact on rates is likely to result. YEC may have lost an opportunity to bring some downward pressure on customer rates (through a lower CPI escalator in the EPA). Furthermore, YEC did not include

[66] Exhibit B-9, Revised Amended, JM-YEC-1-6, PDF page 25.
[67] Transcript Volume 1, page 31, lines 4-10.
[68] Transcript Volume 1, page 50, line 21, to page 52, line 4.

planned projects (BESS and Moon Lake) in the time horizon of this agreement and as such calculated higher potential LTA thermal benefits than are likely to occur. The result of YEC's action or inaction is higher EPA costs to YEC and ultimately higher rates to customers.

Reliability

The Board agrees with the parties that the EPA and resulting infrastructure will not reduce YIS reliability and accepts that southern YIS reliability is likely to improve. The Board has a concern regarding "commercial imperative". The argument of Mr. Yee[69] and the testimony from YEC[70] bring diverging viewpoints on the effect of "commercial imperative". In a discussion regarding the asset life of a hydro plant, YEC responded that building an asset for a utility is not the same as building it for an IPP. You cannot assume the same asset lives.[71]

Lastly, regarding the concerns brought forward by UCG concerning the comparison of revenues to the electricity acquired under the EPA, the Board notes that in the cost-of-service regime which is followed in Yukon, costs are averaged. An incremental cost cannot be compared to an average revenue rate because an incremental cost deviates from the averaging from the cost-of-service study that the rates were based on. As a result, the Board concludes that the comparison provides a meaningless result.

3.3 The capability of existing and currently committed and expected generation and transmission facilities, including thermal generation facilities, to provide reliable electric power generation to meet the forecast load requirements in (a) and the effect of the Agreement on this capability – Term of Reference 3.c.

YEC

YEC stated that, during the initial 40-year term of the Amended EPA, (through the THELP facilities) it will acquire 8.75 MW of renewable dependable capacity during the peak winter period and LTA of 34.0 GWh of energy during the winter period to displace between 17.3 and 24.2 GWh/year of LTA thermal generation

[69] Nathaniel Yee Final Argument, paragraphs 34-39.
[70] Transcript Volume 1, page 72, lines 8-25.
[71] Transcript Volume 1, page 110, lines 4-15.

required to supply forecast load on the YIS. If required and approved, YEC can also provide up to 7.5 GWh/year of summer-period energy.[72]

YEC noted three key features of the existing capabilities and requirements of the YIS:

- The YIS is isolated from other grids and is reliant on self-supply for capacity and energy. It cannot import capacity or energy when it is short, nor can it export any surplus.
- There is surplus supply in the summer when customer demand is less and supply is constrained in the winter when demand for energy and capacity peaks.
- Since the YIS is an isolated grid, YEC uses an N-1 dependable capacity planning criterion. Therefore, when planning for supply, YEC is required to have enough dependable capacity to supply the forecast non-industrial peak winter demand (i.e., excluding major industrial demand) under the largest single contingency. The YIS's current largest single contingency corresponds to the loss of the 37 MW Aishihik generation station, either through an outage of the generating station itself or the transmission line from the generating station to the Takhini Substation and the Whitehorse Substation.[73]

YEC forecasts a capacity shortfall of 26.96 MW for 2021-22, and without new resources, the capacity shortfall is expected to grow. To resolve the capacity shortfall on a short-term basis, YEC has been renting diesel-generation units.[74]

As noted in Section 3.1 of this report and in the BESS proceeding, the non-industrial peak load for the YIS is expected to grow between 2021 and 2030 and the capacity shortfall from the expected growth needs to be addressed.[75]

Table 4-1 of the Amended Application demonstrates a capacity shortfall until 2028-29. YEC presented that the capacity shortfall would be met only by the completion of the following projects:

- Replacement of diesel-generation units after existing units retire;

[72] Amended Application, pages 17-18, PDF pages 21-22. (Summer energy is limited to two weeks per summer.)
[73] Amended Application, page 18, PDF page 22.
[74] Amended Application, pages 18-19, PDF pages 22-23. YEC has stated that reliance on rented diesels can create risks.
[75] Amended Application, page 19, PDF page 23, plus the page 11 reference from the report submitted regarding the BESS proceeding.

- Completion of the Whitehorse Generating Station #2 unit uprate project;
- Completion of the BESS project;
- Successful implementation of DSM measures;
- The Atlin generation project and supply through the YEC-THELP EPA; and
- Completion of the first phase of the Moon Lake Pumped Storage project.[76]

YEC stated in argument that the "need to address the N-1 dependable capacity shortfall and thermal energy displacement was not challenged in IRs or at the oral hearing."[77]

John Maissan

Mr. Maissan stated that, on an LTA basis, hydro-generation meets 84% to 85% of YIS energy requirements. This would be below the 93% target level stated in the Government of Yukon's climate change objectives in *Our Clean Future: A Yukon strategy for climate change, energy and a green economy* and the renewable portfolio standard in the anticipated *Clean Energy Act*. The rental diesel generators are used to meet the peak load generating requirements and to provide enough installed capacity to meet the N -1 capacity planning criterion. As more and more rental diesel units are required, YEC incurs costs to install the infrastructure to connect these rentals to the grid. If YEC were to maintain this course and meet the grid requirements, there could come a time that the required number of rental diesel generators will not be available.

Mr. Maissan concluded that the EPA is a necessary part of the supply portfolio for YEC to achieve the 93% renewable energy target.[78]

Nathaniel Yee

Mr. Yee noted that the EPA has been delayed by one year and that indeterminate delays with respect to the Moon Lake project have been acknowledged. He added that, if projects are not completed on time, YEC does not have a viable alternative for those projects. As a result, there could be a potential need for 30 to 46 rental diesels and YEC would face location and connection issues for that number of diesel units.[79]

[76] Amended Application, page 21, PDF page 25, Table 4-1.
[77] YEC Final Argument, page 2, PDF page 4.
[78] John Maissan Final Argument, pages 4-5, PDF pages 5-6.
[79] Nathaniel Yee Final Argument, PDF page 6, paragraphs 41-44.

Board views

The Board considers that the EPA is one of the sources in YEC's portfolio of projects that supports YEC in providing dependable capacity. The EPA contributes to a lower dependable capacity shortfall on the YIS and can displace some thermal generation. It has the capability of providing a reliable electric power supply to meet the forecast load requirements in future years. From the information that has been presented on this record, the Board is satisfied that the EPA will not hinder existing and currently committed (and expected) generation and transmission facilities.

The services provided by THELP include a transmission line from the generation site to AEY's substation at Jakes Corner. Although the interconnection agreement was not complete at the time of the close of record for this proceeding, the Board accepts the submissions from YEC that the upgrades included in the EPA will provide safe and reliable delivery of the generation output from Atlin to the YIS.

The Board took note that the EPA provides N-1 capacity support in the winter season. By definition, this is idle capacity waiting for a catastrophic event (the N-1 event) to activate and operate. Currently, the rented diesels meet this requirement and the EPA is expected to displace additional diesel units. The addition of 8.75 MW of firm capacity during the peak winter period and the estimated LTA displacement of between 17.3 GWh and 24.2 GWh of thermal generation have not been challenged in this proceeding. Although YEC and Mr. Yee disagreed on the number of diesel rental units that may be required in the future, the Board finds that there was no disagreement that the EPA will replace up to five rental diesel units when fully operational.

The Board accepts that firm non-industrial load is expected to continue to grow until at least the year 2030, that existing generation and transmission facilities, excluding rented diesels, cannot cover the N-1 capacity shortfall during the winter peak and that the EPA will therefore mitigate some of that dependable capacity shortfall. Further, the LTA expected thermal displacement from the energy deliveries from the EPA will align YEC's generation mix with the targets expressed in the Government of Yukon's policy paper *Our Clean Future: A Yukon strategy for climate change, energy and a green economy*.

3.4 Risks associated with the Agreement, including its potential impacts on YEC and rates for customers and on the reliability of electricity service provided to customers – Term of Reference 3.d.

YEC

YEC identified project risks in Section 4.3 of the Application. Project risks were categorized as follows[80]:

- Risks associated with the Conditions Precedent
- Risks associated with construction and commissioning
- Operations risks
    - Risks related to delivered energy
        - Risks related to actual EPA volumes being different than LTA energy deliveries assumed for establishing amended EPA pricing
        - Risks related to YIS loads, other renewable energy sources or fuel costs for thermal energy generation differing from assumed levels
    - Risks related to monthly constraint energy
    - Risks related to dependable capacity
        - Risks related to dependable capacity payments
        - Risks related to dependable capacity service

Risks associated with the Conditions Precedent

Article 2.1(d) of the EPA lists nine Conditions Precedent[81] that must be satisfied (unless waived by both parties to the EPA) before the EPA has legal force.[82] YEC viewed these risks as minimal because YEC will know the outcome before the end of 2022, with sufficient time to arrange for rented diesels for 2024-25 to ensure reliability.

Risks associated with construction and commissioning

YEC noted that once the Amended EPA Conditions Precedent are completed, YEC costs and customer rates are not affected by THELP's costs and funding risks. There are no payment obligations until THELP energy deliveries commence after the Commercial Operation Date. The EPA also has protections for YEC related to the first peak winter period.[83]

[80] This section is a summary taken from PDF pages 31-36 of the Amended Application.
[81] Amended Application, Attachment A, pages A1-7 to A1-8, PDF pages 73-74.
[82] Amended Application, Attachment A, Article 2.1(a), page A1-6, PDF page 72.
[83] Amended Application, page 28, PDF page 32.

Risks associated with Operations – delivered energy

YEC identified risks related to delivered energy in two categories.

Risks related to the actual EPA volumes delivered being different than the LTA energy deliveries assumed for the purpose of establishing Amended EPA prices.

For this category, YEC stated that this risk is not likely to have a material impact on YEC costs and discussed the following protections:

If deliveries under the EPA do not occur as expected, YEC will rely upon other supply sources (including thermal). From a pricing perspective, YEC is indifferent as its prices in the EPA are derived from a thermal energy generation benchmark.

Customer rates are based on LTA thermal and renewable generation forecasts to meet forecast YIS loads; therefore, YEC's position is that variances would not affect customer rates.

A further risk identified by YEC relates to shortages in LTA project energy deliveries relative to the LTA forecasts preventing YEC from meeting the 93% renewable portfolio standard in the expected new *Clean Energy Act*. As the *Clean Energy Act* has not been proclaimed, these risks are not known at this time.

Risks related to YIS loads, other renewable energy resources or fuel costs for thermal energy generation being different than assumed for setting Amended EPA energy prices.

YEC stated that it is likely that actual loads, fuel costs and other renewable resources will vary from forecast assumptions and that those risks will affect net YEC costs relative to thermal energy generation and will be reasonable in terms of YIS resource planning.

YEC noted that fuel prices are consistent with prices mandated for the SOP IPP, EPA prices assume a high level of SOP IPP development, the deemed benefits of the EPA are sensitive to changes in industrial load, but that the no industrial load assumption beginning in 2035 minimizes risk. Customers will win if a carbon tax is implemented versus using a thermal alternative.

Risks associated with monthly constraint energy

YEC will bear the costs for monthly constraint energy (energy that could not be delivered due to non-permitted system constraints caused by YEC or AEY). YEC assessed this to be minimal and controllable by AEY and YEC.

Risks associated with dependable capacity

YEC's position is that the energy and capacity source for the EPA is considered to be highly reliable. YEC identified risks related to dependable capacity in two categories:

> *Risks related to dependable capacity payments*
>
> There is a dependable excess capacity payment account that tracks and provides recovery for any dependable capacity payments that are in excess. The recovery of excess payments is dependent upon potential carbon charge savings payments, additional payments for energy (post 2034) or summer delivered energy payments. The excess payments are only recoverable from items defined as Additional Payments or Carbon Charge Saving Payments. After 2034, any industrial loads added to the system will give further opportunity for YEC to recover dependable capacity excess payments.
>
> ***Risks related to dependable capacity service reliability***
>
> YEC supports the modeled years provided by SNC Lavalin and that water availability is not an expected risk. YEC does not expect anything more than short-term disruption from THELP's generating plant. The only concern with this aspect is if a disruption occurs during an N-1 event during cold weather.

The only risks YEC faces prior to the EPA coming into force are for regulatory costs and negotiation costs for the EPA.[84]

[84] YEC Final Argument, page 18, PDF page 20.

John Maissan

The following table[85] depicts the risks identified by Mr. Maissan and his assessment of those risks:

Risks	**Assessment**	**Notes**
Delivery of modelled energy levels	Low	1
Delivery of dependable capacity	Low	2
Correlation between Surprise Lake and Marsh Lake	Medium	3
Actual cost of thermal generation/EPA cost of generation	Low	4
Load risk (actual versus forecast)	Low	5
Capital costs	Unknown	6
Risk on reliability	Low	7
Peak occurring before the PWP capacity test	Low	8
BESS and Moon Lake not included in modelling	Low	9

Notes

1. Mr. Maissan was comfortable with YEC only paying for the level of energy delivered and that three professional firms modelled water availability.
2. Mr. Maissan saw this as the technical risk of the plant not performing as expected. His view is that hydro plants are dependable.
3. Mr. Maissan's view is that there is some correlation between the THELP project and YEC's hydro plants. His concern is that, when 51 Atlin water years are randomly compared to YIS hydro, the results may well be different than if the THELP project in Atlin dry years was compared to the YIS during corresponding Marsh Lake dry years because they are likely to occur together and similarly for wet years. Mr. Maissan questioned why such a study was not undertaken. YEC replied that there was some correlation but that YECSIM model development on that issue was not feasible to date and that brings some risk regarding the setting of the EPA winter energy price. YEC does not expect such correlation analysis to LTA thermal displacement and any risk is likely offset by the conservatism applied to the EPA load forecasts and EPA energy process.[86]

[85] Mr. Maissan Final Argument, pages 5-8, PDF pages 6-9.
[86] YEC Reply Argument, page 1, PDF page 3.

4. Mr. Maissan relied on the response to JM-YEC-1-10 Revised Amended. With a revised forecast with mining load continued to 2044, he concluded that the EPA terms favour lower rates.
5. There is a risk that electric loads may be higher or lower than forecast; however, Mr. Maissan's position was that the EPA load forecast is sound.
6. It was noted that capital costs for the project have risen from $206 million to $240 million. Mr. Maissan cannot assess the capital cost risk in terms of at what capital cost will THELP not proceed with the project.
7. Mr. Maissan is satisfied that voltage support for the Teslin area in case the THELP generator trips removes this reliability concern.
8. The risk of a new system winter peak being established before the PWP is offset by higher hydro capacity being available before the PWP.
9. In Mr. Maissan's view, if the BESS and Moon Lake projects are not included in the thermal displacement models, then the potential for thermal displacement can only improve.

Nathaniel Yee

As discussed earlier, Mr. Yee identified that relying on "commercial imperative" is one risk that YEC is taking. Also, as in any project, climate risk will exist. He also noted that if the project does not go ahead, there is a risk that YEC will not be able to accommodate all the rental diesels that would be required.[87] YEC responded that it reviewed in detail many factors beyond THELP's financial incentives to provide reliable service, including the available water resource, the utility controls on YIS uprate requirements and other information supporting the expected reliable service that the EPA will provide.[88]

UCG

UCG noted that there is a risk regarding the Conditions Precedent not having been concluded.[89]

Board views

The Board reviewed the risks as identified by each of the parties and how the parties rated that risk and provides its views on those risks on a party-by-party basis. Where parties have identified similar risks, those items were consolidated to

[87] Nathaniel Yee Final Argument, paragraphs 45-50; Nathaniel Yee Reply Argument, pages 3-4.
[88] YEC Reply Argument, page 3, PDF page 5.
[89] UCG Final Argument, PDF page 4.

avoid repetition. As such, a risk identified by one party was not restated in the table of another party. For example, if YEC identified a risk, a similar risk identified by an intervener is not restated in the table of the risks identified by an intervener.

YEC identified risks

Risks	**Assessment**
Conditions Precedent[90]	Low
Construction and commissioning	Low
Operations – delivered energy volumes varying from forecast[91]	Low-medium
Operations – YIS loads varying from forecast[92]	Low
Monthly constraint energy	Low
Dependable capacity payments	Low
Dependable capacity service reliability[93]	Low

John Maissan identified risks

Risks	**Assessment**
Correlation between Surprise Lake and Marsh Lake	Medium
Actual cost of thermal generation/EPA cost of generation	Low
Capital costs	Unknown
Peak occurring before the PWP capacity test	Low
BESS and Moon Lake projects not included in modelling	Low

Nathaniel Yee identified risks

Risks	**Assessment**
Commercial imperative	Medium
Climate change	Low
Ability to accommodate all diesel rentals	High

[90] This issue was also identified by UCG and Mr. Yee.
[91] This issue was also identified by Mr. Maissan.
[92] This issue was also identified by Mr. Maissan.
[93] This issue was also identified by Mr. Maissan. This is also combined with Mr. Maissan's delivery of dependable capacity.

The Board's assessment of the risks

Risks	Assessment
Conditions Precedent	Medium
Construction and commissioning	Low
Operations – delivered energy volumes varying from forecast	Medium
Operations – YIS loads varying from forecast	Medium
Monthly constraint energy	Low
Dependable capacity payments	Low
Dependable capacity service reliability	Low
Correlation between Surprise Lake and Marsh Lake	Medium
Actual cost of thermal generation/EPA cost of generation	Low
Capital costs	Medium
Peak occurring before the PWP capacity test	Low
BESS and Moon Lake projects not included in modelling	High
Commercial imperative	Low
Climate change	N/A
Ability to accommodate all diesel rentals	Medium
Little YEC internal knowledge regarding the details of the EPA	Low
That further conditions or costs will arise from other oversight bodies	Medium

Although YEC rated the risks with the Conditions Precedent as minimal, the Board disagrees with this rating for the following reasons. The Board is not kept abreast of the progress of each of the Conditions Precedent. In addition, there could be further costs associated with conditions placed on any of the approvals THELP is seeking from other respective regulatory bodies, or any other conditions placed that may impact the performance of the generating station or financially affect the ability of the project to go forward. Therefore, the Board assesses this as a medium risk.

The Board agrees with the risk assessments and comments made regarding construction and commissioning, monthly constraint energy, dependable capacity payments, dependable capacity service reliability and the load peak occurring before the PWP capacity test. The Board agrees that these risks are low. The climate change risk is not applicable as it will affect any project, not just that related to the EPA.

The Board is confident that energy volumes, in any given year, delivered from the THELP facility will differ from the LTA. The Board disagrees with YEC's assessment of the risks related to energy volumes. If the expected energy deliveries under the EPA cannot be made, YEC said it has the thermal energy option to make up for any shortfall. However, YEC's price for thermal generation exceeds the delivered winter energy price as calculated in Table A3 of the Amended Application. Further, although results from three different models assessed hydrological information and potential output from THELP's plant, each model produced a different result; one result was removed from consideration and a blend of the remaining two models was used as the basis for the output forecast. Based on the record of this proceeding, there is no evidence that YEC did anything more than accept the results from the model. Similarly, as noted by Mr. Maissan, YEC did not attempt to correlate output from the THELP facility with the output of YEC's Whitehorse facilities during low water years to determine sufficient energy output. As a result, the Board assesses this risk as medium.

The Board agrees with YEC that actual loads, renewable sources and fuel costs will vary from forecast assumptions. For the reasons provided by YEC above, the Board agrees that the risks associated with fuel prices and changes to forecast load are low. As discussed in Section 3.2 of this report, by not including the BESS and Moon Lake projects in its forecast to determine the price for winter delivered energy, the Board assesses the risk that YEC is paying a higher price for energy than is necessary as high. Consequently, the Board gives this an overall assessment of medium.

The correlation between Surprise Lake and Marsh Lake were discussed above with regards to energy volumes. The Board assesses this risk as medium.

Mr. Maissan identified the risk associated with actual cost of thermal generation/EPA cost of generation as low. The Board agrees with his assessment based on the revised IR response[94] that this is a low risk.

YEC stated that once all the Conditions Precedent have been signed off, the contract is legally enforceable and all risk with respect to capital costs belong to THELP. The forecast capital costs went up from $206 million to $240 million and the EPA had to be amended for that change. Given the current economic environment, there is a risk that the capital costs could go even higher and could

[94] JM-YEC-1-5 Amended, PDF pages 19-22.

put the project and EPA in jeopardy. The Board agrees with Mr. Maissan and assesses this risk as medium.

Excluding the BESS and Moon Lake projects, as mentioned earlier, presents risks that the derived winter delivered energy prices are higher than necessary. This also overstates the thermal displacement benefits and increases the likelihood of increased volumes of spilled water at YEC-owned hydro facilities.[95] The Board rates this risk level as high.

Mr. Yee identified the use of "commercial imperative" as one of the means YEC was stating to ensure reliability. However, the Board accepts YEC's response that there are other factors in the EPA to ensure reliability. The Board rates this risk as low.

YEC did not directly respond to Mr. Yee's comments on YEC's physical ability to accommodate a growing number of diesel rentals to meet capacity shortfalls if the EPA does not go ahead. YEC disagreed with the quantum of the diesels that may be necessary and said that other projects may come online in future to reduce rented diesel requirements. The Board agrees with Mr. Yee that if the EPA does not go ahead, there is a medium risk that YEC will not be able to accommodate the number of diesel rentals required.

YEC used external counsel and external consultants to negotiate the EPA. For the hearing, an external consultant was the principal witness regarding EPA matters.[96] It is not clear if any YEC employees attended the full negotiation process or if any YEC employees have as detailed an understanding of the EPA. The Board assesses this risk as low.

As noted above regarding the Conditions Precedent, the Board assesses a medium risk that other regulatory and oversight bodies may impose additional conditions on the Atlin project that may either increase the costs for the project or delay the in-service date for the project.

The Board sees the overall risk as low for reliability issues. The risk is higher regarding rates, but that has been discussed in other sections of this report.[97]

[95] YEC takes delivery of all energy. If thermal displacement is less, then that means EPA deliveries will replace YEC hydro. However, if YEC is not withholding the water for storage, then it is spilling the water instead. As hydro is largely a fixed cost, if there are lower volumes generated, then the cost per unit of YEC hydro-generation increases.
[96] Transcript Volume 1, page 44, lines 5-10.
[97] For example, please refer to Sections 3.2 and 3.5 of this report.

3.5 Evidence that all reasonable alternative options have been considered and that proposed spending commitments have been selected on reasonable grounds – Term of Reference 3.e.

YEC

In its Amended Application, YEC referred to both the BESS proceeding and its 10-Year Renewable Electricity Plan to address forecast energy and capacity shortfalls, noting that new resources will provide dependable capacity and that it is placing high priority on new renewable projects that will not rely on new thermal generation or rented diesel-generation units.[98]

In its Amended Application, YEC referenced the alternatives to the EPA by referring to the BESS project proceeding and its 10-Year Renewable Electricity Plan. Alternatives were mentioned as "Committed and Planned Supply Options" as line items to Table 4-1.[99] The following were the identified options with rated capacities:

- Diesel replacements (12,500 kW)
- Whitehorse #2 Uprate (638 kW)
- BESS (7,200 kW)
- Atlin Hydro EPA (8,750 kW)
- DSM (starting at 2,205 kW for 2021-22 and growing to 7,091 kW by 2030/31)
- Moon Lake Pump Storage Phase 1 (35,000 kW)

YEC noted that BESS and the EPA each can reduce the need for rented diesels and that the Moon Lake Pumped Storage project in conjunction with BESS and the EPA are the only resource options (other than new thermal) that can remove the N-1 dependable capacity shortfall and remove the need for rented diesels.[100]

YEC further referred to a Knight Piesold Ltd review update in its 10-Year Renewable Electricity Plan that identified five small hydroelectric project options (including Atlin) in Yukon and northern BC with capacities ranging from 8 MW to 13 MW, four of which had storage capabilities.[101] YEC chose to proceed with the

[98] Amended Application, page 24, PDF page 28.
[99] Amended Application, page 21, PDF page 25, Table 4-1.
[100] Amended Application, page 25, PDF page 29.
[101] Further discussion of the small hydro projects occurred in response to YUB-YEC-1-57 Amended, PDF pages 105-109.

Atlin EPA for its ability to supply dependable capacity and firm winter energy and its shorter project development timeline.[102]

In conclusion, YEC stated:

> The only other alternative identified to date for meeting the capacity shortfall without rented diesels would be to develop additional permanent thermal (diesel) capability beyond the planned replacements of retired units. As reviewed in the BESS proceeding, the development of new permanent diesel plants is not supported by stakeholders and is also not in line with goals outlined in Yukon government's draft "*Our Clean Future: A Yukon strategy for climate change, energy and a green economy*."[103]

Regarding further examination of the thermal option, YEC stated:

> As a result of detailed planning assessments (including consultation and engagement on the 20 MW new diesel plant site options identified stakeholder concerns with this option), YEC's Board in 2019 rejected that alternative for further consideration and directed that new permanent thermal options focus on diesel replacement at existing plants.[104]

YEC further responded:

> Major new permanent diesel options (beyond replacement of retired units) are only likely to be revisited within the next decade in the event that the Tutshi-Moon Lake Pumped Storage Project (or some equivalent renewable option) is confirmed not to be feasible at this time.[105]

YEC argued that its 10-Year Renewable Electricity Plan limits new thermal development to the replacement of existing thermal capacity that is retired in order to pursue development of specified renewable generation options.[106] YEC added that ownership of the proposed Atlin hydro plant was not an option available to YEC.[107]

YEC did not address the second part of this Term of Reference, "that proposed spending commitments have been selected on reasonable grounds."

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[102] Amended Application, page 25, PDF page 29.
[103] Amended Application, page 25, PDF page 29.
[104] UCG-YEC-1-8, PDF page 105.
[105] YUB-YEC-1-36 (b and c), PDF page 743.
[106] YEC Final Argument, PDF page 6.
[107] YEC Final Argument, PDF page 7.

John Maissan

Mr. Maissan argued that there is no social licence for a thermal generating plant when society (and the governments) are demanding reductions in greenhouse gas emissions.[108] Noting that the Atlin project was an unsolicited proposal, Mr. Maissan agreed with the position of YEC that none of the other identified hydro projects were as far advanced as the one proposed by THELP but added that YEC has yet to issue a RFP under the SOP IPP to explore other options. Mr. Maissan questioned any comparison of this EPA to the SOP IPP that currently exists and recommended that YEC, on a go-forward basis, do such projects on an RFP basis.

Mr. Maissan did not address the second part of this Term of Reference, "that proposed spending commitments have been selected on reasonable grounds."

Nathaniel Yee

Mr. Yee stated that YEC has not provided information on viable or reasonable alternative options and added that, with no viable alternatives, the Board's ability to confirm proposed spending commitments on reasonable grounds is limited.[109]

Other than rented diesels, the only other alternative to meet the capacity shortfall is to develop permanent thermal capabilities beyond the planned replacement of retired units. Since YEC was directed by its board of directors not to pursue such options and such options are not supported by stakeholders, such options are not in alignment with government policy and would take at least four years to be completed. As such, these options cannot be considered a viable alternative. Mr. Yee added that an expanding diesel rental fleet is not a reliable alternative.

UCG

UCG stated that using a 12.5 MW greenfield diesel plant as a benchmark is not a reliable way to assess the costs for energy to YEC versus the EPA, as the two alternatives are not of the same scale. UCG recommended that the Government of Yukon go back and, using the federal and territorial grant money, look into solar panels and battery packs for each household in Yukon.[110]

[108] John Maissan Final Argument, PDF page 8.
[109] Nathaniel Yee Final Argument, PDF page 2.
[110] UCG Final Argument, PDF page 3.

Board views

As in the BESS proceeding, it is clear from the submissions of all parties that, in the near term, some form of diesel generation is the only viable alternative to the EPA. The Board agrees with the position of Mr. Yee that, although YEC did present alternatives (Table 4-1 of the Amended Application) and presented thermal perspectives (permanent thermal and rented diesels), based on YEC board direction or policy, government policy, or current status of other projects, no other alternatives are viable in the near term.

The Board considers that the following events contributed to the lack of viable alternatives, other than diesel rental units, in the short term. YEC's capacity shortfall was recognized in its 2016 Resource Plan (spring 2017). YEC began renting diesels for the winter of 2017/18, which has since become the default N-1 dependable capacity shortfall solution. YEC then pursued permanent diesel solutions including a 20 MW diesel plant, which was included in its 2017-18 GRA.[111] Based on the evidence from YEC, it was prepared to proceed with the permanent thermal plant at that time. In the decision to that GRA dated December 27, 2018, the Board noted that YEC supported its case that adding capacity is needed but that YEC did not provide a sufficient business case to support the project.[112] Had YEC done so, the thermal plant could have been in place by 2021[113] and the well-documented shortcomings of rented diesels[114] would not be a recurring issue in each of YEC's subsequent regulatory proceedings before this Board. As a result of the poor business case, YEC put itself in the position of having no other viable option at the time to obtain capacity other than renting diesel units.

The Board notes that instead of resubmitting a proper business case regarding the 20 MW diesel option, YEC, at the direction of its board, went in a different direction, thus cementing its reliance on the diesel rental option. In the Board's opinion, had THELP not approached YEC regarding the Atlin project and potential EPA, YEC would not have had any other options regarding a resolution to its

[111] YUB-YEC-1-36, PDF page 744.
[112] Appendix A to Board Order 2018-10, paragraph 470.
[113] Appendix A to Board Order 2018-10, paragraph 464. YEC later stated that, had it pursued the permanent 20 MW diesel option in 2019, it would not have been ready until 2023 (YUB-YEC-1-36, PDF page 745). However, from its opening statement in this EPA proceeding, completion of the Atlin expansion project has been delayed to 2025.
[114] YUB-YEC-1-36, PDF pages 744-745; Yukon Utilities Board Report to Yukon Minister of Justice, Yukon Energy Corporation Application for Energy Project Certificate and Energy Operation Certificate Regarding the Proposed Battery Energy Storage System, PDF pages 30-31, June 30, 2021.

capacity shortfall. In addition, YEC has not set up any RFP for new projects, renewable or otherwise, and has not provided any evidence that it has moved forward on any of the renewable projects it identified in either its 2016 Resource Plan or 10-Year Renewable Electricity Plan.

The Board recognizes that YEC identified the Moon Lake Pumped Storage project as a future project to provide significant capacity and energy. However, YEC indicated the project is going slower than anticipated[115] and federal funding has yet to be made available.[116] Thus, the timeline for this project is unknown. This project could slip into the 2030s and, all things being equal, diesels to cover capacity shortfalls could be rented well into the 2030s.

In addition, the Board is not satisfied with YEC's evaluation of renting versus purchasing of diesel units for the purpose of satisfying capacity shortfalls. For the following reasons, the Board is of the opinion that YEC appears to not have given serious consideration to the purchase option and preparing a thorough analysis to test its viability. YEC assumes that the only purchase option is the purchase of the units it currently rents.[117] YEC did not provide any evidence that an RFP could not provide a satisfactory result or different result than the one it assumed regarding the acquisition of the rented diesels. This is especially significant since YEC has admitted that the current rental units are not the type of unit that YEC would secure as permanent units.[118] YEC added that Finning has not made any proposals for YEC ownership of the rental units.[119] However, the Board considers that the onus is on YEC to seek out and take the initiative to find viable supply options. YEC has not presented any evidence that this occurred.

The Board considered YEC's submissions that a purchase/sale alternative would not be realistic or practical because the rental costs are known at the front end. Also, it has to consider the practicality of buying and selling units potentially on an annual basis. YEC added that it could not confirm at the time of purchase what the sale price of those units would be down the road to a level that YEC's board of directors would be satisfied with. YEC also pointed to the mismatch between supply using a permanent diesel for capacity and the fluctuating capacity shortfall YEC forecasts going forward. Due to that mismatch, YEC assumes it would be

[115] Transcript Volume 1, page 51, lines 8-13.
[116] Transcript Volume 1, page 51, lines 14-20.
[117] YUB-YEC-1-36, PDF page 746.
[118] YUB-YEC-1-36, PDF page 746.
[119] YUB-YEC-1-36, PDF pages 746-747.

buying and selling diesels on an annual basis. YEC's position was that renting diesels provided it with more flexibility. YEC added that how quickly load grows brings uncertainty.[120]

Regarding uncertainty regarding load growth, the Board notes that YEC provided its load forecasts. The Atlin EPA assumes a certain load growth, and YEC has used that load forecast as part of its justification for the EPA. Uncertainty around load growth exists in any capacity supply option YEC chooses to pursue. Accordingly, the Board finds this submission unacceptable.

The Board is of the opinion that YEC's submissions regarding the matching of capacity supply to forecast capacity requirements are disingenuous because YEC does not precisely match its capacity supply options with its capacity shortfall. Further, YEC provided evidence of matching capacity supply options with its capacity shortfall in its Amended Application. Table 4-1 shows a capacity surplus with the Moon Lake project.

Further, the Board is of the view that YEC's assumption that it would need to buy and sell diesel-generating units on an annual basis is unsupported. YEC could acquire a unit to meet its capacity shortfall requirement until a permanent renewable solution is in place. Then when the unit is not required, YEC can either shift the unit to replace retiring units or sell the unit. Since the unit is intended for capacity purposes, the hours of run time would likely not be significant. To reduce uncertainty, YEC could go to the market to estimate the future value of the diesel unit it wants to sell; such a market exists. The Board noted that, for its initial submission regarding the Minto PPA (Purchase Power Agreement), YEC proposed to purchase the "used" diesel unit that Minto acquired for electricity until the mine was connected to the grid.

Although the Board agreed with the rental of diesel-generation units on an urgent short-term basis for YEC's 2021 GRA, the evidence of YEC in this proceeding is that the diesel rentals are not a good solution and that the need for additional capacity is for more than the near term. The Board does not accept that YEC provided sufficient evaluation or investigated the permanent diesel-generating unit alternative. It appears that since the initial rental agreement and the ensuing problems with the rental diesel units, YEC has not explored any other options to address the shortfall prior to the forecast renewable energy projects being brought

[120] YEC 2021 GRA Proceeding, Transcript Volume 3, pages 461-463.

on. However, the Board finds that the permanent diesel generator is not an alternative to the EPA but complementary to it.

Regarding the second part of this term of reference, "that proposed spending commitments have been selected on reasonable grounds", it appears that, before the commercial operation date, YEC's committed costs chiefly relate to the negotiations of the Agreement and the regulatory process of this review. In the Board's view, these costs are not significant relative to the costs of a new facility or the energy and capacity payments to THELP. The Board has discussed the EPA and its impacts on rates to customers in Sections 3.2 and 3.4 of this Report.

3.6 Prudency of entering into the Agreement as proposed at this time – Term of Reference 3.f.

YEC

YEC submitted the following reasons regarding the prudency of entering into the Agreement at this time:

- The EPA can displace up to five diesel rental units, it provides dependable renewable capacity for the YIS, and it is the only cost-effective renewable resource option available today.
- The EPA has minimal and reasonable risk impacts to YEC, customer rates and service reliability.
- The Conditions Precedent manages initial risk and has minimal if any impact on YEC costs, customer rates or reliability of service.
- Entering the EPA now enables THELP to work with government funding agencies and other parties that will allow the development of this resource project.[121]

John Maissan

Mr. Maissan supported entering into the EPA at this time as it is a cost-effective alternative and there are no other cost-effective alternatives to the THELP project. The EPA has low risk, will provided winter energy and capacity, reduce greenhouse gas emissions and enable YEC to meet the 93% renewable electricity target by 2030.[122]

[121] YEC Final Argument, pages 20-21, PDF pages 22-23.
[122] John Maissan Final Argument, page 10, PDF page 11, paragraph 9.

Nathaniel Yee

Mr. Yee stated that presenting this as the only option and not suggesting any reasonable alternatives does not allow sufficient context to make any determinations as to whether the EPA is prudent or reasonable.[123]

UCG

UCG stated that green power and climate change are considerations to go forward with the project and the EPA. UCG added that government grants do not appear to do anything to alleviate the cost pressure to YEC for their electricity and capacity purchases. UCG said that there is a shortfall between the additional revenues and the incremental costs of the energy from the EPA and therefore took no comfort that the Agreement is in the public interest.[124]

Board views

Consistent with the Board's views provided in Sections 3.1 and 3.3 of this report, the Board finds that there is a need for the EPA. In addition, the funding procured from the federal, Yukon and potentially the British Columbia governments for the Atlin project makes it more attractive for ratepayers. However, the Board is concerned that the Atlin project has been delayed one year from the original expected in-service date. Also, the Conditions Precedent deadlines have been extended several times, preventing the Board from examining and considering any issues that may arise therefrom. In light of the Board's analysis set out in this report, these concerns do not militate against the Board's recommendation that the EPA is necessary at this time.

As a consequence of the risks and uncertainties identified above, the Board is unable to determine the prudency of the EPA at this time. However, once all costs are known, all Conditions Precedent have been removed and all the facts are before the Board, the proper forum for testing the prudency of the EPA is in a GRA proceeding.

[123] Nathaniel Yee Final Argument, PDF page 7, paragraph 52.
[124] UCG Final Argument, PDF pages 3-4.

4 BOARD FINDINGS AND RECOMMENDATIONS

Specific aspects of the project to be reviewed

The Terms of Reference required the Board to report on, and make recommendations about, the necessity for the Agreement and its timing and proposed terms and conditions. A summary of the Board's findings on specific aspects of the EPA to be reviewed, as identified in the Terms of Reference, are as follows:

3.a. The public need for the Agreement under various reasonable electric load forecasts.

- The Board finds a near-term need for the EPA under various electric load forecasts.

3.b. The effect of the proposed commitments on the rates of customers and the reliability of electricity service provided to customers.

- The benefit of the reduced winter energy price is a phantom benefit.
- Energy delivered beyond the thermal displacement level and in excess of that used for storage purposes is of no value to YEC.
- In the Board's view, YEC started its negotiation high with this CPI term, and therefore, customer rates are likely adversely affected by the approach to this term.
- YEC should have known about the Pine Creek EPA and the terms and conditions contained in that agreement. The lack of research for this document was harmful to YEC's starting negotiation position and in the end likely results in higher rates to Yukon electricity customers.
- When the Moon Lake project comes online, YEC will be paying for, through the Atlin EPA, capacity it does not require and for thermal displacement benefits that will not be realized.
- Given that YEC will not pay more than the LTA displaced thermal benefits and will take all energy delivered, it is highly likely that YEC will be paying a price that covers more than the LTA thermal displacement benefits. In a GRA setting, the prudency of this may be an issue.
- Due to YEC's approach to the negotiations, the Board finds that YEC may have lost an opportunity to bring some downward pressure on customer

rates. Furthermore, YEC did not include planned projects in the time horizon of this agreement that may have a negative impact on rates.

- The Board agrees with the parties that the EPA and resulting infrastructure will not reduce YIS reliability and accepts that, for the southern YIS, the reliability is likely to improve.

3.c. The capability of existing and currently committed and expected generation and transmission facilities, including thermal generation facilities, to provide reliable electric power generation to meet the forecast load requirements in (a) and the effect of the Agreement on this capability.

- The Board is satisfied that the EPA will not hinder existing and currently committed (and expected) generation and transmission facilities.
- The EPA, when fully operational, will replace up to five diesel rental units.
- The Board accepts that firm non-industrial load is expected to continue to grow until at least the year 2030 and that existing generation and transmission facilities, excluding rented diesels, cannot cover the N-1 capacity shortfall during the winter peak and that therefore the EPA will mitigate some of that dependable capacity shortfall. Further, the LTA expected thermal displacement from the energy deliveries from the EPA will align YEC's generation mix with the targets expressed in the Yukon government's policy paper *Our Clean Future: A Yukon strategy for climate change, energy and a green economy*.

3.d. The risks associated with the Agreement, including its potential impacts on YEC and rates for customers and on the reliability of electricity service provided to customers.

- The Board is not kept abreast of the progress of each of the Conditions Precedent. There could be further costs associated with conditions placed on any of the approvals THELP is seeking from other respective regulatory bodies or any other conditions placed that may impact the performance of the generating station or financially affect the ability of the project to go forward. Therefore, the Board assesses this as a medium risk.
- The Board finds that, due to construction and commissioning, monthly constraint energy, dependable capacity payments, dependable capacity service reliability, actual cost of thermal generation/EPA cost of generation, the load peak occurring before the PWP capacity test, and the use of commercial imperative, there may be little internal YEC knowledge

regarding details of the EPA and variances in fuel prices or YIS load from forecast as low risk.

- If the expected energy deliveries under the EPA cannot be made, YEC said it has the thermal energy option to make up for any shortfall. However, YEC's price for thermal generation exceeds the delivered winter energy price as calculated in Table A3 of the Amended Application. YEC did not attempt to correlate output from the THELP facility with the output of YEC's Whitehorse facilities during low water years to determine sufficient energy output. The Board assesses this risk as medium.
- As discussed in Section 3.2 of this report, by not including the BESS and Moon Lake projects in its forecast to determine the price for winter delivered energy, the Board assesses this risk as high. In consideration of the risk assessments for fuel prices, load and energy renewables, the Board gives this an overall assessment of medium.
- Given the current economic environment, there is a risk that capital costs could go even higher and could put the project and EPA in jeopardy. The Board agrees with Mr. Maissan and assesses this risk as medium.
- Excluding the BESS and Moon Lake projects, as mentioned earlier, presents risks that the derived winter delivered energy prices are higher than necessary. This also overstates the thermal displacement benefits and increases the likelihood of increased volumes of spilled water at YEC-owned hydro facilities. The Board rates this risk level as high.
- The Board agrees with Mr. Yee that if the EPA does not go ahead, there is a medium risk that YEC will not be able to accommodate the number of diesel rentals required.

3.e. Evidence that all reasonable alternative options have been considered and that proposed spending commitments have been selected on reasonable grounds.

- As in the BESS proceeding, it is clear from the submissions of all parties that, in the near term, some form of diesel generation is the only viable alternative to the EPA. The Board agrees with the position of Mr. Yee that, although YEC did present alternatives (Table 4-1 of the Amended Application) and presented thermal perspectives (permanent thermal and rented diesels), based on YEC board direction or policy, government policy or current status of other projects, no other alternatives are viable in the near term.

- The Board is not satisfied with YEC's evaluation of renting versus purchasing of diesel units for the purpose of satisfying capacity shortfalls.
- The Board does not accept that YEC provided sufficient evaluation on the permanent diesel-generating unit alternative. However, the Board does not see the permanent diesel generator as an alternative to the EPA but as being complementary to it.
- Regarding the second part of this term of reference, "that proposed spending commitments have been selected on reasonable grounds", it appears that before the commercial operation date, YEC's committed costs chiefly relate to the negotiations of the Agreement and the regulatory process of this review. In the Board's view, these costs are not significant relative to the costs of a new facility or the energy and capacity payments to THELP. The Board has discussed the EPA and its costs of rates to customers in Sections 3.2 and 3.4 of this report.

3.f. Whether it is prudent to enter into the Agreement as proposed at this time.

- The Board accepts that the EPA is necessary at this time. However, the Atlin project has been delayed one year from the original expected in-service date. The Conditions Precedent deadlines have been extended several times, preventing the Board from examining and considering any issues that may arise therefrom.

5 BOARD CONCLUSIONS

The Board accepts the EPA as a necessary addition to YEC's supply options to meet its capacity shortfall and reduce its need for diesel. On a societal basis, this project will cost close to one quarter of a billion dollars for less than 9 MW of capacity. YEC's last thermal generation project (20 MW from its 2017-18 GRA) was expected to cost less than one quarter of the amount of the Atlin project for twice the capacity. The above illustrates an example where societal concerns are in conflict with economic efficiency. Without explicit guidance from government, such as through an order-in-council or other legislation, the Board is not mandated to balance societal concerns expressed in various government policies with the economic efficiency determined through cost-of-service regulation. The Board finds it incumbent upon the government, if it desires to set a direction or a specific policy objective, to do so through legislation.

6 OTHER RECOMMENDATIONS

The evidence of YEC was that it must take all renewable energy from IPPs. Most of that energy comes at a time when YEC has surplus hydro-generation available. IPP energy is generally not available during winter when YEC faces peak demands and constrained supply. The Board recommends that the Government of Yukon review and amend the IPP policy to incentivize winter generation and provide more green winter supply options for the YIS. Further, from a ratepayer cost perspective, John Maissan's recommendation for YEC to utilize a Call for Power to encourage involvement of other players could enhance YEC's negotiating position and provide exposure to other generation/capacity options for YEC.