Yukon Utilities Board

Report to Yukon Minister of Justice

Yukon Energy Corporation Application for an Energy Project Certificate and Energy Operation Certificate Regarding the Proposed Mayo Hydro Enhancement Project (Mayo B)

May 17, 2010

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1 Introduction

On December 10, 2009, the Yukon Energy Corporation (YEC) submitted an application to the Government of Yukon for an Energy Project Certificate and an Energy Operation Certificate for the Mayo Hydro Enhancement Project (Mayo B), which was designated as a regulated project pursuant to Order-in-Council 2009/220. The application was made pursuant to Part 3 of the *Public Utilities Act* (PUA).

By a letter dated December 18, 2009, the Minister of Justice for the Government of Yukon referred the application to the Yukon Utilities Board (YUB or Board) for a review and hearing pursuant to Part 3 of the PUA. The letter included the Terms of Reference for the review which, along with setting out the purpose and scope of the review, required the YUB to submit its report and recommendations to the Minister of Justice by no later than March 31, 2010. Subsequent correspondence[1] from the Minister of Justice required the report to be submitted no later than Friday April 16, 2010. This timeline was not adhered to for two important reasons. Firstly, the public hearing was held on April 8, 2010, a date which gave intervenors an opportunity to fully participate and test the application. Secondly, the Board required sufficient time to consider the evidence and submissions of the parties and to make its recommendations.

The application describes the proposed Mayo B Project as an enhancement to the existing YEC Mayo hydroelectric facilities in order to increase hydro generation capacity installed on the Mayo River from approximately 5 MW to approximately 15 MW. The enhancement will include the construction of a new powerhouse downstream of the existing powerhouse and the construction of related facilities, as well as adjustments to the management of water on the Mayo River system downstream of the existing Wareham Dam.[2] The timing of the Mayo B Project reflects funding agreements with the Federal Government for both Mayo B and Stage 2 of the Carmacks Stewart Transmission Project (CSTP2) which will connect the Mayo-Dawson (MD) grid with the Whitehorse-Aishihik-Faro (WAF) grid. With a planned in-service date of late 2011, the Mayo B Project represents an opportunity to displace diesel generation energy requirements relating to the forecast growing loads on both grids.

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1 Letter from Minister of Justice to the Yukon Utilities Board, February 15, 2010, page 2.

2 Application, page 1.

This proposed Mayo B Project was included in the February 27, 2009 Mayo B Project Proposal filed with the Yukon Environmental and Socio-Economic Assessment Board (YESAB) with the provision for an additional one metre of drawdown at Mayo Lake. This one metre drawdown provision was later removed from the application to YESAB. YEC plans to proceed with the licensing of the Mayo Lake enhanced storage (one metre drawdown) as a separate project proposal with an anticipated filing with YESAB in the fall of 2010.

Specifically the Minister's December 18, 2009 letter provided the following Terms of Reference for the YUB:

> **General purpose of review and hearing**
>
> 1. The general purpose of the review and hearing is to obtain the YUB's report and recommendations on the potential benefits, costs, risks and customer impacts that influence whether Mayo B should proceed as proposed by YEC.
>
> **Public hearing**
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> 2. The YUB shall hold a public hearing in a format to be determined by the YUB and it shall receive submissions from any person or groups or classes of persons who, in the opinion of the YUB, have an interest in the matter.
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> **Specific aspects of the project to be reviewed**
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> 3. The YUB shall report on and make recommendations about the necessity for Mayo B and its timing and design, with particular regard to:
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> a. The public need for Mayo B under various reasonable electric load forecasts, including near term requirements related to the Minto (Capstone Mining Corporation), Bellekeno (Alexco Resource Corporation) and Carmacks Copper (Western Copper Corporation) mines and to any other potential major industrial customers, and the effect of the project on the rates of customers;
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> b. The capability of existing and currently committed new transmission and generation facilities to provide reliable electric power generation to meet the forecast load requirements, taking into account the new planning criteria as proposed by the YEC and recommended by the YUB. In particular, the YUB shall report on:
>
> i. the implications of approving Mayo B prior to the environmental and socio-economic assessment and regulatory approval of the Mayo Lake Drawdown (including how, if at all, Mayo B's

expected impact on YEC and its customers differs according to whether the Mayo Lake Drawdown is permitted or not);

ii. the relationship between Mayo B and CSTP Stage 2 completion;

iii. the effect the completion of Mayo B is expected to have on the ongoing use of diesel generation at various locations under various reasonable electric load forecasts; and

iv. other implications of Mayo B to the system reliability, customer rates and economic growth in the Yukon.

c. The risks facing Mayo B and their potential impacts on rates for customers, including, but not limited to, the risks arising from:

i. changes to general economic, market, or financial conditions;

ii. any mitigation measures and/or modifications to project design or schedule required by the environmental and socio-economic assessment and regulatory approvals;

iii. the timelines, and other conditions, contained in the Federal Agreement;

iv. loads forecasts, both industrial and residential, not being realized;

v. unanticipated cost overruns or project financing capability; and

vi. the possibility that the Mayo Lake Drawdown does not proceed.

d. What, if any, alternatives to Mayo B might be advisable given reasonable load assumptions and risk assessments. In particular, the YUB shall report on:

i. possible alternative configurations for timing and structure of the Mayo B as proposed by YEC; and

ii. whether it is prudent to build Mayo B at this time.

Timing of report and recommendations

4. The YUB shall submit its report and recommendations to the Minister of Justice no later than March 31, 2010.

Recommendation respecting certificates

5. The YUB shall provide a recommendation on whether YEC should be granted an energy project certificate and an energy operation certificate for Mayo B and if so, whether the certificates should be subject to any terms and conditions and what these terms and conditions should be.

Other Recommendations

6. The YUB may make any other recommendations or provide any other information that it considers advisable in the circumstances.

In correspondence from the Minister of Justice dated February 15, 2010 the Terms of Reference were amended by the following:

1. The purpose of the review and hearing is to obtain the YUB's report and recommendations on the potential benefits, costs, risks and customer impacts that influence whether Mayo B should proceed as proposed by YEC. (The existing Terms of Reference describe this as the "general purpose" of the review and hearing, implying that they have other, more specific purposes. This is not the case.)

2. Paragraphs 3(a) to (d) of the Terms of Reference list certain matters to which the YUB is encouraged to pay particular regard. It is not expected, however, that the YUB will analyze these in greater detail than the YUB itself considers necessary in order to fulfill the purpose of the review and hearing, nor, despite the existing wording of these paragraphs, is it intended that the YUB will necessarily report and provide recommendations on each of the enumerated items. The YUB is instead expected to focus on those items that in its judgment bear most directly on the decisions to be made in respect of the application.

3. Despite existing paragraph 4, the YUB is to submit its report and recommendations to the Minister of Justice no later than Friday, April 16, 2010.

Based on the Terms of Reference, the Board established a process for the Part 3 review and hearing. Board Order 2010-01 was issued on January 25, 2010 which established an initial schedule for the Mayo B process. Subsequently, Board Orders 2010-02 and 2010-03 set out additional process steps and the hearing date, time and location. The initial Notice of Hearing was attached to Board Order 2010-01 and subsequently published in the Whitehorse Star and Yukon News.

A public hearing took place from April 6 through 8, 2010 in Whitehorse with oral argument and reply occurring on April 8, 2010. Registered intervenors were Peter Percival, Utilities Consumers' Group (UCG), Yukon Electrical Company Ltd. (YECL), Yukon Conservation Society, the City of Whitehorse, and John Maissan. Mr. Maissan subsequently withdrew his name as a registered intervenor. Registered Observers were Yukon Department of Energy, Mines and Resources, and the Yukon Chamber of Commerce.

All intervenors were provided the opportunity to make information requests, file evidence, cross-examine the YEC witnesses, and provide final argument and reply.

2 Necessity for Mayo B

2.1 Public Need for Mayo B

Views of YEC

In its Application, YEC submitted that the Mayo B Project provides the opportunity to have added material renewable hydro generation in place by 2012. YEC indicated that the Mayo B Project's in-service date occurs at a time when electricity loads are forecast to increase and to require additional grid service and energy beyond available surplus hydro. Moreover, unless new renewable power resource options are developed, YEC submitted that the need for new diesel generation in Yukon will continue well into the future.[3]

YEC stated that Mayo B was expected to supply system-wide loads following interconnection of the WAF and MD systems (interconnected system or IS).[4] The new IS, including committed projects, will comprise approximately 132 MW of installed generation prior to the addition of Mayo B. System capability to meet energy loads consists of two main generating sources – renewable and diesel.[5]

YEC explained that renewable generation, primarily hydro, was dispatched on the WAF and MD systems as the first and main source of supply and this mode of operation would not change with the initiation of the IS.[6]

> Yukon Energy generation dispatch in effect first meets integrated loads requirements with non-dispatchable generation (wind and YECL Fish Lake hydro) and then with YEC hydro generation, with diesel only being used as required.

With respect to existing and committed generation capacity (without Mayo B), YEC submitted that significant diesel generation may be required even under relatively low-load situations in very low load-flow years to meet varying firm load levels on the Yukon IS.[7]

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3 Application, page 24.
4 Application, Attachment D-1.
5 Application, Attachment C-1.
6 Ibid.

YEC based its long-term economic analysis of the Mayo B Project on the following:

a. approved YEC retail non-industrial loads (Order 2009-10);
b. approved YECL non-industrial loads and Fish Lake generation forecast (Order 2009-5);
c. non-industrial loads beyond 2009 that were based on:
   i. an increase of 0.6 GW.h in 2010 for Faro reclamation loads above 2009 levels and
   ii. increases of 1.85% per year after 2009 for all retail loads;[8]
d. Industrial loads that were based on known or announced developments in Yukon and whose project lives were based on current reasonable expectations; these include the Minto (operating mine), Alexco, and Carmacks Copper mines.[9]

YEC submitted that the application set out reasonable electric load forecasts, including near term (2012-2018) requirements related to Minto, Alexco, and Carmacks Copper mines that drive the public need for Mayo B to be in service by 2012.[10] Moreover, the application presented a very conservative forecast in that the forecast incorporated only those mine loads which are projected to end in 2018 and did not include other new industrial loads.[11] Despite the conservative forecast, YEC submitted that there was a clear public need for Mayo B and for subsequent new renewable resources in order to displace the requirement for diesel generation.[12]

Views of the Intervenors

YECL submitted that the evidence suggests that the benefit from the Mayo B Project is a renewable energy resource project which aims to reduce the use of diesel to meet load requirements. As such, the Mayo B Project will not result in greenhouse gas emissions associated with the diesel option. However, YECL submitted that a realistic load forecast, among other things, is just as important. YECL submitted that it was not consulted and did not have input into YEC's wholesale sales forecast. Moreover, albeit conservative, YEC's load forecast is based on industrial load growth that by its nature "can be transient and can negatively impact customers who are left behind when the mines go away."[13]

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7 Application, Attachment C-4.
8 Consistent with the long-term load forecast growth rate used in the 2006-2025 Resource Plan.
9 Application, Attachment D-1.
10 Transcript, page 414, lines 3-7.
11 Transcript, page 418, lines 3-8.
12 Transcript, page 418, lines 14-24.
13 Transcript, page 443, lines 1-2.

The City of Whitehorse stated that it was in favor of the Mayo B Project and submitted that the Board should provide a report to the Minister that was in favor of certification of the Mayo B Project. The City's support was based in part on the displacement of diesel generation on the grid and the associated long-term environmental and financial benefits.

UCG submitted that the Board should be clear in its consideration of the proposed Mayo B Project, "that the project does not specifically address a need in the sense that there is a load that will not be met in the near term."[14] UCG expressed its concern that if the intention of the proposed Mayo B Project was to displace diesel generation, it may be difficult to determine the amount of displacement that has taken place until mine loads were actually added.[15] Further, UCG submitted that Yukon Development Corporation (YDC) has specifically taken on the risk that no new mine load is committed, such that for the purposes of the business case analysis the YUB is expected to assume that a Carmacks Copper-type load will exist from 2012 to 2018.[16]

Views of the Board

The Board considered

a. The public need for Mayo B under various reasonable electric load forecasts;
b. The capability of existing and currently committed new transmission and generation facilities to provide reliable electric power generation to meet the forecast load requirements, taking into account the new planning criteria as proposed by YEC.

The Board notes from YEC's submission:

> Without the Project, existing and committed Yukon Energy generation and transmission facilities (as reviewed in Attachment C) will still be able to supply forecast WAF/MD grid generation energy load forecasts for many years to come by relying on existing diesel generation facilities.[17]

Additionally, with respect to the need for Mayo B YEC submitted the following:

> The requirement to proceed with Mayo B at this time is not directly tied to the timing of a specific emergent industrial load (such as Minto mine in the case of CSTP Stage 1) … The Project also provides the opportunity to have added

[14] Transcript, page 452, lines 9-11.
[15] Transcript, page 456, lines 1-4.
[16] Transcript, page 458, lines 15-19.
[17] Application, page 22.

> material renewable hydro generation in place by 2012 for the emergent Carmacks Copper mine industrial load as assumed in the base load forecast.
> …
> Mayo B will come into service at a time when electricity loads are now forecast over the near term to require grid service and energy materially beyond available surplus hydro, driving new diesel generation requirements in Yukon over both the near term and the long term unless new renewable power resource options are developed.[18]

Considering the above, the Board finds that the Mayo B Project is not required to meet an approved near term specific load. Rather the Mayo B Project is premised on Mayo B being a renewable energy resource project meant to displace diesel generation and the associated greenhouse gas emissions resulting from diesel generation to meet load requirements. The Board took into account YEC's submission that Mayo B economics have been considered and assessed on the following basis:

> Although Mayo B will also contribute additional firm winter peak capacity to the IS, the economics assessment focuses on the energy contribution of Mayo B to displace IS diesel generation that would otherwise be required.[19]

With respect to YEC's base case load forecast, the Board considers that YEC has used a conservative assumption in the forecast as it contains no industrial loads beyond 2018. A more likely scenario to the Board is that industrial loads will continue to be served by the WAF/MD interconnected grid beyond 2018.[20]

The Board also notes that YEC in its load forecast has adopted a 1.85% long-term average annual growth rate, which is the same growth rate that YEC incorporated in its 2006-2025 Resource Plan. Moreover, the Board observes that each of the metrics used to forecast long-term growth in the 2006-2025 Resource Plan is now higher than was the case at the time of the Resource Plan forecast.[21]

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[18] Application, page 24.
[19] Application, page 25.
[20] Application, page 24.
[21] A, Attachment D-2.

In consideration of the above, the Board is of the view that YEC's load forecast is conservative. Accordingly, the Board finds that YEC's load forecast for the period used to evaluate the economics of the Mayo B Project is reasonable.

However, the Board has several concerns respecting the economics of the Project. First, the Board shares UCG's concerns that if the intention of Mayo B is to displace diesel generation, it will be difficult to determine that material displacement has taken place until mine loads have been added. This concern is mitigated given the conservative nature of YEC's load forecast, as noted above.

Second, the Board takes exception with YEC's response to YUB-YEC-1-37. In that response YEC submitted:

> Industrial customers that are connected to the hydro grid system, such as Minto and Alexco (as well as Carmacks Copper in future forecasts) make up a portion of the grid firm load requirements that Yukon Energy must plan for and serve from utility generation on a non-discriminatory basis…[22]

The Board points out that while YEC may have an obligation to serve, and that any such obligation is non-discriminatory, nevertheless YEC must make prudent decisions in terms of how its customers are served and the generation source to serve its customers.

Furthermore, the Board notes YEC's response to YUB-YEC-1-25, wherein YEC provided the levelized cost of energy (LCOE) for various scenarios relating to the Mayo B Project. However, YEC did not present a scenario wherein Mayo B was not added. Such information would have been especially helpful to the Board in understanding the effect on costs in assessing the proposal. Therefore, the Board recommends that YEC, in future similar applications, provide LCOEs with and without the proposed project.

To conclude, based on the load forecast and comments of YEC, there is enough generation in place to serve forecast loads, and based on this single criteria there is not a specific need for the Mayo B Project. However, based on the comments and analysis of YEC, there is clearly a

[22] As is the case in most rate regulated jurisdictions **YEC has an obligation to serve all customers that request electrical service within areas presently served by YEC.** This includes industrial customers throughout the Yukon which request connection and agree to pay the transmission/distribution capital costs to connect to the existing grid. **[Emphasis added]**

demonstrated public benefit if Mayo B proceeds. The cost savings to Yukon ratepayers and other benefits from displacing diesel generation lead the Board to recommend that the public benefit is significant enough that, in concert with Board comments on other sections in this report, YEC should proceed with the Mayo B Project.

2.2 *Capability of Existing Transmission* and *Generation Facilities*

Section 3(b) of the Terms of Reference requested the YUB to consider the capability of existing and currently committed new transmission and generation facilities to provide reliable electric power generation to meet the forecast load requirements, taking into account the new planning criteria as proposed by YEC and recommended by the YUB. In this section, the Board will consider the need for the Mayo B Project taking into account YEC's generation capacity planning criteria.

Views of YEC

YEC presented the case for the need for Mayo B mainly in economic terms. YEC stated, in its IR responses:[23]

> The main purpose or need for the Mayo B Project through to 2019 (as well as beyond that date) as described in the Application is to provide a source of economical renewable energy to supplant base load diesel energy generation requirements rather than to provide additional generating capacity for reliability (peak winter load) purposes.
>
> The existing and currently committed generation and transmission of the integrated grid, absent Mayo B, can supply the electric energy (kW.h) necessary to supply forecast load to 2019 with or without the forecast major industrial loads. As reviewed in the response to YUB-YEC-1-7(h), the forecast diesel generation required in 2013 without Mayo B (64 GW.h) and with the forecast industrial loads would equal a capacity factor of only 15% for the existing diesel generation capacity (48 MW without Minto mine diesels), and could similarly supply the 2017 forecast diesel generation of 78 GW.h (after which time the grid load is assumed to decline as mines are assumed to be shut down).

In dealing with the need in terms of its generation capacity planning criteria YEC stated:

> Analysis has not been carried out to confirm the date when added diesel generation capacity would need to be added to the grid system, for peak winter capacity planning purposes (i.e. LOLE or N-1), to serve the loads forecast through

[23] IR YUB-YEC-1-41.

> to 2019 with or without the forecast industrial loads. Mayo B will serve to defer this requirement – however, no economic benefit for this deferral has been estimated in the Application or included in the economic rationale for Mayo B.[24]

YEC added that it had not yet produced an LOLE model that would deal with the integration of the WAF and MD grids once the Carmacks-Stewart Stage 2 Transmission Project (CSTP) connecting the two grids was complete. YEC explained that:

> Given the changes brought about by the completion of CSTP Stage 2, Yukon Energy does not yet have the capability to model the full integrated grid in a manner that permits calculation of an LOLE value. As part of the five year update to the 2006 Resource Plan, Yukon Energy will be updating the LOLE model later in 2010 to handle the full integrated grid. There is no expectation that the LOLE value upon connection will exceed the 2 hours/year target, particularly as the LOLE calculations typically benefit from increased diversity in the complement of generating units on a system. [25]

YEC also stated:

> As reviewed in YUB-YEC-1-41, Yukon Energy has not yet done a detailed assessment of the capacity planning criteria reflecting the situation with CSTP Stage 2 and Mayo B. One the two major capacity criteria (the LOLE analysis) has not been updated to be able to model the benefits of the integrated grid. At the present time, each system on it own basically meets (WAF)[26] or exceeds (MD) the established planning criteria.[27]

With respect to its N-1 criterion, YEC declared:

> An emergency N-1 criteria was also included in YEC's new capacity planning criteria to address the seriousness of sustained outages of a critical system component (e.g., on WAF, currently an interruption of the Aishihik transmission) during the period of peak winter loads. Since most industrial loads in Yukon, such as mines, typically have their own on-site diesel generation for limited emergency purposes, the N-1 criteria is calculated to include all firm loads, with the exception of major industrial loads. "Emergency" backup for a mine implies sufficient capacity to protect essential system and camp needs, and would not imply capability to supply power as needed for normal operation. As with LOLE, the N-1 criterion will be reviewed in the near term in light of completion of CSTP Stage 2.[28]

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[24] Ibid.
[25] IR YUB-YEC-1-6.
[26] Excluding the Minto diesels.
[27] IR YUB-YEC-1-36.
[28] IR YUB-YEC-1-6.

In IR YUB-YEC-1-11, YEC provided an analysis of the integrated system that demonstrated, based on its current N-1 criterion and its current load forecast, omitting industrial load, that without Mayo B's additional capacity (10 MW) the system would be slightly deficient in peaking capacity by the end of 2018. The analysis also demonstrated that with Mayo B's additional capacity the integrated system would be able to meet the N-1 criterion past the 2019 cutoff date of the analysis requested.

In testimony,[29] Mr. Morrison of YEC stated that of the two generation capacity planning criteria adopted by YEC, LOLE and N-1, the N-1 test didn't seem to indicate a shortage of capacity for some considerable period of time.

Mr. Morrison explained that, as more industrial load is added to the system, the LOLE criterion is likely to emerge as a more determinative criterion than N-1. He indicated that time-wise the LOLE criterion might be the determinative criterion with the addition of Carmacks Copper. However, the results of an LOLE analysis would have to be available to reach a conclusion as to when LOLE will become the determinative criterion.

Views of the Intervenors

In its argument, the City of Whitehorse asked the Board to recommend that conditions be included in the energy project certificate for Mayo B issued by the Minister. The ones that pertain to this issue are listed below:

- As YEC had indicated in cross-examination that it intended to bring a new general rate application prior to Mayo B coming into service, this should be a condition of the certificate.
- To require YEC to perform an updated LOLE analysis prior to a new rate application.
- To require YEC in its next rate application to provide information on how much diesel capacity is still required on the integrated grid and whether there is any opportunity to delay refurbishment of certain diesel facilities or whether mothballing or decommissioning any diesel facilities is required or possible at that time.

[29] Transcript, pages 353 to 355.

Views of the Board

The Board accepts YEC's evidence that the existing and currently committed new generation and transmission facilities of the integrated grid, absent Mayo B, can supply the electric energy (GW.h) necessary to supply the forecast load to 2019 with or without the forecast industrial loads. These transmission facilities include CSTP Stage 2 transmission scheduled to be commissioned in 2011.

The Board also accepts YEC's evidence that without Mayo B and with the forecast load, YEC's N-1 generation capacity planning criterion would not be met by existing generation facilities beyond the end of 2018 and that with Mayo B the criterion would be met for some period beyond 2019, the end of the analysis period.

The Board notes that this criterion addresses the need for additional generation capacity (MW) to supply load demand under single contingency outage conditions during the annual maximum peak load hour and not the need for additional energy (GW.h) to supply load requirements or the cost of that energy, throughout the year. If Mayo B were not to proceed, then this test suggests another source of generating capacity might be required, possibly diesel generation.

However, based on the evidence before it, the Board cannot reach a definitive conclusion respecting the need for Mayo B in terms of YEC's second generation capacity planning criterion, loss of load expectation (LOLE). YEC has yet to create an LOLE model for the integrated system (the combined WAF and MD systems starting in 2011) and do the necessary studies to address the generation capacity adequacy of the integrated system going forward. The Board had expected that such an analysis would have been undertaken before the application was filed with the Board.

The Board considered YEC's view that the generation capacity of each of the two systems is currently adequate to meet its LOLE criteria. In addition, it is YEC's view that when the two systems are integrated in 2011, due to the completion of CSTP Stage 2, the combined integrated system should meet the LOLE criterion at that point in time.

However, the Board believes that beyond 2011 with increasing load, the generation capacity adequacy of the integrated system as measured by LOLE will change. To what extent existing

generation capacity will be adequate and for how long remains unknown. As well, starting in 2012, the contribution in capacity reliability terms (LOLE) of Mayo B and hence the timing of any need for Mayo B in capacity terms (MW) remains unknown. As was observed by YEC:

> The LOLE test, therefore, would be fairly important. We do know from the Resource Planning that we would expect with Carmacks Copper, if I remember correctly, being added that the break – the point of which you tip from the N-1 being determinative to the LOLE being determinative would probably be expected to occur and so this may not be the determinative test; it may be the LOLE test. So we would need to see the results of that.[30]

The Board agrees that the LOLE test is important, and therefore recommends that YEC perform an LOLE analysis of generating capacity adequacy and need through to at least 2019 utilizing an updated model of the integrated system, and to do this prior to a new general rate application.

The Board concludes that the need for the Mayo B Project has not been supported or justified on the basis of YEC's capacity planning criterion due to a lack of evidence, specifically LOLE analysis. Therefore, YEC's justification of the need for Mayo B must be based solely on the economic and other benefits (public benefit) claimed due to diesel energy displacement. The Board expects YEC to proceed to produce an LOLE model of its integrated system and to conduct a study of future generating capacity requirements utilizing this model for future review as part of the five year update of its 20-Year Resource Plan.[31]

[30] Transcript, pages 353 and 354.
[31] YUB-YEC-1-6.

3 Other Matters

In addition, the Terms of Reference in section 3(b) laid out other more specific matters which were:

i. The implications of approving Mayo B prior to the environmental and socio-economic assessment and regulatory approval of the Mayo Lake Drawdown (including how, if at all, Mayo B's expected impact on YEC and its customers differs according to whether the Mayo Lake Drawdown is permitted or not);

ii. The relationship between Mayo B and CSTP completion;

iii. The effect the completion of Mayo B is expected to have on the ongoing use of diesel generation at various locations under various reasonable electric load forecasts; and

iv. Other implications of Mayo B to the system reliability, customer rates and economic growth in the Yukon."

The Minister of Justice's letter, dated February 15, 2010, provided the Board with further guidance regarding the Terms of Reference. The letter stated in part:

> Paragraphs 3(a) to 3(d) of the Terms of Reference list certain matters to which the YUB is encouraged to pay particular regard. It is not expected, however, that the YUB will analyze these in greater detail than the YUB itself considers necessary in order to fulfill the purpose of the review and hearing. Nor, despite the existing wording of these paragraphs, is it intended that the YUB will necessarily report and provide recommendations on each of the enumerated items. The YUB is instead expected to focus on those items that in its judgment bear most directly on the decisions to be made in respect of the application.

In this section of the report, the Board addresses items i, ii, iii and iv set out above, having regard to the Minister's guidance.

3.1 Mayo B and Mayo Lake Drawdown

Views of YEC

YEC stated that the Mayo B Project is economic, and that the generating capacity that will be available from the Mayo plant (Mayo B and Mayo A) is not modified, with or without the additional one metre drawdown of Mayo Lake. The enhanced storage potential at Mayo Lake

provides the opportunity, in certain high inflow years, to capture flows that would otherwise be in excess of the storage capacity of the system.

YEC explained[32] that the energy value of a metre of Mayo Lake storage, when used to generate at Mayo B, is approximately 14 GW.h; however, this added storage range, which would be accessed in higher water years, would not be used every year. The actual year to year impacts will vary depending on annual water flow, i.e. the added bottom storage would allow for added Mayo generation primarily in high flow years, when the water would otherwise be spilled.

YEC also stated that the reduction in Mayo B long term average net generation without Mayo Lake drawdown (i.e. no license change at Mayo Lake compared to one metre added drawdown proposed) is expected to vary depending on the integrated system dispatchable generation load. YEC further indicated that on a present value basis under the base case forecast used in its analysis, the levelized reduction equals 4 GW.h/yr which implies the use of the full 14 GW.h/yr of added storage on average once in every 3.5 years.

Based on long term average flows, YEC estimated[33] that it would be required to provide 4 GW.h/yr more diesel energy generation so long as Mayo Lake enhanced storage was not available. Based on its estimate of the incremental costs of diesel energy generation, 26 c/KW.h in 2012 dollars, and the need to provide 4 GW.h/yr of additional energy, YEC estimated that the increase in annual average ratepayer costs would be $1 million in 2012 dollars – costs that would be fully avoided with Mayo Lake enhanced storage.

On a present value basis, over the 65-year life of the Mayo B Project, YEC estimated that this extra diesel energy generation would amount to approximately $20 million in increased costs.

Also, YEC estimated that additional annual greenhouse gas emissions from diesel generation would equal 2800 tonnes/yr.

YEC also stated that with or without Mayo B storage enhancement, Mayo B capital costs and the Mayo B direct annual costs to ratepayers would not change.

[32] Application, page 37, footnote 67.
[33] Application, pages 37 and 38.

Views of the Intervenors

Intervenors did not directly comment on this issue.

Views of the Board

The Board agrees with YEC's statement that the issue of the Mayo Lake drawdown will not affect the projected Mayo B capital costs or Mayo B's annual operating costs.

The Board is of the view that the long term costs cited by YEC for extra diesel energy generation required without the Mayo Lake drawdown may not be realized. The basis for this view is that the value cited arises from YEC's economic model which does not consider or provide for any future displacement of additional diesel energy generation by other renewable energy projects and is sensitive to the veracity of the load forecast. The Board expects YEC will continue to advance renewable resource projects that will continue to displace diesel generation where economic and needed in capacity terms.

The Board also considered YEC's evidence[34] that there is presently no other renewable resource option that could be developed to be available in the near term, the 2012-2015 time frame, that would in turn further displace diesel generation. The Board believes that should renewable resource projects be chosen over increased diesel generation beyond 2015, as indicated by YEC in other evidence, the long term value of the increased operating costs cited could be significantly reduced.

Therefore, the Board finds that the main effect of the approval of the Mayo B Project prior to a decision on the Mayo Lake drawdown is confined to the requirement to provide additional diesel based energy, starting in 2012, which would result in an increase in annual diesel energy operating costs estimated at $1 million/yr in 2012 dollars based on 4 GW.h/yr. The Board is of the view that the actual additional costs that might be incurred will be subject to actual hydrological conditions that exist year by year on the total system, the veracity of the load forecast, and the possible future installation of other renewable resource generation facilities.

[34] Application, page 40.

3.2 Mayo B and CSTP Completion

Views of YEC

Regarding the relationship between Mayo B and the CSTP completion, YEC gave two reasons as to why the CSTP Stage 2 was required. Firstly, the integration of the two existing grids, WAF and MD, will allow energy from existing generating units to be transmitted to loads throughout the integrated system. Secondly, the additional energy provided by Mayo B will be transmitted to loads throughout the integrated system.

CSTP Stage 2 is scheduled for completion in February 2011, in part to allow hydro based energy from the WAF system to flow to the MD system during the summer of 2011. This energy will replace Mayo A hydro based energy that will not be available during the summer of 2011 due to the construction of Mayo B.

If there were a delay in the completion of CSTP Stage 2,[35] hydro energy would not be available from the WAF system. In that case, during the period that Mayo A would be unavailable, the MD system would have to be supplied by more expensive diesel generation from within the MD system. Were that to happen, YEC estimated, based on diesel displacement, that it could cost up to $220,000 extra for each of the 12 weeks ($2.64 million) that the Mayo A units would unavailable.

Views of the Intervenors

Intervenors did not directly comment on this issue.

Views of the Board

The Board considered YEC's statement that CSTP Stage 2 is scheduled for completion in early 2011. The Board finds that any additional costs to replace the energy displaced by the Mayo A outage in mid 2011 should not become an issue for this Application, but can be subject to a prudency review in a future General Rate Application by YEC.

[35] IR YUB-YEC-1-10.

3.3 Diesel Generation Use at Various Locations

Views of YEC

On the question of the effect that the completion of Mayo B is expected to have on the ongoing use of diesel generation at various locations, YEC stated that the main purpose or need for the Mayo B Project is to supplant base load diesel energy generation requirements on the integrated system. The main thrust of YEC's analysis involved economic modeling of generation unit energy production at a high level. In planning terms, this meant YEC did not model the dispatch of diesel generation units on an individual basis.

YEC did however provide information on the total amount of diesel energy required in each year of its analysis based on the results of its economic model[36] and its load forecast, including industrial load. Based on that information, the table below illustrates and summarizes the change in total diesel energy generation expected due to the Mayo B Project, with average water flows. It also shows the dollar amount of the net savings expected by YEC due to diesel displacement taking into consideration the costs of Mayo B.

The years 2012 and 2016 represent the time period during which the mining load is forecast to be fully operational. Beyond 2016, YEC's load forecast assumes that total energy consumption declines once the mines begin to shut down. The year 2019 illustrates the point in the forecast when the mines are totally shut down and diesel energy generation requirements decline significantly. The year 2024 illustrates a point five years later where load growth has resumed and diesel energy generation has increased.

[36] IR YUB-YEC-1-25A.

Again, the table below summarizes these numbers and shows the diesel generation capacity factor based on existing diesel capacity of 47 MW.[37] The numbers shown are rounded off for comparison purposes.

Table Showing Diesel Energy Required and Diesel Capacity Factor Both With and Without the Mayo B Project and Net Diesel Offset Savings with Mayo B (Based on YEC's Load Forecast and Economic Model)

Year	Diesel Energy Required With Mayo B (GW.h)	Diesel Capacity Factor With Mayo B	Diesel Energy Required No Mayo B (GW.h)	Diesel Capacity Factor No Mayo B	Net Diesel Savings Due to Mayo B ($million)
2012	30.6	9%	57.1	15%	3.8
2016	48.2	12%	79.4	19%	5.7
2019	0.0	0%	14.1	3%	1.6
2024	17.0	4%	38.8	9%	4.5

YEC explained that these numbers apply for a Mayo B Project with the Mayo Lake drawdown approved. Without the Mayo Lake drawdown approved, the potential energy output of the Mayo B Project would be reduced by about 4 GW.h/yr[38] on a long term levelized basis. In those years where that additional energy output would be required by the system, YEC expected additional diesel energy generation would make up that part of the difference that existing hydro generation could not provide.

YEC advised[39] the Board that it could not produce a useful forecast of diesel generation by individual unit or plant location due to the following operational factors:

1. Although a specific unit may be "stacked" to be the first unit dispatched when required based on fuel efficiency and availability of staff resources, there are numerous other conditions that change from time to time which affect the decision of which unit to use such as:

    a. If there is a need to consider if particular units which otherwise are not first in the stacking order are in need of being run for some amount of time ("exercised"), or
    b. If there is a need to use generation to "turn over" YEC's fuel inventories to ensure fuel is not stale.

[37] IR CW-YEC-1-22.
[38] Application, pages 9 and 37.
[39] IR YUB-YEC-1-7, Transcript, pages 346 to 347.

2. With the completion of CSTP Stage 2, the diesel stacking order will need to be revisited to take into consideration the integrated system, which provides the possibility for diesel generation at Dawson and Faro to be dispatched for overall grid support where that would aid in minimizing line losses. Consideration will have to be given to running diesel units separate from the load in the area in order to maintain the stability of the transmission grid.

In response to the following question,[40]

> Just to follow up on that stacking order, will YEC need to consider grid support and loss minimization in the stacking order and dispatch of diesel generation units for operational purposes to reduce – and will that reduce the claimed diesel displacement benefits for Mayo B based on YEC's economic planning model?

YEC stated:

> I presume that, overall, the question you're posing is whether or not if we optimize the systems for the diesel only case could we reduce the line losses and therefore reduce the amount of diesel we're assuming, and if we don't at Mayo B, certainly – and even with Mayo B, we're going to be running a fair amount of diesel if you look at the numbers, if the Carmacks Copper mine is there until we generate some more renewable. There will certainly be all efforts made that can be reasonably be made to optimize all of the factors that you and I are talking about.
>
> From the modeling point of view at the moment, I would just say that the people that have been doing it have conscientiously tried from the model stage to reflect what makes sense rather than inflate it. It's always subject to potential improvements, you know, looking at the way you and I are talking about it, but at the moment I'm not aware of any particular improvements that are leaping out to make a big difference, material difference to the analysis we're presenting, but I can – I don't know whether there's anything useful I could add to it, but maybe at the break I could check whether there's anything I could add to what I'm saying from talking to the people who run the systems. That might explain why there isn't really any material gain in a diesel-only system what we're somehow ignoring by the modeling we're doing.
>
> I do get the point of your question, I just don't know whether I can give you any better answer than that one.

In response to a follow up question[41] on the same matter YEC again stated that it did not believe that its estimates of diesel requirements without Mayo B were inflated but did not provide any further information on this matter.

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[40] Transcript, pages 347 to 349.

Views of the Intervenors

Intervenors did not directly comment on this issue.

Views of the Board

The Board understands that the energy production model employed by YEC did not model diesel energy generation on an individual unit basis.[42] Nor did it take into consideration any transmission system operational requirements that would dictate the use of diesel generation such as loss minimization or system control.

The Board also understands that YEC modeled its transmission losses as part of its load forecast but did not model a specific offset in its energy production model to account for any diesel generation required to supply transmission losses and to meet operational needs (apart from the energy production economic considerations of its model).

One impact of this approach on the results of YEC's economic analysis[43] is illustrated as follows. Based on YEC's model, YEC predicts no requirement whatsoever for diesel energy generation in 2019 with Mayo B in operation,[44] which in turn appears to contradict its evidence on the need to run its diesel units for operational reasons including the need to minimize transmission losses.

YEC's modeling approach means that this issue is imbedded to some degree in each year of YEC's economic analysis, and not just 2019. This in turn means that the amount of annual diesel energy displacement predicted will be somewhat greater than would be experienced under actual operating conditions.

The Board has reviewed the evidence provided by YEC on the planning and operational aspects of diesel energy displacement due to the Mayo B Project. The Board believes it likely that the economic benefits claimed for net diesel energy displacement with Mayo B in operation, based on YEC's economic planning model, may not be fully realized in all circumstances due to operational requirements and constraints, including system losses.

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41 Transcript, page 349.
42 IR YUB-YEC-1-30A.
43 IR YUB-YEC-1-25A.
44 Application, page 29, Figure 2.

However, the Board is of the view that any reductions in the economic benefits claimed, due to operating requirements and losses, are not likely to be significant enough to affect the Board's overall conclusions based on YEC's economic analysis.

3.4 Mayo B's Impact on System Reliability (Other Implications)

Views of YEC

YEC stated that although the main purpose of Mayo B is to provide a source of economical renewable energy to supplant base load diesel energy generation, Mayo B will serve to defer the need for new winter peaking capability on the system. YEC did not attribute an economic benefit to this deferral in its cost savings analysis.

YEC's evidence[45] suggested that if the load forecast develops as predicted, that there would potentially be a shortfall of peak capacity to meet the N-1 capacity reliability test by the end of 2018. The development of Mayo B or the utilization of some other generating source[46] would alleviate that shortfall.

Views of the Intervenors

Intervenors did not directly comment on this issue.

Views of the Board

The Board agrees that in terms of the N-1 capacity reliability test that the development of Mayo B would alleviate a potential shortfall in peak capacity by the end of 2018, given YEC's current load forecast. The Board notes that should Mayo B not proceed, other alternatives exist such as additional diesel generation or other renewable energy projects that could meet the need for additional peaking capacity. The Board further observes that given the magnitude of the shortfall in 2018 it is likely that such capacity might not be needed before the end of 2019.

The Board is of the view that the issue of need for future generating capacity was not addressed using LOLE analysis and thus it is premature to reach a conclusion on the need for future capacity and the benefits of that capacity starting in a particular year based on the N-1 criterion alone as other factors influence the timing of this need.

[45] IR YUB-YEC-1-11.
[46] IR YUB-YEC-1-9.

However, the Board agrees that in the operating realm the presence of Mayo B does enhance system reliability and the value of having Mayo B's additional capacity available, starting in 2012, may arise at time of system peak if the system experiences multiple outages of generating capacity or during other periods of the year. On the other hand, Mayo B's contribution to enhanced system reliability might arise at times of transmission outages,[47] such as certain outages to the Carmacks-Stewart transmission line.

[47] IR YUB-YEC-1-20.

4 Risks Facing the Mayo B Project

4.1 Changes to General Economic, Market or Financial Conditions

YEC, in its application identified several risks related to the Mayo B Project. In summary, these risks are described as:[48]

- Availability of adequate no cost capital funding
- Regulatory schedule delays
- Federal and territorial permitting
- Capital cost increases and construction risks
- Project feasibility risks related to grid load and debt borrowing costs.

YEC submitted that the largest risk faced by the Mayo B Project - that of adequate no cost capital funding - has been addressed through the Federal Contribution Agreement and the no cost contribution funding from the Yukon Development Corporation (YDC). Regulatory schedule delays were mitigated by the removal of the one metre drawdown provision from Mayo Lake, in the YESAB review. YEC expects to receive all necessary regulatory approvals.[49]

With respect to mitigating construction cost risks, YEC provided the following comments:[50]

- **Selection process for MOU construction contractor in June 2009** – The construction management approach followed by Yukon Energy allowed for early competitive selection of a construction contractor in spring 2009 with selection of Peter Kiewit Sons through an MOU contract awarded in June 2009. Through the MOU with Kiewit, Yukon Energy established procedures to arrive at an open book procurement and construction contract that included an agreed upon construction and development schedule and target pricing formula. This approach was adopted to reduce price and risks of delay, and risks related to the lack of contractor participation in the early stages of project design. While working to secure a final construction agreement, the contractor worked with YEC and its design engineer (KGS) in reviewing preliminary designs and cost estimates, and the tender process for selecting the turbine/generator supplier. By early December 2009 YEC had updated capital cost estimates from this process and agreed to commercial terms with Kiewit that formed the basis for finalizing a construction contract.

[48] Application, page 34.
[49] Ibid, page 35.
[50] Exhibit B8, YEC opening remarks, pages 7-8.

- **Selection process for Turbine/Generator Contractor** - The turbine/generator was identified as key long lead equipment for the project that needed to be tendered in fall 2009 to enable this equipment to be installed on site in fall 2011. On September 16, 2009 Yukon Energy issued an RFP for a Turbine/Generator supplier and on November 6, 2009 this process closed (an award was made after the Part 3 Application was filed).

YEC identified other project feasibility risks as delays in the completion of the CSTP Stage 2, loss of the Mayo Lake enhanced storage provisions and risks that Mayo B costs will exceed diesel generation costs due to reduced diesel fuel prices, load risks, or general economic conditions.

In the Application, the forecast completion of CSTP Stage 2 is the end of 2010, leaving sufficient time and therefore it does not pose a risk to Mayo B. If the Mayo Lake storage enhancement does not proceed, the incremental diesel generation costs would be approximately $20 million on a present value basis, but will not affect Mayo B annual costs.[51]

The evidence of YEC stated that if the Carmacks Copper project did not go ahead, the Project will still be cost effective vis-à-vis diesel generation.[52] YEC added that other load risks would not be material enough to affect the project economics.

In terms of general economic risk, the YEC position was that YDC will secure long term borrowing for the Project within the near term and sustained low diesel prices were considered unlikely.

From a rates perspective, YEC submitted that the flexible debt financing will mitigate most rate impacts.

Views of the Intervenors

UCG argued[53] that the Board should recommend as a condition for the project certificates that any net costs may not be recovered by YEC until they are matched with benefits in subsequent years. This would be attained either through flexible debt financing, deferrals or other mechanisms. UCG added that any recommendation of the Board be conditional on approval from

[51] Application, page 38.
[52] Ibid.
[53] Transcript, page 464.

other bodies such as YESAB. Further, UCG proposed that certification be linked to current rates but at a conceptual level, residual costs would be funded by ratepayers but not through increased rates.

Views of the Board

The Board finds that YEC has put in place adequate no cost capital funding through the Federal Agreement and YDC. The Board would prefer to see the details of the flexible debt provisions, but notes that a prudency review will occur in the future.

The Board notes that YEC has not received all approvals with respect to licensing and permits from other regulatory bodies. YEC has demonstrated that it has taken the necessary steps and is willing to take the necessary steps to meet those requirements and address timing issues.

The Board finds that the ability of YEC to lock in the price of the generation turbine and to use an "alliance model" in terms of project construction is evidence of risk mitigation in regards to construction. None-the-less a prudency review can occur at a later GRA. The Board is of the view that YEC has clearly taken steps to manage the risks with respect to general economic, market and financial conditions.

4.2 Project Modifications or Mitigation Measures

Views of YEC

YEC provided the following update on the YESAB process and construction process:[54]

- ***YESAB Draft Screening Report issued March 12, 2010*** - Review of the draft report and discussion to date with regulators and NNDFN indicates that no major new issues have been identified by YESAB or other parties. At a high level YESAB has provided terms and conditions consistent with Yukon Energy's Application. Based on review to date, Yukon Energy sees no financial impact from the YESAB or related regulatory process that would change the Mayo B overall budget capital cost.
  …
- ***Construction Contract with Kiewit signed March 12, 2010 –***A construction contract with Kiewit was completed and signed March 12, 2010, and Kiewit is currently undertaking pre-construction activities to be ready for construction once permits are issued. This construction contract includes:

[54] Exhibit B8, pages 12-14.

1. An agreed concept design and project scope for Mayo B consistent with the Part 3 Application.
2. An "Alliance model" open book contract arrangement where the parties commit to work together and in good faith to address issues that arise on a best-for-project basis and where the major risks to the project will be shared between YEC and Kiewit in accordance with the terms of the agreement. The contract includes all provisions required under the federal funding agreement, including right to audit by the Auditor General. The stipulated primary targets of YEC and Kiewit are:
    - To complete the work at or below the Target Maximum Price of $85.40 million, and
    - To complete the work in accordance with the project schedule, which includes a Commercial Operation Date of December 31, 2011.
    …

- ***Turbine Generator Supplier Selected January 15, 2010 (ABB) and final contract signed March 31, 2010 –*** The turbine/generator is the key long lead equipment item for this project. With the assistance of Kiewit, YEC undertook a competitive process to select a turbine generator supplier. The selection process was completed in January 15, 2010 with a Preliminary Agreement between Yukon Energy and ABB; a supply agreement was finalized and signed on March 31, 2010 with a final contract price (including Preliminary Agreement costs) of approximately $5.04 million and schedules for delivery consistent with the Kiewit project schedule.

Views of the Intervenors

Intervenors did not directly comment on this issue.

Views of the Board

Within its Application, information responses and testimony, the Board finds that YEC has addressed mitigation issues in terms of the YESAB process and related costs. Further, the Board considers that the Project design work completed in the summer of 2009 should reduce the need for any material design modifications.

4.3 Federal Agreement – Timelines/Other Conditions

Views of YEC

YEC included with its application, Attachment E, Agreement for the Yukon Green Energy Legacy Project. There are two terms of note in the agreement:

1. "Substantial Completion" is a defined term given the definition – occurs when the project can be used for the purpose for which it was intended. And,

2. Clause 3.1 which states:

> Canada agrees, subject to the Terms and Conditions of this Agreement, including Schedule B, to pay a contribution to the recipient of not more than 50 percent of the total Eligible Costs of the project, during the three Fiscal Years starting in 2009-2010 and ending in 2011-2012 …

YEC highlighted that there is no funding for work competed after March 31, 2012 hence the project must be completed (in operation) by March 31, 2012.

Views of the Intervenors

Intervenors did not directly comment on this issue.

Views of the Board

The Board observes that Attachment E of the Application outlines the time constraints faced by YEC. As this is an opportunity project based on available funding, the Board considers that the deadlines within the Federal Agreement drive most aspects of this Project. The Board is of the view that without the Federal Agreement, there would not be a Mayo B Project.

4.4 Risks of Load Forecasts not Being Realized

Views of YEC

YEC provided the following argument with respect to load forecast risk:[55]

> The fourth sub item under section 3 (c) of the Terms of Reference is, and I quote: "Load forecasts, both industrial and residential, not being realized" and the risks related to that Mr. Chairman, the application, IRs, and hearing testimony addressed in detail, as you've heard, the risks of load forecasts not being realized and specific measures to protect ratepayers against the risk of the Carmacks Copper load being delayed or not materializing. To address these and other rate risks regarding Mayo B, you've heard that YEC intends to arrange flexible debt financing with YDC for Mayo B similar to the current YEC flexible term debt long-term loan arrangements related to Whitehorse No. 4. With the provision of flexible debt financing, Mayo B net generation revenue requirement costs will be capped at 10 to 11 cents per kilowatt hour of net generation. This arrangement will mitigate load risk relating to future loads being less than what is forecast in this application. What this means is from a load perspective this approach will be that any load risk is not expected to create any upward pressure on overall near-

[55] Transcript, pages 430-431.

term retail rates and that rate customers are protected specifically against rate increase risks related to the delay of the Carmacks Copper load.

Views of the Intervenors

UCG provided the following argument:[56]

> However, if the intention of the proposed Mayo B Project is to displace diesel generation specifically, UCG would remain concerned that until mine loads are actually added it may be difficult to determine that material displacement has taken place.

Views of the Board

The Board discussed the effect of load forecasts and the risks of those load forecasts not being realized in the Public Need section of this report. The Board notes that ratepayers are protected through the flexible debt financing in the event that the Carmacks Copper load does not materialize. The Board notes that although YECL[57] was not consulted in regards to the load forecast, the load forecasts for both YEC and YECL were recently tested before this Board. The Board has concluded that for this Application, the load forecast provided by YEC is conservative. The Board is of the view that any deviation from the forecast, other than Carmacks Copper, has minimal downside.

4.5 Unanticipated Cost Overruns or Project Financing Capability

Views of YEC

YEC noted measures it has taken to reduce risks with respect to construction costs.

Mitigation measures include:[58]

- Geotechnical field studies undertaken in 2009
- Construction management approach and alliance model open book contract arrangement
- Early selection and contracting for turbine
- More advanced preliminary engineering design
- Significant review of Project cost estimates
- Owner retained construction administration

[56] Transcript, pages 456.
[57] Transcript, pages 442-443.
[58] Application, pages 35-36.

- Field inspection services

It is the submission of YEC based on the above, that it has taken sufficient measures to avoid unanticipated cost overruns.

Views of the Intervenors

UCG submitted that:[59]

> … if the proposed project goes forward Yukon Energy will need to provide a convincing business case demonstrating the prudence of its actual spending to allow the actual costs to be added to rate base, particularly to the extent that the final costs are in excess of the costs in this process if that were the case. UCG also submits that if this proposed project does not go forward, any costs incurred outside typical project planning should be absorbed by the utility and not recovered from ratepayers.

UCG further added that it would be appropriate for the Board to consider a mechanism that defers rate impacts to a time when benefits of the project become realizable. The details of such a mechanism could be determined in a future rate application.

Views of the Board

The Board is of the view that YEC has benefited from experience and taken steps to avoid cost overruns. The measures demonstrate the steps taken by YEC to reduce construction cost risk. However, the measures do not guarantee cost overruns will not occur. Given the total cost of the Mayo B Project, and the contingencies built into the cost structure, the Board cautions that cost overages may not be viewed as prudent in a future proceeding.

4.6 Mayo Lake Drawdown

Views of YEC

Within the evidence, YEC has noted that without the change in the water licence to have an additional one metre drawdown at Mayo Lake, YEC would be required to provide 4 GW.h/year more diesel generation. This condition would persist until such time as the drawdown was approved. YEC estimated the incremental costs to ratepayers of the additional diesel generation

[59] Transcript, page 457, starting at line 7.

at approximately $1 million/year. Concerning project economics with respect to the drawdown of Mayo Lake, YEC provided the following comment:[60]

> However, as is amply demonstrated in the Application and in responses to interrogatories, Mayo B is fully economic without the additional metre of drawdown.

Views of the Intervenors

UCG argued that the Project, as it is before the Board should be evaluated excluding the additional one metre drawdown of Mayo Lake.[61] UCG noted that YEC understood the Project to be economical even without the drawdown. UCG then asked the Board to consider making the Mayo B Project certificate conditional upon YEC obtaining the additional drawdown if the Board could not make a recommendation without the drawdown occurring.

Views of the Board

The Board is of the view that the Mayo B Project is economical with or without the additional one metre drawdown of Mayo Lake. The economics and associated impact on rates of the Project are enhanced if the one metre drawdown does occur. If the Project proceeds, the Board recommends that YEC pursue the additional one metre drawdown at Mayo Lake.

[60] Exhibit B8, page 11.
[61] Transcript, page 459, lines 8-17.

5 Alternatives to Mayo B

Views of YEC

With respect to alternatives to Mayo B, YEC made the following submission:[62]

> Absent Mayo B there is today no apparent renewable resource option that could be developed to be available over the near term (2012-2015) to replace the average annual 28 GW.h of additional renewable net generation (diesel generation displacement) that Mayo B is forecast to provide over this 4 year period. At 26 cents/kWh incremental cost, 28 GW.h of diesel generation would incur added annual fuel and operating costs of approximately $7.3 million and increase CO2 emissions by approximately 19,600 tonnes per year. Not proceeding with the Mayo B expansion means that YEC and Yukon ratepayers would be at risk during the near term (2012-2015) for the additional forecast 28 GW.h or more per year of diesel generation (i.e., the diesel generation that Mayo B would otherwise displace with related costs and GHG emissions).

YEC identified other projects feasibility or prefeasibility study as Gladstone Diversion (18 GW.h/year), Atlin winter storage (18 GW.h/year), and Marsh Lake Fall/Winter Storage (7.7 GW.h/year). These projects were further discussed in YUB-YEC-1-8(a):

> While Mayo B is the first generation enhancement opportunity to proceed (among the suite of potential projects considered), Yukon Energy is also proceeding with planning activities on a series of other enhancements to existing hydro facilities in order to continue to meet ongoing requirements to develop renewable generation resources. Projects currently being considered as part of feasibility and planning activities include the Gladstone Diversion project (up to 18 GW.h/year), small scale Atlin winter storage project (up to 18 GW.h/year), Marsh Lake fall/winter storage project (up to 7.7 GW.h/year), as well as longer term/ larger scale options such as geothermal generation options and larger scale Hydro (such as Hoole, at 100-300 GW.h/year).
>
> Smaller scale developments such as Atlin, Marsh Lake and Gladstone require relatively short construction periods (typically on the order of one year). However, these projects present regulatory and licencing challenges and at this time it is not possible to forecast the licencing periods that may be required to proceed with each project. Larger scale greenfield hydro generation options cannot likely be developed in less than 5-7 years even on an expedited schedule.

[62] Application, page 40.

> As noted during the Yukon Energy 2008/2009 GRA, in the YESAB materials and in the current Application, due to their nature (i.e., timing considerations related to the ability to licence the projects in a timely manner) these projects are not considered alternatives to Mayo B to displace diesel generation starting in 2012. Mayo B was selected as the only project that could be advanced and reasonably completed in order to displace near term Yukon grid generation requirements for baseload diesel.

Views of the Intervenors

The City of Whitehorse would like to see YEC make a stronger commitment to demand side management.[63] The City of Whitehorse, in support of YCS, would also like YEC to explore and institute other forms of green energy, but was of the view that wind power, at this time was not a reasonable alternative, given the current funding and time constraints on that funding.

UCG argued that, since the Project is opportunity based, and due to the timing constraints of that opportunity, the Board's and intervenors' hands have been effectively tied in terms of proposing alternatives.[64] UCG said:[65]

> Because the project is opportunity based and because that opportunity is tied to the influx of over $80 million in external funds tied to this particular project, parties are tasked with proposing alternatives that cost in the order of $36.5 million that generate benefits of the proposed Mayo B project, even though it actually cost $120 million.
>
> With great respect, the time for proposing alternatives to the project in a useful way would have been at the time a proposal for Federal funding was being considered, such that similar external funding could have been considered for other projects. As it is, the external funding that is available is tied to this project. UCG concedes that in this particular case the result may have been the same or similar in terms of conclusion based on, for example, the shovel readiness of this proposal as compared to other alternatives.

UCG also submitted that one of the alternatives that should have been considered was the use of on-site diesel generation to serve transient industrial mine loads, and that such an evaluation should have been considered before a decision to apply for funding was made.[66]

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[63] Transcript, page 446-447.
[64] Transcript, pages 460-461.
[65] Ibid, lines 20-25 and page 461 lines 1-11.
[66] Transcript, page 462.

It was UCG's view that YEC has not given proper consideration to demand side management, especially in regards to mine loads. UCG was concerned that DSM activities by mine loads, with or without the input of YEC, had the ability to alter the load assumptions which underpin the economics of the project.[67]

YCS, through its evidence, proposed that YEC look at the feasibility of Mount Sumanik as a wind energy alternative to Mayo B.[68]

Views of the Board

The view of the Board on alternatives is that YEC essentially did not provide any viable alternative to the Mayo B Project other than diesel. The Board considered the testimony of YEC that a project such as Mount Sumanik is too early in the prefeasibility phase to meet the current time constraints faced by YEC in terms of both funding and need (load).

With respect to other alternatives, YEC took into account the following alternatives:[69]

> A. MR. OSLER: I just add one thing. When we looked at these projects and ended up with Mayo B, it was because we thought it would probably take awhile to get them to a stage where we could proceed with them, and I think the experience is demonstrating that, although it's going better than Mr. Morrison expected, that indeed it's taking time. But the good news part of it is if it works, if this being patient gets the information needed to deal with regulatory and actually come out with success, these are not projects that take a long time to build. They can be done relatively quickly. They're not expensive projects. We're not talking about anybody saying "Geez, this is very expensive." These are very efficient projects, and they're focused on winter energy in each case.
>
> So that -- the key is to get regulatory approval. Each one has got their own unique little stamp and until you've got regulatory approval, you've got nothing. But once you've got that, you've got a very nice project. And you look at our numbers in the forecast we've got right now, they would fit in quite nicely to – by 2013 or something like that, '14, into helping with the situation with diesel.
>
> A. MR. MORRISON: Mr. Chairman, if I might, just before we move on, just one very quick point that I think is worth making. This is -- and I'm not suggesting that the question suggested this, but just so that everybody is very clear about this, we don't -- we didn't look at this as Mayo B and/or Marsh, Atlin, and

[67] Transcript, page 463.
[68] Exhibit C5-4.
[69] Transcript, pages 364-365, YEC panel cross examined by Board Counsel.

> Gladstone. Let's all be very clear: It's Mayo B and Marsh, Atlin, and Gladstone. We need them all. And we need them -- we need the Marsh, Atlin, Gladstone as quick as we can get them in complement to Mayo B.

The Board accepts the evidence of YEC that the alternative projects (Marsh Lake, Atlin, Gladstone) compliment Mayo B, are relatively low cost, but are not expected to clear the regulatory hurdles in the timeframes required for either the federal funding, or to meet the near term load requirements of YEC. Given the evidence before this Board, it is clear, based on the load assumptions of YEC, from an opportunity cost perspective, the public will benefit if YEC is granted Energy Operation and Energy Project Certificates for Mayo B.

6 Prudent to Build Mayo B Now

Views of YEC

YEC made the following submission on whether it was prudent to move ahead with Mayo B:[70]

> Mr. Chairman, the evidence clearly demonstrates that Mayo B is a well thought out project. It has gone through the required Resource Planning exercises endorsed by this Board in its report to the Minister regarding its 20-year Resource Plan back in 2007.
>
> There is a significant identified need that we've talked about in detail related to the reduced surplus hydro generation and the need to find new sources of renewable generation to meet the ongoing baseload diesel requirements forecast to be required by 2012.
>
> As we've noted in the evidence, there are no other renewable resource projects of a similar scale that could produce the same quantity of energy as Mayo B that could be advanced through the feasibility planning stages, licensed, and built to be in service in the 2012 time frame. The availability of the Federal government funding towards a significant portion of the costs of this project also presented a once-in-a-lifetime opportunity to put in place a significant legacy infrastructure project that combine the enhancement of an existing asset with the interconnection of the WAF and Mayo Dawson grids.
>
> Mr. Chairman, given the evidence that you have heard at this proceeding, it would be imprudent not to proceed with this project.

Views of the Intervenors

Intervenors did not directly comment on this issue.

Views of the Board

Given the timing constraints outlined in the Green Infrastructure Fund agreement for the Yukon Green Energy Legacy Project, the Board finds that YEC should proceed with the Mayo B Project at this time.

[70] Transcript, pages 434-435.

7 Conditions

Views of YEC

YEC submitted that the conditions requested below should not be recommended.

Views of the Inteveners

The intervenors requested the Board to attach certain conditions if the Board were to recommend the issuance of energy project and energy operation certificates for the Mayo B Project.

The City of Whitehorse requested the following conditions be attached to the recommendation:[71]

- YEC submit a new general rate application to the Board prior to Mayo B being placed into service.
- YEC provide an updated LOLE study prior to the general rate application noted above.
- The flexible financing details with YDC be fully determined and the complete financing agreement be included in the next general rate application.
- YEC market and sell carbon credits based on the reduced diesel emissions from the operation of Mayo B.
- YEC provide a stronger commitment to DSM measures.

UCG asked for the following conditions:[72]

- If the Board is not prepared to recommend the project without the 1 metre drawdown of Mayo Lake, then provide a recommendation conditional on YEC obtaining the 1 metre drawdown of Mayo Lake.
- Any net costs related to the project in any year will not be recovered by YEC until matched by net benefits in subsequent years.
- Any recommendation should be conditional on YESAB approval.

Views of the Board

The Board expects that YEC will provide a full and complete study of its capacity using its capacity planning criteria and include it as part of its next GRA. The Board further expects the complete details of the flexible debt financing with YDC and illustrative examples of how the flexible debt financing works will be provided by YEC in its next GRA. Further, at the time YEC provides an update to its 20 Year Resource Plan, the Board will require YEC to include an extensive update on its demand side management plans and initiatives undertaken to date, and

[71] Ibid, pages 445-446.
[72] Ibid, pages 459 and 464.

explanation on these initiatives to be undertaken in the near term. At this time the Board will not dictate when YEC should file its next GRA as the Board believes that economics will determine that timing.

Although the Board is recommending the Minister approve Energy Project and Energy Operation certificates for the Mayo B Project as proposed by YEC, in any future GRA proceeding YEC will have to show the prudency of the project.

Finally with respect to the marketing of carbon credits as requested by the City of Whitehorse, YEC made the following comments:

> A. MR. OSLER: We're very definitely pursuing, and the reasonable expectation is that there will be something there because there are carbon credits in this world, and people are paying attention to them, companies are securing them, and YEC is actively, and has been for some time, looking at them. So -- but we just don't feel comfortable putting a specific number in there.[73]

The Board is of the view that in its next GRA, YEC should provide an update on its pursuit of marketing carbon credits.

Based on the foregoing, and recognizing that several of the conditions brought up by intervenors will be dealt with in YEC's next GRA, the Board does not recommend that the Minister add in the conditions proposed by the intervenors.

[73] Transcript, page 136, lines 6-12.

8 Conclusion

The Board recommends that YEC be granted an Energy Project Certificate and an Energy Operation Certificate for Mayo B for the reasons set out in this report.

Appendix 1 – Recommendation Summary

The Board notes YEC's response to YUB-YEC-1-25, wherein YEC provided the levelized cost of energy (LCOE) for various scenarios relating to the Mayo B Project. However, YEC did not present a scenario wherein Mayo B was not added. Such information would have been especially helpful to the Board in understanding the effect on costs in assessing the proposal. Therefore, the Board recommends that YEC, in future similar applications, provide LCOEs with and without the proposed project. Page 11

To conclude, based on the load forecast and comments of YEC, there is enough generation in place to serve forecast loads, and based on this single criteria there is not a specific need for the Mayo B Project. However, based on the comments and analysis of YEC, there is clearly a demonstrated public benefit if Mayo B proceeds. The cost savings to Yukon ratepayers and other benefits from displacing diesel generation lead the Board to recommend that the public benefit is significant enough that, subject to Board comments on other sections in this report, YEC should proceed with the Mayo B Project. Page 11

The Board agrees that the LOLE test is important, and therefore recommends that YEC perform an LOLE analysis of generating capacity adequacy and need through to at least 2019 utilizing an updated model of the integrated system, and to do this prior to a new general rate application and prior to Mayo B coming into service. Page 15

The Board is of the view that the Mayo B Project is economical with or without the additional one metre drawdown of Mayo Lake. The economics and associated impact on rates of the Project are enhanced if the one metre drawdown does occur. If the Project proceeds, the Board recommends that YEC pursue the additional one metre drawdown at Mayo Lake. Page 32

Although the Board is recommending the Minister approve Energy Project and Energy Operation certificates for the Mayo B Project as proposed by YEC, in any future GRA proceeding YEC will have to show the prudency of the project. Page 36

Appendix 2 – Board Expectations for YEC

The Board expects YEC to proceed to produce an LOLE model of its integrated system and to conduct a study of future generating capacity requirements utilizing this model for future review as part of the five year update of its 20-Year Resource Plan. Page 16.

The Board expects YEC will continue to advance renewable resource projects that will continue to displace diesel generation where economic and needed in capacity terms. Page 18

The Board expects that YEC will provide a full and complete study of its capacity using its capacity planning criteria and include it as part of its next GRA. The Board further expects the complete details of the flexible debt financing with YDC and illustrative examples of how the flexible debt financing works will be provided by YEC in its next GRA. Further, at the time YEC provides an update to its 20 Year Resource Plan, the Board will require YEC to include an extensive update on its demand side management plans and initiatives undertaken to date, and explanation on these initiatives to be undertaken in the near term. Page 37

The Board is of the view that in its next GRA, YEC should provide an update on its pursuit of marketing carbon credits. Page 38