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UTILITY RATES REVIEW COUNCIL OF NUNAVUT
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CONSEIL D'EXAMEN DES TAUX DES ENTREPRISES DE SERVICES DU NUNAVUT

Report to the Minister Responsible for the Qulliq Energy Corporation

Respecting:

An Application by the Qulliq Energy Corporation For Approval of Major Project Permit to Upgrade the Iqaluit Distribution System from 5kV to 25kV

Report 2010-03

April 30, 2010

THE UTILITY RATES REVIEW COUNCIL

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ABBREVIATIONS

GRA	General Rate Application
PDC	Power Distribution Centre
AFUDC	Allowance for Funds Used During Construction
QEC	Qulliq Energy Corporation
URRC	Utility Rates Review Council

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1. Introduction

Qulliq Energy Corporation (QEC), as a designated utility, is required pursuant to Section 18.1 of the Qulliq Energy Corporation Act (QEC Act), to seek approval from the responsible Minister prior to undertaking a major capital project. In this regard, Section 18.1 of the QEC Act provides as follows:

> "Definition
> (1) In this section, "major capital project" means a capital project that has a total cost that exceeds $5,000,000.
>
> Major capital project
> (2) The Corporation shall not undertake, nor permit any of its subsidiaries to undertake, a major capital project unless it applies in advance to the Minister for an order giving permission for the project.
>
> Minister may seek advice
> (3) Before responding to an application for permission made under subsection (2), the Minister may seek the advice of the Utility Rates Review Council established under the *Utility Rates Review Council Act*.
>
> Corporation to provide information
> (4) The Corporation shall provide the Minister and the Utility Rates Review Council with any information necessary for the Minister to decide whether permission should be granted.
>
> What Minister may do
> (5) The Minister may
> (a) grant permission for undertaking the major capital project, with or without conditions; or
> (b) refuse permission.
>
> Order
> (6) Permission granted by the Minister under paragraph (5)(a) shall be in the form of an order."

By letter dated February 2, 2010 the Minister requested advice from the URRC with respect to QEC's Application dated November 21, 2009,and received by the responsible Minister on February 2, 2010 for approval of a major capital project permit to complete the upgrade of the Iqaluit distribution system from the existing 5 kV voltage level to a 25 kV voltage level.

2. Particulars of the Application

QEC requests approval to complete the upgrade of the Iqaluit distribution system from a voltage level of 5 kV to 25 kV. Specifically, the application states:

> "This application seeks the approval from the Minister Responsible for Qulliq Energy Corporation pursuant to section 18.1 of the QEC Act, R.S.N.W.T. 1988, c.N-2 for a project permit for completion of the 25 kV conversion of the Iqaluit distribution system." [Application;Piv)]

The new system will consist of 2 new 25 kV substations located adjacent to the main and federal plants and three 25 kV trunk feeders, with provision for a future feeder #4. The project is expected to be carried out over a 3 year period commencing in the 2010/11 fiscal year with completion in 2012/13, at a forecast capital cost of $14.1 million.

The major components making up the project are the substation construction and distribution feeder system upgrade. The following Table sets out the project costs by major component:

Project Cost Breakdown by Fiscal Year

(million)	Spent	2010/11	2011/12	2012/13	Totals
Sub-Station	3.0	2.9	0.7		6.6
Distribution System	0.7	0.9	3.0	1.3	5.9
AFUDC	0.2	0.4	0.6	0.4	1.6
Totals	**3.9**	**4.2**	**4.3**	**1.7**	**14.1**

The existing distribution system consists of a 5 kV Power Distribution Centre (PDC) Substation feeding 8 radial feeders located at the Iqaluit main plant site. Two feeders are intermittently connected to additional generation capacity located at the federal standby plant. QEC states the existing arrangement creates unique load flow situations throughout the system resulting in voltage regulation problems at customer end points due to high current levels on feeders. QEC states, currently 5 feeders on the system are heavily loaded and require corrective action.

QEC states:

> "During our study QEC noticed that due to the loading of the current 5 kV feeder system, the ability to carry out partial or complete feeder tie switching is either severally restricted or impossible given the already heavily loaded feeders. In the past QEC has relied on partial switching during summer loading periods to carry out planned construction and maintenance work, but is currently restricted on all feeders due to continued load growth experienced or the physical location of feeders that can accommodate a load transfer.
>
> Unplanned outages create additional challenges to QEC during the winter peak load months as heavily loaded feeders already experiencing low voltage levels cannot carry additional load from switching activity making winter switching virtually impossible on the current 5 kV system. Feeders that can accommodate the additional load are not physically close enough to connect making the system difficult to operate in its current layout and configuration. The inability to completely tie feeders or transfer load on the 5 kV system also makes it impossible to remove feeder breakers from service located at the existing 5 kV substation (PDC). Presently QEC has to perform a complete feeder outage to customers to remove and replace a breaker if failure occurs." [Application P4]

QEC states the age and obsolescence of the existing system is a concern:

> The age and obsolescence of the current 5 kV system is also a concern to QEC. The Iqaluit system consists of a mixture of old and new equipment. Equipment with differing specifications and engineering construction standards are currently in service in the system. Many of the transformer and overhead plant systems are no longer consistent with current industry standards and lack the reliability performance required. QEC has currently put in place new distribution engineering and purchasing standards to reflect the current standards in place across the country. It is QEC's intention to utilize these standards as the basis for the 25 kV upgrade, thus improving the inherent reliability of the system. [Application P4]

QEC states the upgrade would improve worker safety:

> "Overall we believe this investment is twofold, it further protects our employees while enhancing customer reliability in the event of equipment failure. The current Iqaluit 5 kV switchgear is not Arc resistant, making it an additional risk to mitigate. QEC feels the total replacement of the

> switchgear lineup is more cost effective and reliable than exploring the option of retrofitting the existing equipment." [Application P3]

In addition, QEC indicates the distribution system upgrade to a 25 kV voltage level would reduce line losses for the Iqaluit distribution system which in turn would also result in some savings in variable operating and maintenance expenses.

QEC states the conversion process will be complete in phases and throughout the process sections of the community will experience power outages for duration up to several hours.

3. Process

By letter dated March 10, 2010 the URRC notified the City of Iqaluit respecting the Application. The URRC also caused notice of the Application to be published in newspapers having general circulation in Nunavut on March 22nd & 29th in Nunavut News/North, March 24th & 31st in the Kivalliq News and March 19th & 26th in Nunatsiaq News. The URRC provided an opportunity for the public to make submissions respecting the Application to the URRC by April 9, 2010.

QEC made a presentation to City Council respecting the application on April 7, 2010. There were no written comments respecting the application from interested parties.

QEC responded to information requests from the URRC on March 15, 2010.

The URRC's consideration of the matter is set out in this report

4. Consideration of the Application

The Application requests approval of a major capital project permit to complete the upgrade of the Iqaluit distribution system from the existing 5 kV voltage level

to a 25 kV voltage level. In the URRC's view the application to complete a project for which funds have already been expended is inconsistent with the requirements of Section 18.1 of the QEC Act. By bringing forward a request to "complete" a project, limits the responsible Minister's ability to assess the application and exercise his powers under the Act in a meaningful manner with due regard to alternative choices. Applying for a major capital project permit after significant funds have been committed to the project is a practice QEC must avoid in future. For purposes of this Report, the URRC will review the application in the context of an application for a major capital project permit for the entire project.

The URRC notes QEC's assessment in Appendix A that as far back as 2005 voltage regulation on feeders 6 and 7 were falling outside CSA C235 standards. The URRC also notes QEC's statement that existing feeders 6, 4, 3, & 2 are going to experience voltage regulation problems over the next 5-7 years due to heavy loading. QEC states, if switching is carried out between any of these feeders it will create further voltage regulation problems as potential loads on receiving feeders carry the additional load of adjacent feeders, in some cases resulting in the doubling of the load on the feeder. [URRC QEC 2b)]

The URRC notes QEC's expectation that as a result of the distribution upgrades outage time would be reduced by 112 minutes and short duration outages of 5 minutes or less would be eliminated (i.e. conductor slap and bird strikes). [URRC QEC 3b)] The URRC considers delaying the upgrade may result in unacceptable reliability levels. The URRC finds upgrade of the existing system is required, in the proposed timeframe, since feeder capacities on several of the 5 kV feeders have reached or are approaching the loading limits, due to system load growth.

QEC estimates the loss reduction as a result of the upgrade to the 25 kV voltage level to be 2112 Mwh in 2013. The calculation of the loss reduction is set out in URRC QEC 7e). The URRC recognizes the use of 2009 loss numbers to calculate the 2013 losses is a conservative approach since it ignores sales growth between 2009 to 2013. However, the 2009 losses used as the starting

point for the losses calculation includes both technical (pure electrical losses) and non technical losses (unaccounted for losses). Had the calculation been based purely on the existing level of electrical losses the loss reduction estimate would likely have been lower.

The URRC notes the economic analysis in Attachment D of the application reflects QEC's estimates of losses savings to be a major contributor to the economic benefits of the project . However, the URRC considers the need for the project is determined primarily by the reliability requirements of the system and the economic benefits of the project, though relevant, are secondary considerations. The URRC expects QEC to provide accurate estimates of loss reduction at the time the 25 kV project is proposed to be included in rate base at which time the prudence of the project costs will be tested.

With respect to safety, the URRC considers since the 5 kV system did not include arc resistant switchgear and the upgrade does, the upgrade would contribute to greater worker safety.

The URRC notes QEC has been contemplating the 25 kV upgrade since the 2005/06 timeframe. The estimate of the project cost in 2006 was significantly lower than in the current Application. The current budget estimate for the project amounting to $14.083 million represents an increase of approximately $5.136 million compared to the 2006 cost estimates. The major contributor to the increase in the capital budget compared with the 2006 estimates is contract labour. [URRC QEC 4c)]

QEC provided assurances that adequate, tendering, project management and budgetary control procedures are in place to ensure costs are incurred prudently. [URRC QEC 6a) to d)] In the URRC's view the onus is on the utility to demonstrate the prudence of costs at the time such costs are proposed to be included in rate base including how effectively the aforementioned controls and procedures were implemented during project execution. The URRC expects QEC to provide evidence supporting the prudent construction costs of the distribution

upgrade project including details of the internal processes used to ensure costs were expended in a prudent and effective manner, at the time the project is proposed to be included in rate base.

The URRC notes from URRC QEC 10c) that the proposed upgrade, together with the other major additions to rate base in Iqaluit since the time of the last GRA, may result in rate increases in the order of magnitude of $12.84 per month for a domestic customer consuming 700 Kwh/month and $18.34 for a domestic customer consuming 1000 Kwh/month. In the URRC's view, if at the time the upgrade project is proposed to be included in rate base the rate increases are significant, QEC should propose mechanisms to mitigate the rate impacts.

The URRC notes the alternative to upgrading to a 25 kV system would have been an upgrade to a 12 kV system. The Wardrop Engineering report requested by the Minister of Energy in 2006 to conduct an independent review of the distribution system conversion plan, notes that no detailed technical and economic comparisons of alternative plans were carried out before committing to the 25 kV system. The same report notes about $2.6 million had been spent on 25 kV equipment at the time of the report. [Attachment B Executive Summary] In the URRC's view irrespective of whether the correct alternative was chosen or not QEC should have taken the steps necessary to fully evaluate credible alternatives before committing funds to any one alternative.

The URRC notes QEC's view that the differential costs between the two voltage classes (12 kV & 25 kV) are not significant and while loss reduction is also not significant between the two voltage classes, the power transfer capability of the higher (25 kV) system makes it the best value for capital funds spent to carry the project to a 35 year life and beyond. Considering the relatively minor differences in costs and loss savings between a 25 kV and 12 kV system as noted in the Wardrop report, the URRC accepts QEC's evidence that the 25 kV upgrade is the appropriate alternative and would carry the Iqaluit distribution system furthest into the future by maximizing the power transfer capability.

5. URRC Recommendation

1. Having considered the foregoing matters, the URRC recommends that the major capital project permit approval be granted for upgrading the Iqaluit distribution system from the voltage level of 5 kV to 25 kV.

2. URRC directs QEC to engage the community and affected customers in consultations for planning the switch over to the new system thereby ensuring minimal disruption to customers and a smooth transition to the new system

ON BEHALF OF THE

UTILITY RATES REVIEW COUNCIL OF NUNAVUT

DATED: April 30, 2010
Raymond Mercer
Chairman