BRITISH COLUMBIA UTILITIES COMMISSION

ORDER NUMBER G-165-08

SIXTH FLOOR, 900 HOWE STREET, BOX 250
VANCOUVER, B.C. V6Z 2N3 CANADA
web site: http://www.bcuc.com

TELEPHONE: (604) 660-4700
BC TOLL FREE: 1-800-663-1385
FACSIMILE: (604) 660-1102

IN THE MATTER OF
the Utilities Commission Act, R.S.B.C. 1996, Chapter 473

and

An Application by FortisBC Inc.
for a Certificate of Public Convenience and Necessity
for the Copper Conductor Replacement Project

BEFORE: A. A. Rhodes, Commissioner
R.J. Milbourne, Commissioner
P.E. Vivian, Commissioner November 7, 2008

O R D E R

WHEREAS:

A. On June 27, 2008, FortisBC Inc. ("FortisBC", "the Company") applied to the British Columbia Utilities Commission (the "Commission") for a Certificate of Public Convenience and Necessity ("CPCN") for the Copper Conductor Replacement Project (the "Project") (the "Application"); and

B. The Project consists of replacement of 85 percent of its No. 8, No. 6 and No. 90 MCM copper distribution conductors with aluminum conductor steel reinforced ("ACSR") conductors; assessment of poles for age and safety and replacement, subject to the assessment result; updates to the Geographic Information Systems Database; standardization as per FortisBC existing standards for distribution lines; and disposal of the replaced copper conductors through sale; and

C. The Project is expected to start in the first quarter of 2009 and be completed by the fourth quarter of 2018, with estimated capital expenditures of approximately $103 million, including the cost of removals, over the ten-year life of the Project. The net present value ("NPV") of the Project is estimated at approximately $59 million with an estimated NPV of Customer Rate Impact at 0.15 percent. Although the Company is seeking approval of the Project, it is only seeking expenditure approval out to 2010 of $11.7 million. The Company proposes to seek further approval for expenditures beyond 2010 in its future Capital Expenditure Plans; and

D. By Order G-108-08 the Commission established a Written Public Hearing Process and Regulatory Timetable and ordered that a Workshop be held in Kelowna, B.C. on August 12, 2008; and

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E. The Written Public Hearing process concluded with the filing of FortisBC's Reply Submission on September 29, 2008; and

F. The Commission has considered the Application and the evidence and the submissions of the parties.

NOW THEREFORE the Commission orders that the FortisBC Application for a CPCN for its Copper Conductor Replacement Project is denied. The Commission's determination is set out in the Reasons for Decision attached as Appendix A to this Order.

DATED at the City of Vancouver, in the Province of British Columbia, this 7th day of November 2008.

BY ORDER

Original signed by:

A.A. Rhodes
Commissioner

Attachment

FORTISBC INC.

APPLICATION FOR A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY FOR THE COPPER CONDUCTOR REPLACEMENT PROJECT

REASONS FOR DECISION

1.0 THE APPLICATION

By letter dated June 27, 2008 FortisBC Inc. ("FortisBC") filed an application to the British Columbia Utilities Commission ("the Commission") for a Certificate of Public Convenience and Necessity ("CPCN") pursuant to section 45 of the Utilities Commission Act R.S.B.C. 1996 c. 473 ("the Act") to replace certain of its copper conductors and perform other related work over a ten year period ("the Project") ("the Application").

More specifically, the Project would entail:

- replacement of 85 percent of all No. 8, No. 6 and No. 90 MCM Copper Distribution Conductors with Aluminum Conductor Steel Reinforced (ACSR) Conductor;
- assessment of poles for age and safety and replacement subject to the assessment result;
- updates to the Geographic Information Systems ("GIS") Database;
- standardization as per FortisBC existing standards for distribution lines; and
- disposal of the replaced copper conductors through sale.

(Exhibit B-1, pp. 7, 26)

In the Application, FortisBC seeks approval for the ten year Project generally, but has only provided cost estimates for the first two years totalling $11.7 million with a +/- 20 percent level of certainty. FortisBC anticipates the total cost of the Project to be approximately $103 million but takes the position that it cannot determine the level of accuracy of the cost estimates for the future years with any certainty due to the length of the Project and the volatility of costs in the utility industry. It proposes to seek further approval for future expenditures in its Capital Expenditure Plans. (Exhibit B-1, p. 7 Updated)

FortisBC states that the Project is necessary to ensure a "safe and reliable distribution system." (Exhibit B-1, p. 7)

2.0 THE PROCESS

Upon receipt of the Application, the Commission issued Order G-108-08 which established a written hearing procedure and regulatory timetable.

A Workshop presentation was held in Kelowna, B.C. on August 12, 2008.

There were two rounds of Information Requests ("IRs") from the Commission and one round of IRs from the Intervenors. Only the B.C. Old Age Pensioners' Organization et. al. ("BCOAPO") participated in the Intervenor IRs. Buryl Slack-Goodman and Hans Karow also registered as Intervenors and provided comments. FortisBC filed its Final Submission on September 16, 2008. The BCOAPO filed its Final Submission on September 22, 2008 and FortisBC replied on September 29, 2008.

3.0 POSITIONS OF THE PARTIES

No Intervenors opposed the Project.

The BCOAPO appears to support the Project but recommends that FortisBC be required to file annual reports concerning the Project. According to BCOAPO, such filings will allow stakeholders to consider the Company's experience and spending to date when the spending requests for the Project are reviewed as part of future Capital Expenditure Plans.

4.0 THE PROJECT

(i) Existing System

FortisBC is an investor-owned, integrated utility engaged in the business of generation, transmission, distribution and sale of electricity in the southern interior of British Columbia. FortisBC owns assets of approximately $850 million, including four hydro-electric generating plants and approximately 6,850 circuit kilometres of transmission and distribution power lines. (Exhibit B-1, p. 8) FortisBC states that it "has approximately 4,900 circuit kilometres of overhead distribution lines in its system, consisting of approximately 9,300 kilometres of conductor. Of this, approximately 660 circuit kilometres or 13.5 percent, is made up of copper conductors ranging in size from No. 8 to 300 MCM. Approximately 500 circuit kilometres of the copper distribution lines or 960 kilometres of conductor is ... [made up] of No. 8, No. 6 and 90 MCM (legacy) copper which is supported by approximately 8,100 poles." (Exhibit B-1, p. 10) The term "legacy copper" refers to all FortisBC's No. 8, No. 6 and No. 90 MCM copper conductor. (Exhibit B-4, BCOAPO I.R.1.2.1)

FortisBC notes that the legacy copper was commonly used for distribution lines 50 years ago due to its "excellent electrical characteristics" and availability, but that the metallurgical characteristics have deteriorated with the passage of time. A majority of the poles which support the legacy copper were installed at the same time as the legacy copper conductor such that approximately 4,450 poles are now over 50 years old. (Exhibit B-1, p. 10)

Table 1 shows the Legacy Copper Conductor Type and Age Profile.

Table 1
Legacy Copper Conductor Type, Age Profile

Conductor type	Circuit Length	Conductor Length	Age Profile
	(km)		
No. 90 MCM	77	216	> 65 years
No. 8	109	167	> 50 years
No. 6	318	581	≥ 50 years
Subtotal	**504**	**964**	
85 percent of Subtotal	**428**	**819**	

(Exhibit B-1, p.11)

The table below shows the approximate age of legacy versus non-legacy conductors in the FortisBC system.

Table A35.1
Conductor Age Profile

Conductor Type		Age Profile
No. 90 MCM	Legacy	> 65 years
No. 8	Legacy	> 50 years
No. 6	Legacy	≥ 50 years
No. 4	Non-Legacy	Approx. 40 years
Remaining Copper	Non-Legacy	Approx. 40 years or less
Aluminum	Non-Legacy	Approx. 40 years or less

(Exhibit B-4, BCUC I.R. 2.35.1)

(ii) Copper Conductor Failure

FortisBC reports that over the past five years, some 200 out of a total of 350 conductor failure incidents, or 57 percent, involved legacy copper conductor which only makes up roughly 10 percent of the total conductor in service. (Exhibit B-1, p. 13)

FortisBC further states that "within the last four years, twelve incidents involving copper conductor resulted in situations where downed conductors remained energized, creating a public and employee electrocution risk and a fire hazard." (Exhibit B-1, p. 13) However, no injuries in fact resulted. (Exhibit B-4, BCUC I.R. 2.34.1).

FortisBC details these twelve incidents, noting that four of the twelve, or one third, involved No.'s 3 and 4 copper conductors which are not attributable to the conductor itself, but to the Hot Tap Connectors which are directly applied to the conductor without the use of Stirrups. The replacement of the No.'s 3 and 4 conductors will be kept outside the scope of the Project. (Exhibit B-1, p. 15, Table 3)

FortisBC notes a particular concern for conductor failure in "Sensitive Areas" which it considers to include school zones, public parks, and high density residential and commercial areas. It has identified 187 locations in Sensitive Areas where No. 8, No. 6, or No. 90 MCM copper are present as follows:

Table 4
Legacy Copper Conductors in Sensitive Areas (Location Counts)

Sensitive Public Domain Type in FortisBC Inc. Service Area	No. 90 MCM Copper	No. 8 Copper	No. 6 Copper	Total
	Number of Locations			
School Zone	3	5	16	**24**
Public Parks	2	12	16	**30**
High Density Residential Zone	3	25	81	**109**
High Density Commercial Zone	0	4	20	**24**
TOTAL	**8**	**46**	**133**	**187**

(Exhibit B-1, pp. 15-16)

To date, upgrades of legacy copper conductor have primarily been undertaken when the conductor failed. FortisBC is now concerned that the global issue of the deterioration of the legacy copper is not resolved. Fortis BC notes that "[p]ast experience and laboratory analysis has shown that deterioration has compromised the integrity of these conductors and they pose a risk not only to the line crews who work on them, but also to the general public". (Exhibit B-1, p. 16) (emphasis added)

FortisBC provides a summary of the independent laboratory analysis (Exhibit B-1, Appendix A) which includes the following points:

- annealing (softening) of the copper conductor can lead to ductile overload failure under normal operating stress;
- annealing is occurring due to elevated service temperatures from high contact resistance within connections;
- the increase in contact resistance is from the large scale build up of corrosion product within the connection;

- similar conditions are likely to exist in the majority of the hot tap connections and additional failures can be expected;
- additional splice connections showed evidence of annealing; and
- conductor material properties outside of connection areas were below today's specified requirements for copper conductor wire, resulting either from long service life or less stringent standards at the time of installation.

(Exhibit B-1, pp. 21-22)

(iii) Poles

FortisBC notes that the structural integrity of wood poles also decreases with age. It estimates the maximum expected service life of its poles to range between 50 and 70 years. (Exhibit B-1, pp. 22-23)

FortisBC reports that it has some 82,000 wood poles in service, that those greater than 15 years of age are tested on an eight year cycle, and that on average, two percent need to be replaced for an average annual replacement rate of 130/year. (Exhibit B-2, BCUC I.R. 1.14.4)

There are 8,100 poles supporting the legacy conductor. FortisBC proposes to replace 3,900 of the 4,450 poles which are 50 years of age or older and support the legacy copper as part of the Project, to avoid duplication of effort in the future. The remaining legacy poles are expected to be replaced in the ordinary course through other projects over the next ten years. (These numbers may change somewhat following destructive testing and analysis of a sample of the poles which are replaced in the early years of the Project to determine the existence and possible length of any residual life.) (Exhibit B-1, pp. 24-27)

(iv) Options considered

FortisBC notes that the alternatives of "Do nothing" or "Run to Failure" are not viable options due to the safety concerns. (Exhibit B-1, p. 26)

(v) Implementation

The preferred implementation plan for the first three years of the Project involves the replacement of legacy copper conductors and poles in sensitive areas as follows:

Year 1 (2009)

All legacy copper conductors near school zones will be replaced as will No. 8 copper conductors in the vicinity of parks.

This will result in the replacement of approximately 22 circuit kilometres of conductor, the re-conductoring of 36 locations and the replacement of approximately 200 poles.

Year 2 (2010)

All remaining No. 6 and 90 MCM copper conductors in the vicinity of parks will replaced as will No. 8 copper conductors in the vicinity of high density residential areas.

This will result in the replacement of approximately 29 circuit kilometres of conductor, the re-conductoring of 41 locations and the replacement of approximately 260 poles.

Year 3 (2011)

All remaining No. 6 and No. 90 MCM copper conductors in the vicinity of high density residential and high density commercial areas will be replaced.

This will result in the replacement of approximately 66 circuit kilometres of conductor, the re-conductoring of 110 locations and the replacement of approximately 590 poles.

In the final result, over the first three years of the Project, 18 percent of the No. 90 MCM, 34 percent of the No. 8 and 26 percent of the No. 6 copper conductor in the FortisBC service area will be replaced along with 1,050 legacy poles. This will result in the elimination of copper conductor in all 187 locations identified as Sensitive Areas. (Exhibit B-1, pp. 28-29)

Other implementation plans were investigated which involved the same work being done, but over longer time periods. These plans were rejected due to the higher level of safely risk from the extended time to completion of the work and somewhat higher rate impacts. (Exhibit B-1, pp. 56-57)

The comparative economic impacts of the three implementation scenarios are set out in the table below:

Table 10
Economic Comparison of Alternative Implementation Plans

Item	Plan 1 10 Years	Plan 2 13 Years	Plan 3 15 Years
	$ Million		
Unloaded Capital Cost without Cost of Removals (COR)	86.56	111.31	119.45
Corporate Loadings (No AFUDC)	13.04	16.79	17.94
Loaded Capital Cost without Cost of Removals (COR)	99.60	128.10	137.39
Cost of Removals without adjusting for Copper Salvage	5.08	6.53	7.00
Credit from Sale of Copper	(1.43)	(1.47)	(1.50)
Project Capital Cost including COR and Salvage	**103.24**	**133.16**	**142.89**
Energy Loss Savings During the first 15 years	(6.33)	(5.54)	(4.91)
Net Present Value	**59.38**	**66.64**	**64.27**
NPV of Rate Impact	**0.15%**	**0.17%**	**0.16%**
Max. One Time Rate Impact	**0.56%**	**0.37%**	**0.36%**

(Exhibit B-1, p. 58 Updated)

5.0 PROJECT COSTS

As noted above, FortisBC has provided cost estimates for the first two years of the Project only, with a level of accuracy of +/- 20 percent. The cost estimate is based on an average cost per kilometre multiplied by the length of the distribution line to be replaced. The total Project cost estimate of $103 Million is characterized as an order of magnitude value.

Assumptions underlying the cost estimate include the work being performed in snow-free conditions, re-use of existing circuit alignments where possible and outages with standby generation for extended outages or critical uses only. It is further assumed that the structures will be replaced with single pole structures with “a typical ruling span of 70 meters”, that 65 percent of the old circuits will require pole replacements and full rebuilding, including anchoring, and that 70 percent of structures are tangents with the remaining 30 percent being either angles or dead-ends. (Exhibit B-1, p. 48 Updated)

The two year cost estimate for the Project is set out in further detail in the table below:

Table 6
Project Cost 2008/09/10

Sl. No.	SCOPE ITEM	2007/08	2009	2010
1	Labour - Assembly, Framing, Setting, Stringing, etc	0	1,523	2,119
2	Materials	0	1,028	1,430
3	Engineering	0	114	159
4	Other Costs including Traffic Control, Temporary Generation, etc.	0	571	795
5	Project Management	0	114	159
6	Planning and Pre-Engineering	150	0	0
7	Regulatory Cost	150	0	0
8	Annual Public Consultation Cost	0	75	77
9	Capitalized and Direct Overheads (AFUDC = 0)	0	689	897
10	Cost of Removals	0	226	315
11	Contingency	0	457	636
Total Capital Cost (Till 2010)		**300**	**4,798**	**6,585**

(Exhibit B-1, p. 49)

6.0 PROJECT BENEFITS

The Project is being advanced on the basis of improved safety. Additional benefits are stated to include: likely improved customer reliability (from reduced failures of conductors), reduced electrical line losses (due to the reduced line resistance and increased current carrying capacity of new conductor), reduction in unexpected failures (with their corresponding "urgent" capital replacement costs) and reduction in the cost of ongoing "Distribution Line Rebuilds" as some of the work is shifted to the Project. (Exhibit B-1, pp. 39-45)

7.0 RATE IMPACT

Section 4 above reproduces Table 10 from the Application to illustrate the comparative economic impacts of the three implementation scenarios for the Project. Table 10 also shows the Net Present Value of the Rate Impact of the three scenarios. The Net Present Value of Rate Impact of the preferred alternative is estimated to be 0.15 percent with a maximum one time Rate Impact of 0.56 percent.

8.0 COMMISSION DETERMINATION

The Commission Panel has considered the evidence and the submissions in light of the government's energy objectives and agrees with FortisBC that the primary rationale for the proposed Project is the safety of FortisBC personnel and the public it serves. The projected ancillary benefits, while in some cases tangible, are, all else equal, unlikely to be sufficient to support a determination that the Project could be in the public interest.

The Commission Panel also notes FortisBC's reliance on the results of the independent laboratory analysis to establish that the replacement of the legacy copper conductor will mitigate the disproportionate occurrence of failure statistically associated with the legacy copper conductors vis-à-vis the other conductors used in its system.

Accordingly, the Commission Panel has carefully reviewed the PowerTech Report provided as Appendix A to the Application and notes that:

- of the 12 conductor samples submitted for analysis, six were of legacy copper conductor, and six were of No's 2, 3 and 4 non-legacy copper conductor, which are excluded from the scope of the Project.
- the non-legacy samples included one with a failed hot tap connection, and two with un-failed line splices; the balance were connection-free conductor wire samples, as were all of the legacy samples submitted (p.7 Table 2) .
- metallographic examination of the failed hot tap sample from non-legacy conductor confirmed the root cause of failure as annealing due to local resistance heating; similar examination of the un-failed splice samples from non-legacy conductor confirmed similar annealing local to the splices.
- physical testing of the non-legacy samples containing connections confirmed that three inches distant from the connection, the properties of the conductor itself were unaffected (pp 3-6, 12, 13).
- physical testing and metallographic examination of both the connection-free legacy and non-legacy conductor samples confirmed that the material properties are slightly below that of the nominal values dictated by the current standard (p.13) (emphasis added).

In the absence of any evidence as to the nature and cause of the failures in the legacy copper system, and given the expert opinion that the properties of both legacy and non-legacy conductor material are unaffected outside of any connection areas, and that those properties are only slightly below today's standard, the Commission Panel is unable to share FortisBC's conclusion that replacement of all of the legacy copper conductor will mitigate the disproportionate occurrence of failure statistically associated with the legacy system.

The Commission Panel is further concerned that the accelerated replacement of the legacy copper system as proposed in the Project would also result in the rate of pole replacement across the whole Fortis BC system being materially, and potentially unnecessarily, increased from its current level of 130/year by some or all of the 390 legacy system poles/year proposed to be replaced on average over the ten year life of the Project.

For these reasons, the Commission Panel cannot conclude that the expense associated with the Project as submitted is justified, and accordingly denies the Application.

However, the Commission Panel accepts that the options of “do nothing” or “run to failure” are not viable where there are safety concerns. If, in fact, FortisBC has knowledge of specific conditions in its legacy copper system where factors such as hot taps, splices, or other circumstances are playing a role in triggering failures in its legacy copper system, then, given its obligation to mitigate risks to the safety of its workforce and the public, the Commission Panel believes that Fortis BC should be addressing these on a priority basis in the normal course of the operations and maintenance of its system.

The Commission Panel further observes that FortisBC has the option to deal with the balance of its concerns as to the integrity of its legacy copper system over the course of the next ten to fifteen years under its normal Capital Growth and Sustaining programs, as it proposes to do for its non-legacy copper system. (Exhibit B-1, p. 27)