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March 28, 2008

Via Email
Original via mail

Ms. Erica M. Hamilton
Commission Secretary
BC Utilities Commission
Sixth Floor, 900 Howe Street, Box 250
Vancouver, BC V6Z 2N3

Dear Ms. Hamilton:

Re: An Application for a Certificate of Public Convenience and Necessity for the Advanced Metering Infrastructure Project No. 3698493

On December 19, 2007 FortisBC Inc. ("FortisBC") filed an Application for a Certificate of Public Convenience and Necessity which is filed as Exhibit B-1 (the "Original Application") for the Advanced Metering Infrastructure ("AMI") Project.

By Order G-1-08, issued January 4, 2008, the Commission established a written public hearing process to dispose of the Application. As part of this process, FortisBC has responded to two rounds of Information Requests.

FortisBC maintains that the Original Application as submitted provides valuable enhancements to customer service while supporting the BC Energy Plan initiatives in a cost effective manner.

During the Regulatory process associated with the Original Application, FortisBC continued to engage in public consultation with stakeholders including discussions with the Ministry of Energy, Mines and Petroleum Resources with regard to FortisBC's AMI Project. As a result of these discussions, FortisBC is of the opinion that additional benefits which provide further support for the BC Energy Plan should be provided with the addition of functionality not included as part of the Original Application.

Specifically, the BC Energy Plan states that utilities should "...research, develop and implement best practices in conservation and energy efficiency and to increase public awareness. Utilities are also encouraged to explore and develop rate designs to encourage efficiency, conservation and the development of renewable energy."

To provide better support for these statements, FortisBC is proposing the following amendment to the Original Application to adapt its preferred solution to include two functional enhancements:

- Provision for hourly readings through a Validation, Estimation and Editing ("VEE") equipped Meter Data Management Repository ("MDMR"); and
- In-home display capability through a Home Area Network ("HAN").

The Company in its Original Application estimated the AMI Project to cost \$31.3 million. This amendment is estimated to increase the AMI Project cost by \$6.0 million to \$37.3 million. The Original Application reflected a Net Present Value impact on rates of -.09% over 25 years. The addition of the functionality in the amendment is estimated to increase the net present value impact on rates to 0.10% over 25 years. An amended working model for the Discounted Cash Flow Analysis is being filed under separate cover.

FortisBC hereby applies to the British Columbia Utilities Commission, (the "Commission") pursuant to Sections 45 and 46 of the Utilities Commission Act, for a Certificate of Public Convenience and Necessity for the Original Application as applied for on December 19, 2008 and amended pursuant to the Amendment set out herein at a cost of \$37.3 million (the "Amended Application").

FortisBC believes that the amendment to change the preferred solution to include the recommended enhancements to the AMI system is in the best interest of customers and offers more flexibility and support for the BC Energy Plan at a reasonable cost. However, if the Commission does not approve the recommended enhancements, FortisBC respectfully submits that the Original Application as submitted on December 19, 2007, which still provides valuable enhancements to customer service while supporting the BC Energy plan initiatives in a cost effective manner, should be approved. Detailed information regarding the Amended Application is attached.

Also enclosed are updated responses, where appropriate, to Information Requests No. 1 and No. 2 reflecting the Amended Application. These amended responses are intended to be read in conjunction with the original responses (Exhibits B-2 and B-3) as functionality is being added and not removed from the Original Application.

The Company proposes the following extended regulatory process which incorporates a third round of Commission and Intervenor Information Requests. FortisBC has provided updated responses, where appropriate to reflect the Amended Application, to the Commission and Intervenor Information Requests No. 1 and No. 2 and therefore respectfully submits that the proposed addition of Information Request No. 3 be limited to the content of the Amendment to the Original Application.

Proposed Regulatory Timetable

Commission and Intervenor IR No. 3 (Limited to the content of the amendment to the Application)	April 15, 2008
FortisBC Response to Commission and Intervenor IR No. 3	May 6, 2008
FortisBC Final Submission	May 15, 2008
Intervenor Final Submission	May 29, 2008
FortisBC Reply Submission	June 5, 2008

Sincerely,



Dennis Swanson
Director, Regulatory Affairs

cc: Registered Intervenors

FORTISBC

**AN APPLICATION FOR A
CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY**

Advanced Metering Infrastructure (AMI) Project

Amendment March 28, 2007

FORTISBC INC.

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1 **1. The Application**

2

3 On December 19, 2007 FortisBC filed an Application, pursuant to sections 45 and 46 of
4 the Utilities Commission Act, for a Certificate of Public Convenience and Necessity (the
5 “Original Application”, Exhibit B-1) for the Advanced Metering Infrastructure (“AMI”)
6 Project. FortisBC has identified several opportunities to enhance the AMI Project to
7 increase flexibility and improve its alignment with provincial policy and the BC Energy
8 Plan. As compared to the Original Application, the following opportunities were
9 identified:

10

- 11 • Improved access to consumption information for individual customers beyond
12 that which could be provided through the Internet;
- 13 • Increased frequency of energy consumption information beyond daily readings;
14 and
- 15 • More flexibility in designing and adapting Time-of-Use and other innovative rates
16 including Net Metering capabilities.

17

18 FortisBC recommends that the AMI requirements within the Original Application should
19 be amended to address the above opportunities (the “Amended Application”). These
20 amendments are reflected in Amended Table 7.1: AMI Functions and Features and will
21 include:

22

- 23 • An explicit requirement for the AMI system to have Home Area Network (HAN)
24 capabilities to support in-home display devices;
- 25 • An increase in the reading frequency requirement to a minimum of hourly reads;
26 and
- 27 • An upgrade to the Meter Data Management Repository (“MDMR”) to include
28 Validation, Estimation and Editing (“VEE”) capabilities.

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ADVANCED METERING INFRASTRUCTURE (AMI) PROJECT

1 These amendments support several policy actions within the BC Energy Plan including
2 conservation requirements, cost effective DSM opportunities and the exploration of new
3 rate structures that encourage energy efficiency and conservation.

4

5 FortisBC believes the enhancements in this amendment are in the best interest of
6 customers, and offer more flexibility and support for the BC Energy Plan at a reasonable
7 cost. FortisBC therefore requests approval of a CPCN for the AMI Project as described
8 in this Amended Application.

9

10 However, if the Commission does not approve the recommended enhancements,
11 FortisBC respectfully submits that the Original Application as submitted on December
12 19, 2007, which still provides valuable enhancements to customer service while
13 supporting the BC Energy plan initiatives in a cost effective manner, should be
14 approved.

1 **2. Home Area Network**

2

3 For the purposes of this application, the HAN is defined as the technology to
4 communicate with in-home display devices but does not include the display devices
5 themselves. These display devices, communicating through the HAN, would display
6 electrical consumption and pricing information in the customer's building. The ability to
7 provide this information to customers will help to remove barriers that prevent
8 customers from reducing their consumption. The Original Application supported only
9 web access for customers (in addition to their regular bills) to receive their daily
10 consumption information. While web-based information is useful, it does not provide the
11 always-on, real-time information flow that could be provided by a dedicated in-home
12 display.

13

14 Display devices currently available range in functionality from those that support simple
15 visual indicators, such a green/red light indicators for on-peak/off peak periods, to those
16 that can not only display consumption information, but also provide pricing information.

17

18 The HAN that supports in-home display would also support future smart grid
19 applications. This would enable FortisBC and its customers to control certain
20 household appliances and subsequently reduce residential loads during critical peak
21 periods, if such capability was implemented in future.

1 **3. Hourly reading**

2
3 Hourly readings through VEE provide significantly improved consumption detail as
4 compared to the daily readings provided in the Original Application. This information
5 will:

- 6
7 • Allow the Company to better understand consumption patterns of individual
8 customers and rate classes for use in rate design and the development of
9 rate structures. This will allow the Company to explore new rates structures
10 to identify opportunities to use rates as a mechanism to motivate customers
11 either to use less electricity or use less at a specific time.
12
13 • Combined with the HAN, this more detailed information will help FortisBC
14 customers understand their energy consumption patterns, respond to time-
15 based rates and reduce their energy usage. This will provide customers with
16 useful information about their electricity consumption to allow them to make
17 informed choices.

18
19 In addition to providing a higher granularity of data, hourly interval reads can support
20 future flexibility in the implementation of rates, such as Time-of-Use (“TOU”) and Critical
21 Peak Pricing (“CPP”). TOU and CPP are innovative rates that support the BC Energy
22 Plan goal to “either to use less electricity or use less at specific times”. Both rate
23 structures require the measuring of consumption in specific “time buckets” which may
24 have different rates. The consumption in these “time buckets” can be determined with
25 either of the following options:

26
27 “On Meter”: The tracking of consumption in “time buckets” on the meter itself which
28 is then transmitted to the central office daily; or

1 “Off Meter”: Using hourly reading interval data transmitted from the meter to a
2 central MDMR with VEE to calculate rate buckets outside of the meter.

3
4 The Original Application supported On Meter consumption tracking for such rates,
5 primarily based on pricing considerations. Although standard time-of-use rates can be
6 calculated using On Meter, the number of “time buckets” is limited by the frequency of
7 data transmission and the amount of memory on the meter.

8
9 FortisBC’s Amended Application now recommends Off Meter consumption tracking as it
10 provides increased flexibility for future rate design options, which is supportive of the BC
11 Energy Plan as described above, at a reasonable cost to customers. The meter is not
12 relied upon to store the data required to calculate time-of-use rates, nor is any meter
13 programming required when time-of-use consumption parameters change. Although
14 the Amended Application includes TOU calculations Off Meter, it can also support
15 calculations On Meter if required.

16
17 CPP adds another layer of complexity to billing that is better supported by hourly
18 readings. If a CPP program is supported by On Meter consumption tracking, all meters
19 would have to be sent a programming signal in order to implement a new consumption
20 bucket each time a new CPP time was established. With hourly readings, this type of
21 rate complexity is handled in a straight-forward manner through the VEE equipped
22 MDMR by performing rate calculations on the verified hourly readings. This superior
23 rate structure flexibility would enable FortisBC to implement a variety of “new rate
24 structures that encourage energy efficiency and conservation” as outlined in the BC
25 Energy Plan at a reasonable cost to the customers.

26
27 FortisBC believes that it is important to ensure future rate flexibility so that rates using
28 pricing signals can be modified or enhanced to promote the desired customer
29 conservation behaviour.

1 To ensure complete data within the MDMR and to be able to calculate time buckets
2 accurately, requirements of the MDMR must be updated to include VEE capabilities.
3 VEE is an enhancement to the database whereby the system validates hourly readings
4 and provides estimates for missing hourly readings. Similar to other jurisdictions such
5 as Ontario that are implementing AMI, FortisBC will require that their AMI system have
6 at least a 98% read success rate. At 108,000 meters, 24 reads a day, even a 98%
7 success rate will create more than 50,000 gaps each day that need to be estimated in
8 order for the data to be useful.

9
10 Currently, AMI systems utilizing VEE capabilities are prevalent in many jurisdictions
11 including California, Texas and Ontario. The Ontario Energy Board Distribution System
12 Code for its Smart Metering Initiative requires that metering data collected by an
13 electricity distributor be subjected to a validating, estimating and editing (VEE) process
14 if is to be used for settlement and billing purposes. Therefore, all utilities within Ontario
15 will be utilizing the central MDMR which will be equipped with VEE capabilities. In
16 addition, BC Hydro has indicated that VEE technology will be a requirement of its AMI
17 system when implemented.

18
19 Table 1 below illustrates a comparison of the two options for calculating and billing
20 innovative rate designs:

Table 1 - Comparison of Methodologies

	On Meter Calculation on Meter	Off Meter Calculation in MDMR
Calculation of consumption in "time buckets"	On the Meter	In the MDMR
Rate structure changes	Meter must be exchanged for re-programming or re-programmed remotely	Hourly data can be used for different rate structures in a flexible manner. No changes to the meter required.
Meter choice limitations	Re-programming method depends on meter manufacturer. Programming multiple types of meters for the same rate structure can be challenging.	Any meter that supports hourly reading intervals
Critical Peak pricing programming	Re-programming method depends on meter manufacturer. Programming multiple types of meters for the same rate structure can be challenging.	Hourly data is already available for that time period. No changes to the meter required.
Number of "time buckets" that can be supported	Dependent on the Meter manufacturer and limited by frequency of data transmission and amount of memory on the meter	Limited only to the frequency of data (hourly)

- 1 Hourly readings require greater bandwidth than the daily readings required by On
- 2 Meter. The increased bandwidth will reduce the latency for acquiring readings, make
- 3 information available in more of a "real-time fashion" and have the potential to provide
- 4 more immediate feedback to our customers on their energy use.

1 **4. Revisions to Functional Requirements**

2

3 To support the Amended Application, two items in Table 7.1 (found at page 40 of Exhibit
4 B-1), have been updated from “Optional” to “Required”. These items are “Hourly
5 Readings” and “Validation / Estimation in MDMR. In addition, a requirement for HAN
6 capabilities that support in-home display and load control has also been added to the
7 requirements.

Amended Table 7.1: AMI Functions and Features

Type	Description	Original Application Required (R) Optional (O)	Amended Application Required (R) Optional (O)
1. Cost		R	R
2. Vendor Stability	Financial stability Proven installations Ease of vendor relationship Utility references Manufacturing Capacity Scalability to 1,000,000 meters	R	R
3. Functions / Features	Monthly reads for billing	R	R
	Daily readings	R	R
	Hourly readings	O	R
	Hourly readings for select customer profiles	R	R
	< Hourly interval readings	O	O
	Interface to CIS Billing System	R	R
	Interface to Customer Web Access	R	R
	Basic reporting of meter data	R	R
	Outage Management functions	R	R
	Virtual disconnect reporting	R	R
	Restoration verification	R	R
	Voltage readings	O	O
	Tamper detection	O	O
	Supports re-programming of meter without a field visit	R	R
	Instantaneous demand readings	O	O
	Supports TOU pricing models	R	R
	Supports block pricing models	R	R
	Supports CPP pricing models	R	R
	Supports load control	R	R
	Supports remote disconnect / reconnect	R	R
	Complex reporting	O	R
	HAN Supporting In-home Display and Load Control	N/A	R
	Validation / estimation functionality in MDMR	O	R
	Compatibility with Measurement Canada Regulations	R	R
	Secure encryption of the meter data file	R	R
	Ability to use multiple meter brands	R	R
4. Warranties	Product warranties and guarantees	R	R

1 **5. Revisions to Operational Savings**

2

3 The Amended Application requires the addition of software maintenance costs
4 associated with the more complex MDMR including VEE capability. The annual
5 maintenance cost of this software is expected to be an incremental \$0.2 million per year
6 as shown in Amended Table 4.1.1 below.

Amended Table 4.1.1: Total AMI Cost Savings

Category	Annual Savings Original Application (\$000s)	Annual Savings Amended Application (\$000s)
Meter Reading	2,491	2,491
T&D Operational	318	318
Customer Service	307	307
Operating Expenses AMI	(524)	(727)
Total Net Annual Savings	2,592	2,389

1 **6. Revisions to Project Costs**

2
3 The Company estimates that it will require a capital investment of \$37.3 million for the
4 acquisition and deployment of FortisBC's recommended amendment which is an
5 increase of approximately \$6.0 million from the Original Application. Amended Table
6 6.3 below provides a summary breakdown of the required capital expenditures for both
7 the Original and Amended Application.

8

Amended Table 6.3: Summary of Capital Costs

	Costs Original Application (\$000s)	Costs Amended Application (\$000s)
(i) Meters and Modules	19,507	20,684
(ii) Network Infrastructure	6,700	7,771
(iii) IT Infrastructure and Upgrades	1,483	5,014
(iv) Project Management	2,701	2,701
AFUDC	950	1,130
Total Capital Cost	31,341	37,300
(v) Non-Project Costs		
Incremental Meter Costs	1,336	1,336
Avoided Future Capital Costs	(1,250)	(1,250)

1 **7. Revision to Rate Impact Analysis**

2
 3 Under the Original Application, the implementation of AMI had a net present value
 4 impact on rates of -0.09 percent over a twenty five year period. The maximum
 5 incremental annual rate impact is 0.40 percent in 2010 and the project is expected to
 6 reduce rates by the year 2016.

7
 8 Under the Amended Application, the implementation of AMI has a net present value
 9 impact on rates of 0.10 percent over a twenty five year period. The maximum
 10 incremental annual rate impact is 0.46 percent in 2010. However, by the year 2022, the
 11 Project will reduce rates. Table 6.6 below is a summary of the NPV of revenue
 12 requirements for the amended Application.

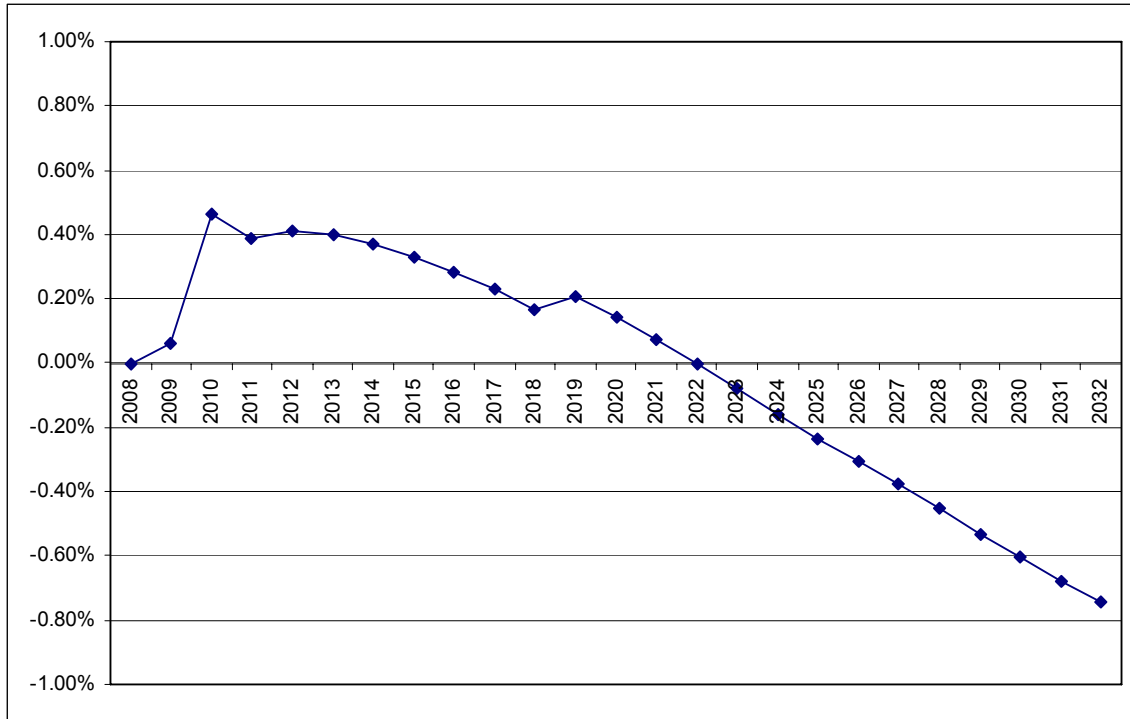
Amended Table 6.6: Summary of Revenue Requirements – Amended Application

	Expenditure / Impacts	2008	2009	2010	2011	2012	2016	2033
		(\$000s)						
1	Cumulative Capital Expenditure	568	17,170	37,507	37,586	37,647	37,642	37,387
2	Non-Project Costs	0	110	207	286	347	342	86
3	Total Operating Expense	0	0	(518)	(2,389)	(2,510)	(3,041)	(5,754)
4	Financing Cost	0	641	2,013	2,684	2,565	2,068	(8)
5	Total Revenue Requirement	0	151	1,184	1,062	1,179	884	(5,497)
6	Maximum Annual Incremental Rate Impact Over Previous Year	0.46%						
7	Net Present Value of Revenue Requirement	3,154						
8	One-Time Equivalent Rate Impact	0.10%						

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- 1 Amended Figure 6.6 below summarizes the annual rate impact of the Amended
- 2 Application from 2008 to 2033 based on full AMI implementation as outlined in this
- 3 Application.

Amended Figure 6.6 Rate Impact – Amended Application



1 **8. Summary**

2
3 FortisBC believes that the Amended Application including a HAN and hourly
4 consumption data in a VEE-capable MDMR is appropriate and in the interest of its
5 customers for the following reasons:

- 6
- 7 • Hourly reading data with VEE provides the utility with more detailed information
8 about consumption patterns;
 - 9 • Paired with the HAN, hourly readings and VEE provide customers with more
10 detailed information which can be used to encourage customers to change to the
11 desired consumption behaviour; and
 - 12 • The HAN and hourly data through the VEE MDMR creates more flexibility in the
13 implementation of innovative rate structures and allows for more flexible options
14 in designing these rates.

15
16 The implementation of any future rate designs would be subject to further applications
17 and regulatory process. However, the tools provided by the Amended Application will
18 provide better information to design more effective rate structures that promote
19 conservation initiatives.

20
21 Other North American utilities are already utilizing these items within the scope of their
22 AMI projects including those subject to Ontario's Smart Metering Initiative. Through the
23 Company's consultation with BC Hydro we understand that they are also considering
24 these items within their application.

25
26 The rate impact of the enhancements described in the Amended Application increases
27 from -0.09% to 0.10%. In summary, FortisBC believes that the benefits of the Amended
28 Application justify the incremental Project costs.

1 **APPENDIX A: NET PRESENT VALUE REVENUE REQUIREMENTS - AMENDED**
2 **APPLICATION**

**Revenue Requirements Template
Option "AMI"**

Line No.	NPV @ 10.00%	0 Dec-08	1 Dec-09	2 Dec-10	3 Dec-11	4 Dec-12	5 Dec-13	6 Dec-14	7 Dec-15	8 Dec-16	9 Dec-17	10 Dec-18	
Summary													
Revenue Requirements													
1	Operating Expense (Incremental)	(24,470)	0	0	(518)	(2,389)	(2,510)	(2,637)	(2,759)	(2,898)	(3,041)	(3,189)	(3,343)
2	Depreciation Expense	12,716	0	0	761	1,662	1,665	1,668	1,660	1,662	1,665	1,668	1,670
3	Carrying Costs	15,491	0	641	2,013	2,684	2,565	2,436	2,307	2,188	2,068	1,948	1,819
4	Income Tax	(583)	0	(490)	(1,071)	(896)	(541)	(296)	(98)	61	191	297	388
5	Total Revenue Requirement for Project	3,154	0	151	1,184	1,062	1,179	1,171	1,109	1,014	884	724	534
Rate Impact													
6	Forecast Revenue Requirements	219,817	240,023	255,139	272,208	287,690	293,400	299,300	305,300	311,400	317,600	324,000	
7	Rate Impact	0.00%	0.06%	0.46%	0.39%	0.41%	0.40%	0.37%	0.33%	0.28%	0.23%	0.16%	
8	NPV of Project / Total Revenue Requirements	0.10%											
Regulatory Assumptions													
9	Equity Component	40.00%	40.00%	40.00%	40.00%	40.00%	40.00%	40.00%	40.00%	40.00%	40.00%	40.00%	40.00%
10	Debt Component	60.00%	60.00%	60.00%	60.00%	60.00%	60.00%	60.00%	60.00%	60.00%	60.00%	60.00%	60.00%
11	Equity Return	9.02%	9.02%	9.02%	9.02%	9.02%	9.02%	9.02%	9.02%	9.02%	9.02%	9.02%	9.02%
12	Debt Return	6.43%	6.43%	6.43%	6.43%	6.43%	6.43%	6.43%	6.43%	6.43%	6.43%	6.43%	6.43%
13	AFUDC	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%	6.25%
Capital Cost													
14	Capital Investment	551	15,992	19,627									
15	Incremental meter costs	0	110	97	79	61	62	62	61	60	59	57	
16	Avoided Itron Purchase (2013 & 2018)	0					(250)					(250)	
16	AFUDC	17	500	613									
17	Total Construction Cost in Year	568	16,602	20,337	79	61	(188)	62	61	60	59	(193)	
18	Cumulative Construction Cost	568	17,170	37,507	37,586	37,647	37,459	37,521	37,583	37,642	37,701	37,507	
19	Land												
20	Net Cost of Removal												
21	Total Capital Cost in Year	568	16,602	20,337	79	61	(188)	62	61	60	59	(193)	
22	Cumulative Capital Cost	568	17,170	37,507	37,586	37,647	37,459	37,521	37,583	37,642	37,701	37,507	
23	Additions to Plant in Service	0	17,170	20,337	79	61	(188)	62	61	60	59	(193)	
24	Cumulative Additions to Plant	0	17,170	37,507	37,586	37,647	37,459	37,521	37,583	37,642	37,701	37,507	
25	CWIP	568	0	0	0	0	0	0	0	0	0	0	

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Annual Operating Costs / (Savings)												
Savings												
26	Annual Meter Reading Savings	-	-	(592)	(2,491)	(2,611)	(2,736)	(2,856)	(2,992)	(3,133)	(3,280)	(3,431)
27	Annual Customer Service Savings	-	-	(74)	(307)	(316)	(324)	(333)	(343)	(352)	(362)	(371)
29	Annual Operations Savings	-	-	-	(318)	(329)	(340)	(351)	(363)	(375)	(387)	(399)
Costs												
32	Incremental Labour	-	-	148	296	304	314	323	333	343	353	364
33	Software Service Agreement	-	-	-	242	246	251	256	262	267	272	278
34	Communications	-	-	-	142	145	148	151	154	157	160	163
35	Equipment Replacements	-	-	-	48	49	50	51	52	53	54	55
				0	0	0	0	0	0	0	0	0
36	Total Incremental Operating Costs (Savings)	0	0	(518)	(2,389)	(2,510)	(2,637)	(2,759)	(2,898)	(3,041)	(3,189)	(3,343)
727												
Depreciation Expense												
37	Opening Cash Outlay	0	0	17,170	37,507	37,586	37,647	37,459	37,521	37,583	37,642	37,701
38	Additions in Year	0	17,170	20,337	79	61	(188)	62	61	60	59	(193)
39	Cumulative Total	0	17,170	37,507	37,586	37,647	37,459	37,521	37,583	37,642	37,701	37,507
40	Depreciation Rate - composite average	4.43%	4.43%	4.43%	4.43%	4.43%	4.43%	4.43%	4.43%	4.43%	4.43%	4.43%
41	Depreciation Expense	0	0	761	1,662	1,665	1,668	1,660	1,662	1,665	1,668	1,670
Net Book Value												
42	Gross Property	0	17,170	37,507	37,586	37,647	37,459	37,521	37,583	37,642	37,701	37,507
43	Accumulated Depreciation	0	0	(761)	(2,422)	(4,087)	(5,755)	(7,415)	(9,077)	(10,742)	(12,410)	(14,080)
44	Net Book Value	0	17,170	36,747	35,164	33,560	31,704	30,107	28,506	26,900	25,291	23,428
Carrying Costs on Average NBV												
45	Return on Equity	0	310	973	1,297	1,240	1,177	1,115	1,057	1,000	942	879
46	Interest Expense	0	331	1,040	1,387	1,326	1,259	1,192	1,131	1,069	1,007	940
47	AFUDC	0	0	0	0	0	0	0	0	0	0	0
48	Total Carrying Costs	0	641	2,013	2,684	2,565	2,436	2,307	2,188	2,068	1,948	1,819
Income Tax Expense												
49	Combined Income Tax Rate	31.50%	31.00%	30.00%	28.50%	27.00%	27.00%	27.00%	27.00%	27.00%	27.00%	27.00%
Income Tax on Equity Return												
50	Return on Equity	0	310	973	1,297	1,240	1,177	1,115	1,057	1,000	942	879
51	Gross up for revenue (Return / (1- tax rate))	0	449	1,390	1,814	1,698	1,613	1,527	1,448	1,369	1,290	1,204
52	Income tax on Equity Return	0	139	417	517	459	435	412	391	370	348	325

FORTISBC INC.
 ADVANCED METERING INFRASTRUCTURE (AMI) PROJECT

<u>Income Tax on Timing Differences</u>												
53	Depreciation Expense	0	0	761	1,662	1,665	1,668	1,660	1,662	1,665	1,668	1,670
54	Less: Capital Cost Allowance	0	1,400	4,231	5,206	4,368	3,645	3,040	2,555	2,148	1,807	1,501
55	Total Timing Differences	0	(1,400)	(3,471)	(3,545)	(2,703)	(1,978)	(1,381)	(892)	(483)	(139)	169
56	Gross up for tax (Total Timing Differences/(1-tax rate))	0	(2,030)	(4,958)	(4,957)	(3,703)	(2,709)	(1,892)	(1,222)	(661)	(191)	231
57	Income tax on Timing Differences	0	(629)	(1,487)	(1,413)	(1,000)	(731)	(511)	(330)	(179)	(52)	62
60	Total Income Tax	0	(490)	(1,071)	(896)	(541)	(296)	(98)	61	191	297	388
<u>Capital Cost Allowance</u>												
61	Opening Balance - UCC	0	0	15,769	31,876	26,748	22,441	18,608	15,629	13,136	11,048	9,300
62	Additions	0	17,170	20,337	79	61	(188)	62	61	60	59	(193)
63	Subtotal UCC	0	17,170	36,107	31,955	26,810	22,253	18,670	15,691	13,196	11,107	9,106
64	Capital Cost Allowance Rate	16.31%	16.31%	16.31%	16.31%	16.31%	16.31%	16.31%	16.31%	16.31%	16.31%	16.31%
65	CCA on Opening Balance	0	0	2,572	5,200	4,363	3,661	3,035	2,550	2,143	1,802	1,517
66	CCA on Capital Expenditures (1/2 yr rule)	0	1,400	1,659	6	5	(15)	5	5	5	5	(16)
67	Total CCA	0	1,400	4,231	5,206	4,368	3,645	3,040	2,555	2,148	1,807	1,501
68	Ending Balance UCC	0	15,769	31,876	26,748	22,441	18,608	15,629	13,136	11,048	9,300	7,605

1
2
3

**APPENDIX B:
RESPONSES TO INFORMATION REQUESTS NO. 1 AND
NO. 2 AMENDED APPLICATION**

FortisBC Responses to BCUC IR No. 1 – Amended Application	22			
Q1.2	Q6.2	Q6.3	Q6.6	Q12.0
Q15.2	Q16.2	Q16.6	Q16.12	Q17.1
Q18.1	Q25.2	Q26.2	Q28.4	Q31.4
Q40.1				
FortisBC Responses to BCOAPO IR No. 1 – Amended Application	52			
Q1.1	Q2.2	Q7.2	Q8.1	Q8.2
Q8.5	Q10.2	Q16.2		
FortisBC Responses to Mr. Alan Wait IR No. 1 – Amended Application	60			
Q8	Q20	Q21		
FortisBC Responses to BCUC IR No. 2 – Amended Application	64			
Q9.5	Q9.6	Q10.1	Q10.2	Q12.2
Q12.3	Q13.1	Q15.1	Q15.2	Q15.3
Q15.4	Q16.3	Q21.2	Q21.3	Q21.7
Q23.2	Q24.1	Q26.1	Q29.1	
FortisBC Responses to BCOAPO et al. IR No. 2 – Amended Application	92			
Q19.1	Q21.5			
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Q10				
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Q1.2	Q1.3	Q2.2	Q4.1	Q6.1

**FortisBC Responses to BCUC IR No. 1 – Amended
Application**

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

Requestor Name: BC Utilities Commission

Information Request No: 1 Amended Application

To: FortisBC Inc.

Request Date: January 25, 2008

Response Date: March 28, 2008

1 **1.0 Executive Summary**

2 **Reference: Exhibit B-1, Executive Summary, pp. 4-5**

3 **Q1.2 FortisBC intends to provide customers access to consumption**
4 **information to raise awareness and provide the tools necessary to**
5 **conserve energy. Does the metering technology envisioned by FortisBC**
6 **provide a real-time display of electricity prices and/or system**
7 **consumption (with the purpose of highlighting periods when the system**
8 **is under stress) to consumers? If not, why not?**

9 A1.2 The AMI technology envisioned by FortisBC will have a communications
10 component within the meter which is known as a Home Area Network ("HAN").
11 This HAN could support the future installation of an in-home display device that
12 could provide a near real-time display of consumption and electricity prices as
13 well as indicating on-peak/off-peak and critical peak periods.

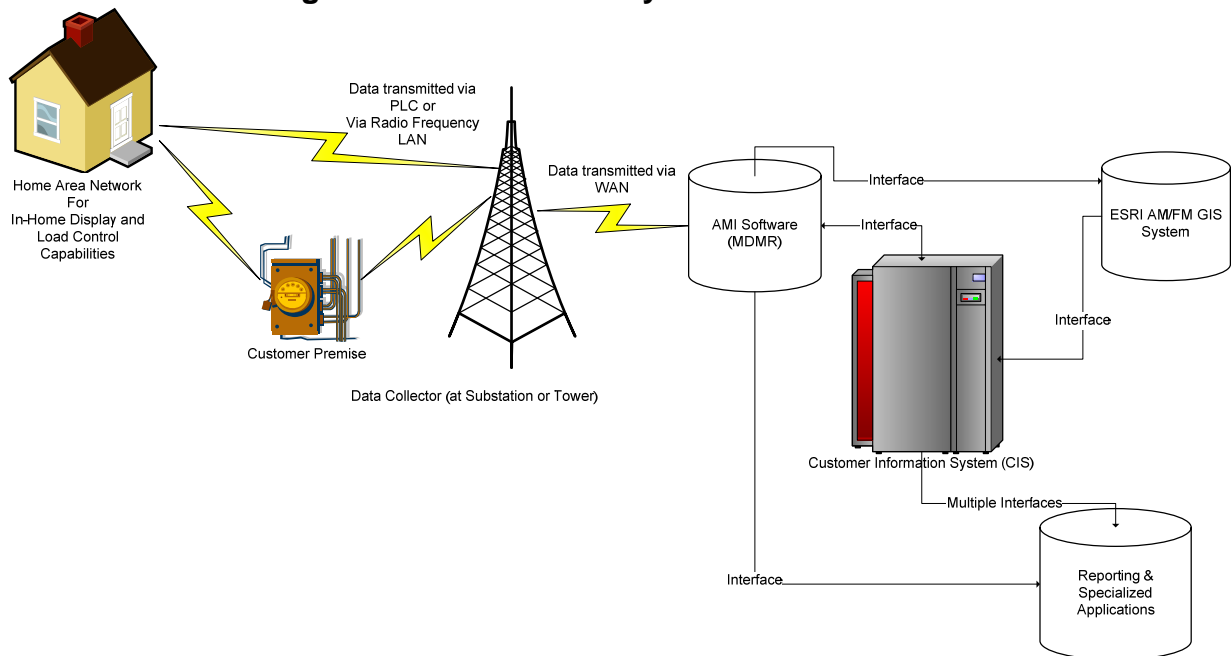
1 **6.0 Project Description**

2 **Reference: Exhibit No. B-1, 4. Project Description, Section No. 4.1.1, AMI**
3 **Benefits Yielding Operational Cost Savings, pp. 12-14**

4 **Q6.2 Provide a system architecture diagram showing the software and**
5 **hardware interfaces.**

6 **A6.2** At a high level, the revised system infrastructure is expected to operate as
7 displayed in Figure A6.2 Amended below which now incorporates the Home
8 Area Network (HAN):

Figure A6.2 Amended: System Infrastructure



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1 **Q6.3 In Figure 1, the meter data is received by the AMI host system and then**
2 **sent to the Meter Data Management System (“MDMS”) that manages data**
3 **storage and analysis to provide the information in useful form to the**
4 **utility. Would FortisBC please explain how it proposes to provide the**
5 **MDMS function within its current Application?**

6 A6.3 The MDMS in FortisBC’s Original Application is referred to as a Meter Data
7 Management Repository (MDMR).

8 The Amended Application includes, in addition to the functions listed in Section
9 6.3 of the Original Application (Exhibit B-1), an MDMR with Validation,
10 Estimation and Editing (VEE) capabilities. VEE is an enhancement to the
11 database where the system validates the hourly readings and provides
12 estimates for any missed readings. This ensures the completeness of hourly
13 data for reporting and rate calculation within the MDMR.

14 **Q6.6 No system or line loss savings have been identifies. Please explain as**
15 **there was some linkage with this issue in the Application for the**
16 **Distribution Substation Automation Program.**

17 A6.6 An analysis of distribution line losses would be enhanced with hourly readings
18 as it will be easier to match feeder to meter consumption.

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1 **12.0 Project Cost**

2 **Reference: Exhibit B-1, General**

3 **Economic Analysis**

4 **The Commission's recently published Decision concerning BC Hydro's**
5 **2006 IEP/LTAP states at pages 200-201:**

6

7 **"Typically the end result of a project evaluation is the expression of a PV or**
8 **a levelized cost of energy or capacity. Both calculations require the use of**
9 **a discount rate, and both calculations require a stream of cash flows to**
10 **apply the discount rate to.**

11

12 **The Commission Panel accepts BC Hydro's argument that two tests may**
13 **be considered for use in project evaluation. The first, and the more**
14 **important, is an economic analysis of a project, which should only use the**
15 **incremental cash flows disbursed by BC Hydro as its key input. The**
16 **second, and less material test is a ratepayer impact analysis which**
17 **examines how BC Hydro will recover a project's costs from its ratepayers**
18 **and which may include items typically not found in a conventional**
19 **economic analysis such as sunk costs, interest during construction and**
20 **costs allocated from other departments of BC Hydro."**

21

22 **Please prepare and file an economic analysis (based in MS Excel) of the net**
23 **benefits of the AMI Project relative to the status quo option. The economic**
24 **analysis should include only expected annual cashflows over the life the**
25 **project, with emphasis on cashflows that are expected to vary between the**
26 **status quo and the AMI Project.**

27 **Ideally, the analysis should focus on the costs of each option. That is,**
28 **savings should be derived implicitly in the comparison of the two sets of**

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1 **cashflows. For example, operating costs associated with meter reading**
2 **should be estimated for the status quo and for the AMI Project. The**
3 **difference would then reflect the savings, if any, attributable to the AMI**
4 **Project. Where this is not possible or overly cumbersome, FortisBC may in**
5 **limited cases include savings as reductions to the AMI Project cashflows,**
6 **but these should be broken out separately, reflect only incremental savings**
7 **by year and input assumptions should be explicit. In all cases, the analysis**
8 **should be structured to facilitate the sensitivity analyses described below.**
9 **The distinction is not critical, but capital costs should reflect costs that**
10 **would normally be capitalized. Operating costs should reflect costs that**
11 **would normally be expensed in the year in which they are incurred.**
12 **FortisBC may establish relevant categories of annual cashflows in**
13 **preparing the model, but at a minimum, should be disaggregated into, but**
14 **not limited to, the following categories:**

15 **Capital costs**

- 16 - **Meter costs**
17 o **Replacement**
18 o **New**
19 - **Meter reading equipment**
20 - **Network infrastructure**
21 - **IT infrastructure and upgrades**
22 - **Project management**

23
24 **Operating costs**

- 25 - **Meter reading**
26 o **Labour**
27 o **Non-Labour**
28 - **T&D operating cost**

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1 - **Customer service**

2 - **Income taxes. This may be incorporated as any significant incremental**
3 **income taxes/savings (calculated on a flow-through "cash taxes" basis**
4 **for simplicity) associated with the AMI Project.**

5 **The capital costs of meters and other equipment should reflect expected**
6 **additions and ongoing replacement costs, including consideration of the**
7 **likely failure rate of different meters.**

8 **Meter reading costs under the AMI Project alternative should include any**
9 **allowance for ongoing manual meter reading in early years, as well as any**
10 **reasonable ongoing allowance for temporary manual meter reading labour.**

11 **Include a separate column in the model for annual GHG reductions**
12 **associated with the AMI Project and the ability to attach an implicit value to**
13 **these savings on a \$/tonne basis which may then be deducted from other**
14 **expenses (in sensitivity analyses).**

15 **All cashflows should be in real \$2008 or any other suitable but common**
16 **benchmark year.**

17 **Total capital expenditures should be included in the year in which they are**
18 **expected to be incurred.**

19 **No financing or depreciation expenses should be included in the analysis.**

20 **Cashflows associated with the status quo should be estimated, together**
21 **with cashflows associated with the AMI Project. The present value of all**
22 **cashflows associated with each scenario should be calculated and the**
23 **difference should indicate the net economic benefit associated with the**
24 **AMI Project over the project life.**

25 **The discount rate should be a separate input to the model that can be**
26 **changed to test alternative assumptions.**

27 **The timeframe for the analysis should encompass the expected life of the**
28 **AMI system meters. A terminal value may be included to reflect any**

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1 residual or salvage value of assets at the end of the period. The
2 assumptions used to derive any terminal value should be clearly stated in
3 the commentary that accompanies the model.

4 The analysis should not include any sunk costs (e.g., depreciation
5 expenses associated with existing meters), but may include capital
6 replacement or upgrade costs (e.g., meter replacement costs in the status
7 quo scenario).

8 The analysis should include likely changes in real cashflows over time, if
9 any. Ideally, real escalation rates for key categories of costs would be
10 specified outside the model so that these assumptions can be altered in
11 sensitivity analyses.

12 The NPV analysis should be prepared using a real discount rate. The base
13 case would use an ~8% discount rate (based on the 10% discount rate used
14 in the Application and 2% general rate of inflation).

15 A brief commentary should be prepared to accompany the model that
16 summarizes key input assumptions (e.g., labour rates and overheads,
17 estimate of terminal values, etc.). The model should be structured to allow
18 changes in key input assumptions for sensitivity analysis.

19 Prepare a base case analysis that reflects the relevant assumptions in the
20 Application. Prepare also preliminary sensitivity analysis based on:

- 21 - Deferring the AMI project one, three and five years. This analysis
22 would include the costs associated with maintaining the current
23 system in the first one, three and five years of the AMI Project
24 cashflows, respectively. This should also consider possible
25 reductions in AMI metering technologies over time.
- 26 - Higher and lower real discount rates. One scenario should reflect
27 FortisBC's allowed real weighted average cost of capital.
- 28 - Key cost uncertainties, including AMI meter costs, real labour and

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1 **fuel escalation rates, and other key operating or capital costs with**
2 **significant uncertainty.**

3 A12.0 As requested, please see the following base case Discounted Cash Flow
4 (“DCF”) analysis and three sets of sensitivity analyses as follows:

- 5 • In Set “A” all values were expressed in real 2007 dollars;
- 6 • In Set “B” values were expressed in nominal dollars; and
- 7 • In Set “C” capital cost sensitivities were examined.

8 In all cases, except where otherwise noted, a discount rate of 8.0 percent has
9 been used. However it should be noted that the Company’s current after-tax
10 Weighted Average Cost of Capital (“WACC”) is currently forecast to be 6.3
11 percent for 2008.

12 Further, the Company is of the opinion that the correct cash flow for project
13 evaluations is the incremental cash flow required from customers in the form of
14 revenue requirements (the ratepayer impact analysis) not the incremental cash
15 flow to the Company resulting from a particular project (the economic impact
16 analysis). Therefore, if the economic impact analysis is determined to be the
17 more important analysis, then the appropriate discount rate is the Company’s
18 WACC or 6.3 percent.

19 Income tax rates do not include the most recent 1.0 percent reduction in BC
20 corporate tax rates proposed for July 1, 2008.

21 No financing or depreciation expenses are included in the analysis.

22 The base case assumes a 25 year modeling horizon with no terminal values.

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1 Although the DCF model allows for the input of a GHG credit, the Company has
2 not included an allowance in the analysis.

3 **Set A – Real Dollar Sensitivities**

4 As previously noted, in all scenarios under Set A values are expressed in real
5 2007 dollars.

6 **Scenario A1 – Discount Rate Sensitivity**

7 At an 8.0 percent discount rate, the discounted cash flow cost to the Company
8 is approximately \$9.6 million.

A1 Discount Rate	6.3 Percent	8.0 Percent	10.0 Percent
	<i>(In Real \$000s)</i>		
Status Quo	41,661	35,896	30,675
AMI	48,599	45,520	42,613
Net Benefit (Cost)	(6,938)	(9,624)	(11,938)

1 **Scenario A2 – Labour Cost Escalation**

2 Labour cost sensitivity was analyzed by holding all other costs in real dollars, and
3 escalating labour costs in the first case by 1.5 percent and by 3.0 percent in the
4 second case.

A2 Labour Cost Escalation	0.0 Percent	1.5 Percent	3.0 Percent
		<i>(\$000s)</i>	
Status Quo	35,896	39,608	44,205
AMI	45,520	46,017	46,590
Net Benefit (Cost)	(9,624)	(6,409)	(2,385)

5 **Scenario A3 – Vehicle Cost Escalation**

6 Vehicle cost sensitivity was analyzed by holding all other costs in real dollars,
7 and escalating labour costs by 2.5 percent and 5.0 percent in two separate
8 scenarios.

A3 Vehicle Cost Escalation	0.0 Percent	2.5 Percent	5.0 Percent
		<i>(\$000s)</i>	
Status Quo	35,896	37,308	39,340
AMI	45,520	45,566	45,612
Net Benefit (Cost)	(9,624)	(8,257)	(6,271)

9 **Scenario A4 – General Inflation**

10 General inflation sensitivity was analyzed by holding all other costs in real
11 dollars, and applying a general inflation factor of 1.0 percent and then 2.0
12 percent.

A4 General Inflation	0.0 Percent	1.0 Percent	2.0 Percent
		<i>(\$000s)</i>	
Status Quo	35,896	36,446	37,077
AMI	45,520	46,087	46,741
Net Benefit (Cost)	(9,624)	(9,641)	(9,664)

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1 **Set B – Nominal Dollar Sensitivities**

2 Set B values are expressed in nominal dollars and unless otherwise indicated are
3 discounted at 8.0 percent. Sensitivity was examined by expressing all costs in
4 nominal dollars using the following base case escalation factors and varying
5 each nominal cost accordingly:

- 6 • Labour Cost Escalation 3.0 percent
- 7 • Vehicle Cost Escalation 5.0 percent
- 8 • General Inflation 2.0 percent

9 **Scenario B1 – Discount Rate Sensitivity**

10 Expressed in nominal dollars, the project provides a net benefit of \$0.9 million at
11 an 8.0 percent discount rate. The project is dilutive at a discount rate of 10.0 and
12 12.0 percent.

B1 Discount Rate	8.0 Percent	10.0 Percent	12.0 Percent
	<i>(In Nominal \$000s)</i>		
Status Quo	48,830	40,637	34,495
AMI	47,898	44,474	41,757
Net Benefit (Cost)	932	(3,837)	(7,261)

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1 **Scenario B2 – Labour Cost Escalation**

2 A change in the labour cost escalation estimate of plus or minus 1.0 percent
3 improves or degrades the economic benefit of the project by approximately \$3.0
4 million respectively.

B2 Labour Cost Escalation	CPCN		
	1.0 Percent Lower	Application 3.0 Percent	1.0 Percent Higher
	<i>(In Nominal \$000s)</i>		
Status Quo	45,656	48,830	52,505
AMI	47,508	47,898	48,333
Net Benefit (Cost)	(1,851)	932	4,172

5 **Scenario B3 – Vehicle Cost Escalation**

6 A change in the vehicle cost escalation estimate of plus or minus 1.0 percent
7 improves or degrades the economic benefit of the project by approximately \$1.0
8 million respectively.

B3 Vehicle Cost Escalation	CPCN		
	1.0 Percent Lower	Application 5.0 Percent	1.0 Percent Higher
	<i>(In Nominal \$000s)</i>		
Status Quo	47,926	48,830	49,883
AMI	47,881	47,898	47,918
Net Benefit (Cost)	45	932	1,965

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1 **Scenario B4 – General Inflation**

2 A change in the general inflation estimate of plus or minus 1.0 percent has an
3 immaterial impact on the project economics.

B4 General Inflation	CPCN		
	1.0 Percent Lower	Application 3.0 Percent	1.0 Percent Higher
	<i>(In Nominal \$000s)</i>		
Status Quo	48,200	48,830	49,555
AMI	47,246	47,898	48,655
Net Benefit (Cost)	954	932	900

4 **Set C – Capital Cost Sensitivities**

5 Capital cost sensitivities under Set C were examined by expressing the values in
6 nominal dollars and varying the timing and capital cost of the project. All
7 scenarios were analyzed using an 8.0 percent discount rate.

8 **Scenario C1 – Defer the Project**

9 Three scenarios were examined in this analysis:

- 10 • Defer the project one year;
- 11 • Defer the project three years; and
- 12 • Defer the project five years.

13 Deferring the project has the ostensible effect of appearing to provide a net
14 benefit. However, the increase in net benefit is due to the increasing cost of
15 continuing operating under the Status Quo. The NPV of each of the AMI deferral
16 scenario varies by less than \$500,000 while the cost of continuing with the Status
17 Quo increases by almost \$5.0 million when comparing the Amended Application
18 to the Defer Five Years scenario. Although deferring the project does result in

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1 lower present value capital expenditures, the ongoing operating costs essentially
2 offset the capital savings.

C1 Defer Project	CPCN	Defer One	Defer Three	Defer
	Application	Year	Years	Five Years
	<i>(In Nominal \$000s)</i>			
Status Quo	48,830	49,896	51,820	53,800
AMI	47,898	47,962	47,480	47,948
Net Benefit (Cost)	932	1,934	4,340	5,852

3 **Scenario C2 – Capital Cost Sensitivity**

4 Capital cost uncertainty was analyzed at a macro level by varying the total capital
5 cost by 10 percent and 20 percent around the CPCN estimates.

6 Every change of plus or minus 10 percent in the capital cost will decrease or
7 increase the net benefit of the project by approximately \$3.1 million respectively.

C2 Capital Cost	CPCN				
	20% Lower	10% Lower	Application	10% Higher	20% Higher
	<i>(In Nominal \$000s)</i>				
Status Quo	48,830	48,830	48,830	48,830	48,830
AMI	41,613	44,756	47,898	51,040	54,182
Net Benefit (Cost)	7,217	4,074	932	(2,210)	(5,352)

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Discounted Cash Flow Analysis

Net Benefit (Cost)

Line No.	NPV @ 8.00%	0 2008	1 2009	2 2010	3 2011	4 2012	5 2013	6 2014	7 2015	8 2016	9 2017	10 2018	15 2023	20 2028	25 2033	
Summary																
Discounted Cash Flow																
1	Capital Costs															
2	Meter Costs															
3	New	674	110	97	79	61	62	62	61	60	59	57	49	34	35	
4	Replacement	17,092	7,413	11,931	0	0	0	0	0	0	0	0	0	0	0	
4		17,766	7,522	12,028	79	61	62	62	61	60	59	57	49	34	35	
5	Meter Reading Equipment	(455)	0	0	0	0	(250)	0	0	0	0	(250)	(250)	(250)	(250)	
6	Network Infrastructure	6,478	3,660	3,602	0	0	0	0	0	0	0	0	0	0	0	
7	IT infrastructure and upgrades	3,761	2,892	1,794	0	0	(250)	0	0	0	0	(250)	(250)	(250)	(250)	
8	Project Management	2,315	515	989	1,031	0	0	0	0	0	0	0	0	0	0	
9		29,864	515	15,064	18,455	79	61	(438)	62	61	60	59	(443)	(451)	(466)	(465)
10	Operating Costs															
11	Meter Reading															
12	Labour	(16,521)	0	0	(407)	(1,657)	(1,680)	(1,703)	(1,726)	(1,749)	(1,772)	(1,794)	(1,815)	(1,913)	(1,986)	(2,052)
13	Non-Labour	(5,291)	0	0	(131)	(534)	(543)	(552)	(549)	(558)	(567)	(576)	(584)	(612)	(632)	(650)
14		(21,812)	0	0	(537)	(2,190)	(2,222)	(2,255)	(2,275)	(2,307)	(2,339)	(2,369)	(2,399)	(2,525)	(2,619)	(2,702)
15	T&D operating cost	(1,842)	0	0	(293)	(297)	(301)	(305)	(308)	(312)	(316)	(319)	(23)	(23)	(23)	
16	Customer service	3,522	0	0	75	416	413	409	405	401	397	393	390	373	361	350
17	Income taxes	(109)	0	(444)	(970)	(812)	(491)	(266)	(91)	53	170	266	350	542	559	8
18		(20,241)	0	(444)	(1,433)	(2,879)	(2,597)	(2,413)	(2,266)	(2,162)	(2,083)	(2,026)	(1,978)	(1,633)	(1,722)	(2,368)
19	GHG Reduction (217.6 tonnes)															
20	Net Cash Flow	9,624	515	14,620	17,022	(2,800)	(2,536)	(2,851)	(2,204)	(2,101)	(2,024)	(1,967)	(2,422)	(2,084)	(2,187)	(2,833)
21	Discounted Cash Flow	9,624	515	13,537	14,594	(2,223)	(1,864)	(1,940)	(1,389)	(1,226)	(1,093)	(984)	(1,122)	(657)	(469)	(414)

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project
Requestor Name: BC Utilities Commission
Information Request No: 1 Amended Application
To: FortisBC Inc.
Request Date: January 25, 2008
Response Date: March 28, 2008

Discounted Cash Flow Analysis

Option "AMI"

Line No.	NPV @ 8.00%	0 2008	1 2009	2 2010	3 2011	4 2012	5 2013	6 2014	7 2015	8 2016	9 2017	10 2018	15 2023	20 2028	25 2033	
Summary																
Discounted Cash Flow																
1	Capital Costs															
2	Meter Costs															
3	New	1,321	89	200	178	145	112	114	113	112	109	107	104	90	62	64
4	Replacement	17,092	0	7,413	11,931	0	0	0	0	0	0	0	0	0	0	0
4		18,413	89	7,613	12,108	145	112	114	113	112	109	107	104	90	62	64
5	Meter Reading Equipment	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	Network Infrastructure	6,478	0	3,660	3,602	0	0	0	0	0	0	0	0	0	0	0
7	IT infrastructure and upgrades	4,216	0	2,892	1,794	0	0	0	0	0	0	0	0	0	0	0
8	Project Management	2,315	515	989	1,031	0	0	0	0	0	0	0	0	0	0	0
9		31,422	604	15,155	18,535	145	112	114	113	112	109	107	104	90	62	64
10	Operating Costs															
11	Meter Reading															
12	Labour	4,068	1,549	1,590	1,220	0	0	0	0	0	0	0	0	0	0	0
13	Non-Labour	1,303	495	509	392	0	0	0	0	0	0	0	0	0	0	0
14		5,370	2,044	2,100	1,612	0	0	0	0	0	0	0	0	0	0	0
15	T&D operating cost	1,786	276	283	288	0	0	0	0	0	0	0	312	324	335	
16	Customer service	7,005	262	269	350	697	697	697	697	697	697	697	697	697	697	697
17	Income taxes	(63)	0	(444)	(970)	(812)	(491)	(268)	(88)	56	174	269	352	548	570	22
18		14,098	2,582	2,207	1,280	(115)	206	429	608	752	870	966	1,049	1,557	1,591	1,054
19	GHG Reduction (217.6 tonnes)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	Net Cash Flow	45,520	3,186	17,362	19,816	29	318	543	721	865	979	1,073	1,152	1,646	1,653	1,118
21	Discounted Cash Flow	45,520	3,186	16,076	16,989	23	234	369	455	504	529	537	534	519	355	163

Discounted Cash Flow Analysis

Option "Status Quo"

Line No.	NPV @ 8.00%	0 2008	1 2009	2 2010	3 2011	4 2012	5 2013	6 2014	7 2015	8 2016	9 2017	10 2018	15 2023	20 2028	25 2033
Summary															
Discounted Cash Flow															
1	Capital Costs														
2	Meter Costs														
3	New	647	89	91	81	66	51	51	51	49	49	47	41	28	29
4	Replacement	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4		647	89	91	81	66	51	51	51	49	49	47	41	28	29
5	Meter Reading Equipment	455	0	0	0	0	250	0	0	0	0	250	250	250	250
6	Network Infrastructure	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	IT infrastructure and upgrades	455	0	0	0	0	250	0	0	0	0	250	250	250	250
8	Project Management	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9		1,557	89	91	81	66	51	51	51	49	49	547	541	528	529
10	Operating Costs														
11	Meter Reading														
12	Labour	20,588	1,549	1,590	1,627	1,657	1,680	1,703	1,726	1,749	1,772	1,794	1,815	1,913	2,052
13	Non-Labour	6,594	495	509	523	534	543	552	549	558	567	576	584	612	650
14		27,182	2,044	2,100	2,149	2,190	2,222	2,255	2,275	2,307	2,339	2,369	2,399	2,525	2,702
15	T&D operating cost	3,628	276	283	288	293	297	301	305	308	312	316	319	335	347
16	Customer service	3,483	262	269	275	280	284	288	292	296	300	303	307	324	336
17	Income taxes	46	0	0	0	0	(2)	3	3	3	3	2	6	10	14
18		34,339	2,582	2,651	2,713	2,764	2,803	2,842	2,874	2,914	2,953	2,992	3,027	3,190	3,421
19	GHG Reduction (217.6 tonnes)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	Net Cash Flow	35,896	2,671	2,742	2,794	2,829	2,854	3,393	2,926	2,965	3,003	3,040	3,574	3,730	3,840
21	Discounted Cash Flow	35,896	2,671	2,539	2,395	2,246	2,098	2,309	1,844	1,730	1,622	1,521	1,655	1,176	577

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

Requestor Name: BC Utilities Commission

Information Request No: 1 Amended Application

To: FortisBC Inc.

Request Date: January 25, 2008

Response Date: March 28, 2008

1 **15.0 Project Costs**

2 **Reference: Exhibit No. B-1, 6. Project Costs, Section No. 6.1, Assumptions**
3 **and Data Sources, p. 28**

4 **Q15.2 Please discuss the unit cost per system component of this proposal with**
5 **respect to the following Electric Power Research Institute “Advanced**
6 **Metering Infrastructure (AMI)”.**

7 A15.2 The additional costs reflected in the Amended Application have resulted in a
8 change in the allocations as listed in Amended Table A15.2 below.

Amended Table A15.2: AMI Estimated Component Cost

	FortisBC Amended	EPRI
	%	
(i) Meters and Modules	57	60
(ii) Network Infrastructure	21	20
(iii) IT Infrastructure and Upgrades	14	9
(iv) Project Management	8	11

9 The higher IT Infrastructure and Upgrade costs now reflect the enhanced
10 MDMR system with VEE capabilities.

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

Requestor Name: BC Utilities Commission

Information Request No: 1 Amended Application

To: FortisBC Inc.

Request Date: January 25, 2008

Response Date: March 28, 2008

1 **16.0 Project Cost**

2 **Reference: Exhibit No. B-1, 6. Project Costs, Section No. 6.3, Cost Details,**
3 **p. 29**

4 **Q16.2 Please identify the exclusions and assumptions made to perform this**
5 **estimate.**

6 A16.2 In addition to those listed in Section 6.1 of the CPCN Application (Exhibit B-1),
7 the following exclusions and assumptions were made to perform this estimate:

8 There were no changes to the assumptions which are:

- 9 • Approximately 10 percent of premises are difficult to access and will
10 require more than one visit.
- 11 • At least 90 percent of meters are located outdoors.

12 However, the exclusions have been changed to the following:

- 13 • Cost estimates do not include the implementation of the following:
 - 14 • Design and implementation of future rate structures still to be
15 determined;
 - 16 • Purchase and installation of load control end devices for
17 customer appliances;
 - 18 • Purchase and installation of remote disconnect/reconnect
19 collars;
 - 20 • Implementation of monthly billing periods; and
 - 21 • Purchase and installation of in-home display units.

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

Requestor Name: BC Utilities Commission

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To: FortisBC Inc.

Request Date: January 25, 2008

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1 **Q16.6 Please provide the estimate accuracy and estimate class based on the**
2 **five cost estimate classifications by Association for the Advancement of**
3 **Cost Engineering (ACEC), Recommended Practice for Classifying Cost**
4 **Estimates.**

5 A16.6 The cost estimates for the additional features in the Amended Application were
6 developed in a manner consistent with the internal costs within the Original
7 Application. These costs would fall under Class Four within the ACEC
8 recommendations for classifying cost estimates (+/- 15 to 60 percent).

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

Requestor Name: BC Utilities Commission

Information Request No: 1 Amended Application

To: FortisBC Inc.

Request Date: January 25, 2008

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- 1 **Q16.12 Please complete the Table 6.3, Summary of Capital Costs and**
 2 **provide the missing data and add any new line items.**

Table 6.3: Summary of Capital Costs				
		Direct Cost	Indirect Cost	Total
		(\$000s)	(\$000s)	(\$000s)
(i)	Meters and Modules			19,507
(ii)	AMI Vendor Training			41
(iii)	Network Infrastructure			6,700
(iv)	IT Infrastructure and Upgrades			1,483
(v)	MDMS – Meter Data Management System			
(vi)	Project Management <ul style="list-style-type: none"> • Project Management • 4 Project Leads • AMI Consultant • Business Analysis 			2,000
(vii)	Existing Meter Removal Cost			
(viii)	Project Planning, Network Design, and Testing			660
(ix)	AFUDC			950
(x)	Escalation (including Inflation)			
Performance Measurement Baseline (“PMB”)				31,341
(xi)	Management Reserve			
Total Allocated Budget (“TAB”)				31,341
(xii)	Other Non-Project Costs			
(xiii)	Regulatory Costs			

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

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Request Date: January 25, 2008

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Table 6.3: Summary of Capital Costs				
		Direct Cost	Indirect Cost	Total
		(\$000s)	(\$000s)	(\$000s)
(xiv)	Contingency			
Total Project Cost ("TCP")				31,341

- 1 A16.12 The capital cost summary in a format similar to that requested is provided in
- 2 Amended Table A16.12 below.

Amended Table A16.12: Capital Cost Summary

	Direct Cost	Indirect Cost	Total
	(\$000s)		
Meters and Modules	17,424	1,263	18,687
AMI Vendor Training	35	3	37
Network Infrastructure	6,557	475	7,032
IT Infrastructure and Upgrades	994	72	1,067
MDMR - Meter Data Management Repository	3,246	235	3,481
Project Management	1,662	123	1,786
Network Design and Testing	561	40	602
AFUDC	-	1,056	1,056
Subtotal	30,480	3,268	33,747
Contingency	2,583	181	2,764
Escalation	714	49	763
Baseline Capital Budget	3,297	230	3,527
Regulatory	25	-	25
Other Non-Project Costs	-	-	-
Total Project Budget	33,802	3,498	37,299

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project
Requestor Name: BC Utilities Commission
Information Request No: 1 Amended Application
To: FortisBC Inc.
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1 **17.0 Project Cost**

2 **Reference: Exhibit No. B-1, 6. Project Costs, Section No. 6.3, Cost Details,**
3 **(i) Meter and Modules, p. 30**

4 **Q17.1 Using the format and row items of the table above, please provide a table**
5 **of the annual costs per year to completion.**

6 A17.1 Please see Amended Table A17.1 below

Amended Table A17.1: Summary of Capital Costs

	2008	2009	2010	Total
	(\$000s)			
Meters and Modules	-	7,229	11,458	18,687
AMI Vendor Training	37	-	-	37
Network Infrastructure	-	3,571	3,461	7,032
IT Infrastructure and Upgrades	-	928	138	1,067
MDMR - Meter Data Management Repository	-	1,894	1,586	3,481
Project Management	445	358	982	1,786
Network Design and Testing	-	602	-	602
AFUDC	16	470	570	1,056
Subtotal	499	15,052	18,196	33,747
Contingency	49	1,217	1,498	2,764
Escalation	-	223	540	763
Baseline Capital Budget	49	1,440	2,038	3,527
Regulatory	25	-	-	25
Other Non-Project Costs				
Total Project Budget	573	16,492	20,234	37,299

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

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1 **18.0 Project Cost**

2 **Reference: Exhibit No. B-1, 6. Project Costs, Section No. 6.3, Cost Details,**
3 **(ii) Network Infrastructure, p. 30**

4 **“From the two AMI technologies examined, FortisBC has identified three**
5 **AMI solutions. All of these solutions will provide the benefits described in**
6 **this Application. The AMI technology solutions contained within this**
7 **application are focused on proven technologies that have been**
8 **thoroughly field tested. These are Power Line Carrier, Radio Frequency,**
9 **and a Hybrid Solution (Exhibit No. B-1, p. 44).”**

10 **Q18.1 Please provide the estimated cost per end-point for each of the three**
11 **mentioned technologies.**

12 **A18.1** The estimated total cost per end-point for PLC technology is \$346 per meter.
13 The estimated cost per end-point for RF technology is \$337 per meter. A
14 detailed estimate was not created for the Hybrid solution.

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

Requestor Name: BC Utilities Commission

Information Request No: 1 Amended Application

To: FortisBC Inc.

Request Date: January 25, 2008

Response Date: March 28, 2008

1 **25.0 Project Cost**

2 **Reference: Exhibit B-1, Section 6.3 (Cost Details), pp. 29-33**

3 **Q25.2 For each of these items, please indicate how the work is to be resourced**
4 **(vendor, contractor, FortisBC in-house resources). For the items that are**
5 **to be completed by the vendor, does FortisBC expect to have a turnkey**
6 **contract incorporating these items? Please explain.**

7 **A25.2 Please refer to the response to BCUC IR No. 1 Amended Application Q28.4**
8 **below.**

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

Requestor Name: BC Utilities Commission

Information Request No: 1 Amended Application

To: FortisBC Inc.

Request Date: January 25, 2008

Response Date: March 28, 2008

1 **26.0 Project Cost**

2 **Reference: Exhibit B-1, Section 6.6 (Rate Impact), p. 36**

3 **Q26.2 Please provide a rate impact NPV over ten years.**

4 A26.2 The NPV of the revenue requirements over a ten year term (2008 – 2018) is a
5 net cost of \$5.2 million.

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

Requestor Name: BC Utilities Commission

Information Request No: 1 Amended Application

To: FortisBC Inc.

Request Date: January 25, 2008

Response Date: March 28, 2008

1 **28.0 Project Cost**

2 **Reference: Exhibit B-1, Section 6.2, p. 28-29**

3 **Project Cost – Cost Summary**

4 **Q28.4 What percentage of the capital costs in Table 6-3 would be fixed during**
5 **the vendor selection process and what percentage would be subject to**
6 **further escalation during implementation? Please explain.**

7 A28.4 All vendor costs will be fixed during the selection process. Internal costs may
8 be subject to further escalation during implementation. Approximately 92
9 percent of costs are expected to be within the scope of the RFP process and
10 fixed during the vendor selection process. Please see Table A28.4 Amended
11 below.

Amended Table A28.4: Capital Cost Breakdown

		Total Costs	Vendor Costs	Internal Costs
		(\$000s)		
i.	Meters and Modules	20,684	20,684	-
ii.	Network Infrastructure	7,771	7,771	-
iii.	IT Infrastructure & Upgrades	5,014	4,305	709
iv.	Project Management	2,701	651	2,050
	Total Capital Cost	36,170	33,411	2,759
	Capital Costs (%)		92	8

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

Requestor Name: BC Utilities Commission

Information Request No: 1 Amended Application

To: FortisBC Inc.

Request Date: January 25, 2008

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1 **31.0 Project Schedule**

2 **Reference: Exhibit No. B-1, 7. Project Schedule, Section No. 7.1, AMI**
3 **Evaluation Criteria,**
4 **pp. 39-41**

5 **Q31.4 Please provide a more in-depth explanation of each optional function in**
6 **the AMI evaluation criteria and why they are classified as optional.**

7 A31.4 Hourly readings, complex reporting and VEE have now been updated to
8 “required” functions and features. The other items continue to be optional for
9 the reasons outlined in the original response to BCUC IR No. 1 Q31.4.

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

Requestor Name: BC Utilities Commission

Information Request No: 1 Amended Application

To: FortisBC Inc.

Request Date: January 25, 2008

Response Date: March 28, 2008

1 **40.0 APPENDIX B: Net Present Value Revenue**

2 **Reference: Exhibit No. B-1, Appendix B: Net Present Value Revenue**

3 **Requirements, p. 48**

4 **Q40.1 Has FortisBC allowed for replacement cost of AMI and associated**
5 **equipment, software and hardware in the Revenue Requirements**
6 **Template?**

7 A40.1 The budget for annual hardware software maintenance has increased to
8 \$242,000 per year beginning in 2011. This item can be found on page 19 line
9 33 of the Revenue Requirements Analysis in the Amended Application.

**FortisBC Responses to BCOAPO IR No. 1 – Amended
Application**

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

Requestor Name: BCOAPO et al.

Information Request No: 1 Amended Application

To: FortisBC Inc.

Request Date: February 5, 2008

Response Date: March 28, 2008

1 **1.0 Reference: Exhibit B-1, pages 3 and 5**

2 **BCUC Staff IR #10**

3 **Q1.1 Given the required AMI Functions set out on page 40, what “innovative**
4 **rate structures and competitive demand side management opportunities”**
5 **will AMI permit that are not possible with current metering but will be**
6 **possible without further investment in meters and the associated**
7 **infrastructure?**

8 A1.1 The Amended AMI Project will allow the implementation of more flexible rate
9 structures without any further investments to the AMI system. However,
10 additional investment may be required in FortisBC’s IT systems. In-home
11 display and load control would require additional investment to implement but
12 that additional investment would be less than it would have been with the
13 Original Application and it will be more flexible as described in the Amended
14 Application.

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

Requestor Name: BCOAPO et al.

Information Request No: 1 Amended Application

To: FortisBC Inc.

Request Date: February 5, 2008

Response Date: March 28, 2008

1 **2.0 Reference: Exhibit B-1, page 4**

2 **Q2.2 What is meant by “cost effective and competitive demand side**
3 **management opportunities, and new rate structures that promote energy**
4 **efficiency and conservation”?**

5 A2.2 The flexibility provided by hourly data, coupled with support for in-home
6 displays, will assist the Company in the design, implementation and evaluation
7 of future DSM programs. Possible future programs include:

- 8 • Time-of-Use Rates;
- 9 • Critical Peak Pricing Rates;
- 10 • In-home display to provide customers with better information; and
- 11 • Load control during critical peak periods.

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

Requestor Name: BCOAPO et al.

Information Request No: 1 Amended Application

To: FortisBC Inc.

Request Date: February 5, 2008

Response Date: March 28, 2008

1 **7.0 Reference: Exhibit B-1, page 16**

2 **Q7.2 What is the service life for network and IT infrastructure (see page 29)**
3 **associated with the project? Are the replacement costs for this covered**
4 **by the \$48,000 in contingency funds for equipment replacements? If not,**
5 **has the future replacement of this equipment been incorporated in the 25-**
6 **year rate impact analysis?**

7 A7.2 The service life of the network and IT infrastructure is still expected to be 25
8 years. The expected replacement costs for the network infrastructure are
9 contained within the \$48,000 per year of "Equipment Replacements". Future
10 support and upgrade costs for the IT infrastructure are budgeted in ongoing
11 AMI operating expenses, now expected to be approximately \$242,000 per year
12 to accommodate the increased functionality of the MDMR.

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

Requestor Name: BCOAPO et al.

Information Request No: 1 Amended Application

To: FortisBC Inc.

Request Date: February 5, 2008

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1 **8.0 Reference: Exhibit B-1, pages 20 and 40**

2 **Q8.1 How many time “buckets” will the AMI-enabled meters be required to be**
3 **able to support (per page 20)?**

4 A8.1 All meter readings provided by the AMI system will be available to create time
5 “buckets”. The number of buckets is therefore limited only by the frequency of
6 meter readings. Hourly readings would allow up to 24 discrete time “buckets”
7 per day, although the number could be greater if overlapping time buckets were
8 desirable (for instance a CPP time “bucket” overlapping one or more TOU time
9 “buckets”).

10 **Q8.2 Please clarify what is meant by the required functionality of “Hourly**
11 **readings for select customer profiles” (page 40)?**

12 A8.2 The amended functionality will now provide hourly interval readings for all
13 customers within the scope of the Amended Application.

14 **Q8.5 How did FortisBC decide which AMI functions and features to require, and**
15 **which to make optional?**

16 A8.5 Additional functions are now listed as “required”. Please see the response to
17 BCUC IR No. 1 Amended Application Q31.4.

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

Requestor Name: BCOAPO et al.

Information Request No: 1 Amended Application

To: FortisBC Inc.

Request Date: February 5, 2008

Response Date: March 28, 2008

1 **10.0 Reference: Exhibit B-1, pages 22-23**

2 **Q10.2 The functionality requirements on page 40 list as “required” a number of**
3 **features that are associated with future benefits. Please provide a**
4 **schedule that lists all such features and that indicates the anticipated**
5 **incremental costs associated with including each at this stage. In each**
6 **case, please discuss briefly the implications (e.g. significantly increased**
7 **cost to include later) of not including the feature at this stage.**

8 A10.2 The items listed as required in Table 7.1 from the Original Application (Exhibit
9 B-1) are separated between those that are required as functional initially and
10 those that are required but not to be functional during this stage of the AMI
11 implementation. The latter category is comprised of the following functions and
12 features:

13 **Supports TOU pricing models:** The Original CPCN Application supported
14 TOU calculations on the meter. The Amended Application supports
15 calculations both on the meter and in the MDMR. The incremental cost of
16 adding this future flexibility (for both TOU and CPP) now is approximately \$4
17 million.

18 **Supports block pricing models:** No change.

19 **Supports CPP pricing models:** The Original CPCN Application supported
20 CPP calculations on the meter. The Amended Application supports
21 calculations both on the meter and in the MDMR. The incremental cost of
22 adding this future flexibility (for both TOU and CPP) now is approximately \$4
23 million.

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

Requestor Name: BCOAPO et al.

Information Request No: 1 Amended Application

To: FortisBC Inc.

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1 **Supports load control:** The Original CPCN application required that the system
2 be able to be upgraded in the future to implement load control. The Amended
3 Application requires that the communications be in the meter at the time of
4 installation to protect against the need to exchange meters in the future to
5 achieve full load control capability. This is being done through the addition of a
6 home area network (HAN). The cost of the HAN is expected to add
7 approximately \$2 million to the project. This cost will support the future addition
8 of load control devices and in-home displays.

9 **Supports remote disconnect/reconnect:** No change.

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

Requestor Name: BCOAPO et al.

Information Request No: 1 Amended Application

To: FortisBC Inc.

Request Date: February 5, 2008

Response Date: March 28, 2008

1 **16.0 Reference: Exhibit B-1, page 42, lines 2 – 17**

2 **Q16.2 Are internal memory capabilities part of FortisBC's required AMI**
3 **functions and features? If not, why not?**

4 A16.2 Yes, internal memory of at least thirty days of readings (assuming hourly
5 readings) will be required as part of the RFP.

**FortisBC Responses to Mr. Alan Wait IR No. 1 – Amended
Application**

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

Requestor Name: Mr. Alan Wait

Information Request No: 1 Amended Application

To: FortisBC Inc.

Request Date: February 5, 2008

Response Date: March 28, 2008

1 **Q8 P.18, L.16; Will the AMI computer program allow the operators to**
2 **key in a meter read ahead of time to automatically read the meter when a**
3 **customer in closing or opening an account?**

4 A8 The AMI system will be required to provide twenty four readings for each meter
5 each day. Therefore, it is expected that a reading will be available for the CIS
6 system to use when calculating a final or opening bill based on the move in/out
7 date. In addition, the system will have the ability to be scheduled to obtain
8 readings on meters at different times as well as on-demand based on a request
9 from an operator.

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

Requestor Name: Mr. Alan Wait

Information Request No: 1 Amended Application

To: FortisBC Inc.

Request Date: February 5, 2008

Response Date: March 28, 2008

- 1 **Q20** How many years would it take to reach a break even point for ratepayers,
2 if calculated in constant dollars, making the AMI change and considering
3 only meter reading?
- 4 A20 In constant 2007 dollars and factoring in only customer growth and meter
5 reading cost savings (labour, vehicles and staff expenses), the Amended
6 Project does not break even within the 25 year modeling term.

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

Requestor Name: Mr. Alan Wait

Information Request No: 1 Amended Application

To: FortisBC Inc.

Request Date: February 5, 2008

Response Date: March 28, 2008

1 **Q21 Please show the calculation of the Project NPV of -0.09% in App. B.**

2 A21 The project impact is now 0.10 percent, which is calculated by dividing the NPV
3 of the revenue requirements (line 5 below) for the project by the NPV of total
4 revenue requirements for the Company (line 6 below).

5
$$= 3,154/3,042,076 = 0.10 \%$$

Revenue Requirements

1	Operating Expense (Incremental)	(24,470)
2	Depreciation Expense	12,716
3	Carrying Costs	15,491
4	Income Tax	(583)
5	Total Revenue Requirement for Project	<u>3,154</u>

Rate Impact

6	Forecast Revenue Requirements	3,042,076
7	Rate Impact	
8	NPV of Project / Total Revenue Requirements	<u>0.10%</u>

**FortisBC Responses to BCUC IR No. 2 – Amended
Application**

1 **9.0 Reference: Exhibit No. B-2, FortisBC Response to BCUC Q15.4.3,**
 2 **Appendix 15.4.3a and 15.4.3b**
 3 **Project Costs**

4 **Q9.5 Please create a comparison of the total capital costs per meter by sub-**
 5 **category (e.g., meters costs, hardware, installation) from Table 3.3 in the**
 6 **FortisAlberta AMI Phase II – Full Deployment Business Case with the**
 7 **equivalent per meter costs in FortisBC’s AMI Application. Please discuss**
 8 **key drivers for any differences in the unit costs for different cost**
 9 **categories in each application.**

10 A9.5 Please see Amended Table A9.5 below:

Amended Table A9.5: Cost per Meter by Category Comparison

		FortisBC CPCN	FortisAlberta Full Implementation	Variance
		\$		
Meters and Modules	a	192	187	(5)
Network Infrastructure	b	72	45	(27)
IT Infrastructure and Upgrades	c	46	2	(44)
Project Management	d	25	6	(19)
AFUDC / Engineering & Supervision	e	10	18	8
Total Cost Per Meter		345	258	(87)

11 The categories used by FortisAlberta were not the same as used by FortisBC
 12 resulting in the discrepancies noted below.

13 (a) FortisAlberta cost includes some substation/network infrastructure
 14 implementation costs;

15 (b) Installation costs for the network infrastructure is partially embedded with
 16 Meters and Module costs within FortisAlberta’s costs;

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

Requestor Name: BC Utilities Commission

Information Request No: 2 Amended Application

To: FortisBC Inc.

Request Date: March 5, 2008

Response Date: March 28, 2008

- 1 (c) FortisAlberta selected Hunt Technologies and the cost of the MDMR is
2 included as part of the Meters and Modules;
- 3 (d) Hunt Technologies have embedded their project management costs as
4 part of FortisAlberta's Meters and Modules category; and
- 5 (e) Engineering and Supervision costs have been included for FortisAlberta
6 above, FortisBC included AFUDC and capitalized overhead costs.

7 **Q9.6 Please create a comparison of the total incremental operating costs and**
8 **offsets per meter from Table 6.3 in the FortisAlberta AMI Phase II – Full**
9 **Deployment Business Case with the equivalent per meter costs in**
10 **FortisBC's AMI Application. Please discuss key drivers for any**
11 **differences in the unit costs for different cost categories in each**
12 **application.**

13 A9.6 FortisBC has on a best effort basis completed Amended Table A9.6 below.

Amended Table A9.6: Comparison of Table 6.3 in FortisAlberta Application

Description	FortisAlberta AMI	FortisBC AMI
	\$	
Capital Expenditures		
Capital Expenditures	252	345
Capital Offsets	(12)	0 ⁽¹⁾
Corporate E&S	18	N/A
Net Capital Expenditures	258	345
Operating Expense		
Operating Expense	102	63
Operating Offsets (Savings)	33	6
Net Operating Expense	69	57

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

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1 Notes:

2 (1)This category reflects the savings with avoided Itron upgrades of (\$12 per
3 meter) offset by the incremental costs of new meters over the life of the project of
4 \$12 per meter.

5 There are a number of possible reasons for variances in costs between utilities
6 that were listed in the response to BCUC IR No. 1 Q15.2 that cannot be
7 quantified. For example, there is no way to determine how much impact if any,
8 the terrain of FortisBC's service area versus FortisAlberta's had an impact on
9 cost. A number of reasons for identified differences are listed in the response to
10 BCUC IR No. 2 Q9.5.

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

Requestor Name: BC Utilities Commission

Information Request No: 2 Amended Application

To: FortisBC Inc.

Request Date: March 5, 2008

Response Date: March 28, 2008

1 **10.0 Reference: Exhibit No. B-2, FortisBC Response to BCUC Q12.0, p. 14-27**
2 **Project Costs**

3 **Q10.1 Please provide a version of the DCF model (with any changes arising from**
4 **this set of IRs) that is not password protected, or provide the Commission**
5 **with the password.**

6 A10.1 An electronic copy of the requested model has been filed in confidence with the
7 Commission.

8 **Q10.2 Please include the capability to switch between a 20-year analysis (as**
9 **used on the FortisAlberta Applications) and a 25-year analysis (as**
10 **currently used by FortisAlberta).**

11 A10.2 An electronic copy of the requested model with the requested capability has
12 been filed in confidence with the Commission.

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

Requestor Name: BC Utilities Commission

Information Request No: 2 Amended Application

To: FortisBC Inc.

Request Date: March 5, 2008

Response Date: March 28, 2008

1 **12.0 Reference: Exhibit No. B-2, FortisBC Response to BCUC Q12.0, p. 14-27**
2 **Project Costs**

3 **Q12.2 Please prepare new version of the real dollar analysis and sensitivities**
4 **that includes real escalation and sensitivities to assumptions about real**
5 **escalation.**

6 A12.2 Please see the analysis below. Sensitivities were modeled around base
7 assumptions as follow:

- 8 • Discount Rate – 8.0 percent
- 9 • Internal Labour escalation – 1.0 percent real
- 10 • Vehicle Cost escalation – 3.0 percent real
- 11 • General Inflation – 0.0 percent
- 12 • Composite Capital Cost Allowance – 14.38 percent
- 13 • Composite Depreciation Rate – 4.20 percent
- 14 • Income Tax Rate (combined federal and provincial on equity):
 - 15 • 2008 – 31.5 percent
 - 16 • 2009 – 31.0 percent
 - 17 • 2010 – 30.0 percent
 - 18 • 2011 – 28.5 percent
 - 19 • 2012 and beyond - 27.0 percent
- 20 • Return:
 - 21 • Equity Component – 40.0 percent
 - 22 • Debt Component – 60.0 percent
 - 23 • Equity Return – 9.02 percent
 - 24 • Debt Return – 6.43 percent

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

Requestor Name: BC Utilities Commission

Information Request No: 2 Amended Application

To: FortisBC Inc.

Request Date: March 5, 2008

Response Date: March 28, 2008

A1	Discount Rate	6.3 Percent	8.0 Percent	10.0 Percent
		<i>(In Real \$000s)</i>		
	Status Quo	46,889	40,043	33,892
	AMI	49,040	45,895	42,928
	Net Benefit (Cost)	(2,151)	(5,852)	(9,036)
A2	Labour Cost Escalation	0.0 Percent	1.0 Percent	2.0 Percent
		<i>(In Real \$000s)</i>		
	Status Quo	37,657	40,043	42,792
	AMI	45,573	45,895	46,250
	Net Benefit (Cost)	(7,916)	(5,852)	(3,458)
A3	Vehicle Cost Escalation	2.0 Percent	3.0 Percent	4.0 Percent
		<i>(In Real \$000s)</i>		
	Status Quo	39,371	40,043	40,823
	AMI	45,877	45,566	45,914
	Net Benefit (Cost)	(6,506)	(5,523)	(5,091)
A4	General Inflation	0.0 Percent	1.0 Percent	2.0 Percent
		<i>(In Real \$000s)</i>		
	Status Quo	40,043	40,594	41,225
	AMI	45,566	46,462	47,115
	Net Benefit (Cost)	(5,523)	(5,868)	(5,890)

1 **Q12.3 Please provide a version of the model that allows separate input of**
2 **assumptions of real and general price inflation for those items where real**
3 **inflation is potentially a factor (e.g., labour costs and vehicle expenses).**

4 A12.3 The requested model has been filed in confidence with the Commission.

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

Requestor Name: BC Utilities Commission

Information Request No: 2 Amended Application

To: FortisBC Inc.

Request Date: March 5, 2008

Response Date: March 28, 2008

1 **13.0 Reference: Exhibit No. B-2, FortisBC Response to BCUC Q12.0, p. 14-27**
2 **Project Costs**

3 **Q13.1 Please provide a detailed summary sheet showing the underlying**
4 **methodology and calculations for each of the deferral scenarios (Scenario**
5 **C1).**

6 A13.1 Each of the scenarios was analyzed in nominal dollars using the following
7 assumptions:

- 8 • Discount Rate – 8.0 percent
- 9 • Internal Labour escalation – 3.0 percent
- 10 • Vehicle Cost escalation – 5.0 percent
- 11 • General Inflation – 2.0 percent
- 12 • Composite Capital Cost Allowance – 14.38 percent
- 13 • Composite Depreciation Rate – 4.20 percent
- 14 • Income Tax Rate (combined federal and provincial on equity):
 - 15 • 2008 – 31.5 percent
 - 16 • 2009 – 31.0 percent
 - 17 • 2010 – 30.0 percent
 - 18 • 2011 – 28.5 percent
 - 19 • 2012 and beyond - 27.0 percent
- 20 • Return:
 - 21 • Equity Component – 40.0 percent
 - 22 • Debt Component – 60.0 percent
 - 23 • Equity Return – 9.02 percent
 - 24 • Debt Return – 6.43 percent

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

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Information Request No: 2 Amended Application

To: FortisBC Inc.

Request Date: March 5, 2008

Response Date: March 28, 2008

1 In each case the capital cost of the project was assumed to remain the same as
2 in the base case on the premise that as the technology is implemented by a
3 greater number of utilities across more jurisdictions, that economies of scale will
4 hold prices at today's levels.

5 A copy of the DCF for each scenario follows:

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project
Requestor Name: BC Utilities Commission
Information Request No: 2 Amended Application
To: FortisBC Inc.
Request Date: March 5, 2008
Response Date: March 28, 2008

Discounted Cash Flow Analysis
Option "AMI"
Scenario C1 - Defer One Year

Line No.	NPV @ 8.00%	0 Dec-08	1 Dec-09	2 Dec-10	3 Dec-11	4 Dec-12	5 Dec-13	6 Dec-14	7 Dec-15	8 Dec-16	9 Dec-17	10 Dec-18	15 Dec-23	20 Dec-28	25 Dec-33
Summary															
Discounted Cash Flow															
1	Capital Costs														
2	Meter Costs														
3	New	1,330	89	200	178	145	112	114	113	112	109	107	104	90	62
4	Replacement	17,092		0	7,413	11,931	0	0	0	0	0	0	0	0	0
4		17,156	89	200	7,590	12,075	112	114	113	112	109	107	104	90	62
5	Meter Reading Equipment	0		0	0	0	0	0	0	0	0	0	0	0	0
6	Network Infrastructure	6,478		0	3,660	3,602	0	0	0	0	0	0	0	0	0
7	IT infrastructure and upgrades	4,216		0	2,892	1,794	0	0	0	0	0	0	0	0	0
8	Project Management	2,315		515	989	1,031	0	0	0	0	0	0	0	0	0
9		29,201	89	715	15,132	18,502	112	114	113	112	109	107	104	90	62
10	Operating Costs														
11	Meter Reading														
12	Labour	5,792	1,595	1,687	1,778	1,398	0	0	0	0	0	0	0	0	0
13	Non-Labour	1,905	515	552	590	470	0	0	0	0	0	0	0	0	0
14		7,697	2,111	2,239	2,367	1,868	0	0	0	0	0	0	0	0	0
15	T&D operating cost	2,454	281	294	306	0	(11)	(11)	(12)	(12)	(12)	(12)	(13)	428	490
16	Customer service	8,564	265	276	286	713	721	739	757	775	794	813	833	940	1,061
17	Income taxes	46	0	0	(423)	(902)	(752)	(484)	(267)	(90)	54	172	274	526	572
18		18,761	2,657	2,809	2,536	1,679	(42)	243	478	673	836	973	1,094	1,894	2,123
19	GHG Reduction (217.6 tonnes)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	Net Cash Flow	47,962	2,746	3,524	17,668	20,181	70	357	591	785	945	1,080	1,198	1,983	2,186
21	Discounted Cash Flow	47,962	2,746	3,263	15,148	16,021	51	243	373	458	511	540	555	625	469

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project
Requestor Name: BC Utilities Commission
Information Request No: 2 Amended Application
To: FortisBC Inc.
Request Date: March 5, 2008
Response Date: March 28, 2008

Discounted Cash Flow Analysis
Option "Status Quo"
Scenario C1 - Defer One Year

Line No.	NPV @ 8.00%	0 Dec-08	1 Dec-09	2 Dec-10	3 Dec-11	4 Dec-12	5 Dec-13	6 Dec-14	7 Dec-15	8 Dec-16	9 Dec-17	10 Dec-18	15 Dec-23	20 Dec-28	25 Dec-33
Summary															
Discounted Cash Flow															
1	Capital Costs														
2	Meter Costs														
3	New	651	89	91	81	66	51	51	51	49	49	47	41	28	29
4	Replacement	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4		651	89	91	81	66	51	51	51	49	49	47	41	28	29
5	Meter Reading Equipment	455	0	0	0	0	250	0	0	0	0	250	250	250	250
6	Network Infrastructure	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	IT infrastructure and upgrades	455	0	0	0	0	250	0	0	0	0	250	250	250	250
8	Project Management	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9		1,561	89	91	81	66	551	51	51	49	49	547	541	528	529
10	Operating Costs														
11	Meter Reading														
12	Labour	28,882	1,595	1,687	1,778	1,864	1,947	2,033	2,123	2,216	2,312	2,411	2,512	3,070	4,425
13	Non-Labour	10,723	515	552	590	627	663	702	733	776	821	868	918	1,193	1,970
14		39,606	2,111	2,239	2,367	2,491	2,610	2,736	2,856	2,992	3,132	3,279	3,430	4,263	6,395
15	T&D operating cost	4,571	281	294	306	318	329	340	351	363	375	387	399	464	608
16	Customer service	4,110	265	276	286	295	303	312	320	329	338	347	357	406	516
17	Income taxes	48	0	0	0	0	0	(2)	3	3	3	3	2	6	14
18		48,335	2,657	2,809	2,959	3,104	3,242	3,385	3,530	3,686	3,849	4,017	4,188	5,139	7,534
19	GHG Reduction (217.6 tonnes)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	Net Cash Flow	49,896	2,746	2,900	3,040	3,169	3,293	3,936	3,581	3,737	3,898	4,065	4,735	5,680	8,063
21	Discounted Cash Flow	49,896	2,746	2,685	2,606	2,516	2,420	2,679	2,257	2,181	2,106	2,034	2,193	1,790	1,177

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project
Requestor Name: BC Utilities Commission
Information Request No: 2 Amended Application
To: FortisBC Inc.
Request Date: March 5, 2008
Response Date: March 28, 2008

Discounted Cash Flow Analysis
Option "AMI"
Scenario C1 - Defer Three Years

Line No.	NPV @ 8.00%	0 Dec-08	1 Dec-09	2 Dec-10	3 Dec-11	4 Dec-12	5 Dec-13	6 Dec-14	7 Dec-15	8 Dec-16	9 Dec-17	10 Dec-18	15 Dec-23	20 Dec-28	25 Dec-33	
Summary																
Discounted Cash Flow																
1	Capital Costs															
2	Meter Costs															
3	New	1,098	89	91	81	66	112	114	113	112	109	107	104	90	62	64
4	Replacement	13,568	0	0	0	0	7,413	11,931	0	0	0	0	0	0	0	0
4		14,666	89	91	81	66	7,524	12,044	113	112	109	107	104	90	62	64
5	Meter Reading Equipment	0				0	0	0	0	0	0	0	0	0	0	0
6	Network Infrastructure	5,998				0	3,660	3,602	0	0	0	0	0	0	0	0
7	IT infrastructure and upgrades	3,904				0	2,892	1,794	0	0	0	0	0	0	0	0
8	Project Management	2,143				515	989	1,031	0	0	0	0	0	0	0	0
9		24,993	89	91	81	581	15,066	18,471	113	112	109	107	104	90	62	64
10	Operating Costs															
11	Meter Reading															
12	Labour	8,631	1,595	1,687	1,778	1,864	1,947	1,525	0	0	0	0	0	0	0	0
13	Non-Labour	2,876	515	552	590	627	663	527	0	0	0	0	0	0	0	0
14		11,506	2,111	2,239	2,367	2,491	2,610	2,052	0	0	0	0	0	0	0	0
15	T&D operating cost	2,992	281	294	306	318	329	(35)	33	0	0	0	0	429	491	560
16	Customer service	7,860	265	276	286	295	303	721	738	730	747	765	784	884	997	1,126
17	Income taxes	129	0	0	0	0	(365)	(836)	(751)	(489)	(273)	(95)	57	463	570	554
18		22,487	2,657	2,809	2,959	3,104	2,878	1,902	20	241	475	671	841	1,775	2,059	2,241
19	GHG Reduction (217.6 tonnes)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	Net Cash Flow	47,480	2,746	2,900	3,040	3,684	17,944	20,373	133	353	584	778	945	1,865	2,121	2,305
21	Discounted Cash Flow	47,480	2,746	2,685	2,606	2,925	13,189	13,866	84	206	315	389	438	588	455	337

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project
Requestor Name: BC Utilities Commission
Information Request No: 2 Amended Application
To: FortisBC Inc.
Request Date: March 5, 2008
Response Date: March 28, 2008

Discounted Cash Flow Analysis
Option "Status Quo"
Scenario C1 - Defer Three Years

Line No.	NPV @ 8.00%	0 Dec-08	1 Dec-09	2 Dec-10	3 Dec-11	4 Dec-12	5 Dec-13	6 Dec-14	7 Dec-15	8 Dec-16	9 Dec-17	10 Dec-18	15 Dec-23	20 Dec-28	25 Dec-33
Summary															
Discounted Cash Flow															
1	Capital Costs														
2	Meter Costs														
3	New	658	89	91	81	66	51	51	51	49	49	47	41	28	29
4	Replacement	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4		658	89	91	81	66	51	51	51	49	49	47	41	28	29
5	Meter Reading Equipment	359	0	0	0	0	0	0	250	0	0	0	0	0	0
6	Network Infrastructure	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	IT infrastructure and upgrades	455	0	0	0	0	250	0	0	0	0	250	250	250	250
8	Project Management	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9		1,472	89	91	81	66	301	51	301	49	49	297	291	278	279
10	Operating Costs														
11	Meter Reading														
12	Labour	30,030	1,595	1,687	1,778	1,864	1,947	2,033	2,123	2,216	2,312	2,411	2,512	3,070	3,695
13	Non-Labour	11,255	515	552	590	627	663	702	733	776	821	868	918	1,193	1,970
14		41,286	2,111	2,239	2,367	2,491	2,610	2,736	2,856	2,992	3,132	3,279	3,430	4,263	5,229
15	T&D operating cost	4,727	281	294	306	318	329	340	351	363	375	387	399	464	533
16	Customer service	4,282	265	276	286	295	303	312	320	329	338	347	357	406	458
17	Income taxes	53	0	0	0	0	0	(2)	3	3	3	3	2	6	10
18		50,348	2,657	2,809	2,959	3,104	3,242	3,385	3,530	3,686	3,849	4,017	4,188	5,139	6,230
19	GHG Reduction (217.6 tonnes)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	Net Cash Flow	51,820	2,746	2,900	3,040	3,169	3,293	3,686	3,581	3,987	3,898	4,065	4,485	5,430	6,508
21	Discounted Cash Flow	51,820	2,746	2,685	2,606	2,516	2,420	2,509	2,257	2,327	2,106	2,034	2,077	1,712	1,396

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project
Requestor Name: BC Utilities Commission
Information Request No: 2 Amended Application
To: FortisBC Inc.
Request Date: March 5, 2008
Response Date: March 28, 2008

Discounted Cash Flow Analysis
Option "AMI"
Scenario C1 - Defer Five Years

Line No.	NPV @ 8.00%	0 Dec-08	1 Dec-09	2 Dec-10	3 Dec-11	4 Dec-12	5 Dec-13	6 Dec-14	7 Jan-15	8 Feb-15	9 Dec-17	10 Dec-18	15 Dec-23	20 Dec-28	25 Dec-33
Summary															
Discounted Cash Flow															
1	Capital Costs														
2	Meter Costs														
3	New	985	89	91	81	66	51	51	112	109	107	104	90	62	64
4	Replacement	11,634	0	0	0	0	0	7,413	11,931	2	0	0	0	0	0
4		12,619	89	91	81	66	51	7,464	12,043	111	107	104	90	62	64
5	Meter Reading Equipment	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	Network Infrastructure	4,408	0	0	0	0	0	3,660	3,602	0	0	0	0	0	0
7	IT infrastructure and upgrades	2,869	0	0	0	0	0	2,892	1,794	0	0	0	0	0	0
8	Project Management	1,577	0	0	0	0	515	989	1,031	2	0	0	0	0	0
9		21,474	89	91	81	66	51	566	15,006	113	107	104	90	62	64
10	Operating Costs														
11	Meter Reading														
12	Labour	11,284	1,595	1,687	1,778	1,864	1,947	2,033	2,123	1,662	0	0	0	0	0
13	Non-Labour	3,796	515	552	590	627	663	702	733	582	0	0	0	0	0
14		15,081	2,111	2,239	2,367	2,491	2,610	2,736	2,856	2,244	0	0	0	0	0
15	T&D operating cost	3,789	281	294	306	318	329	340	351	363	0	0	429	491	560
16	Customer service	7,494	265	276	286	295	303	312	320	1,031	713	730	747	842	1,072
17	Income taxes	110	0	0	0	0	0	(359)	(829)	(747)	(486)	(265)	349	543	563
18		26,474	2,657	2,809	2,959	3,104	3,242	3,387	3,168	2,808	(34)	243	482	1,620	2,196
19	GHG Reduction (217.6 tonnes)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	Net Cash Flow	47,948	2,746	2,900	3,040	3,169	3,293	3,953	18,174	21,278	79	350	585	1,710	2,047
21	Discounted Cash Flow	47,948	2,746	2,685	2,606	2,516	2,420	2,691	11,453	12,416	43	175	271	539	439

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project
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Discounted Cash Flow Analysis
Option "Status Quo"
Scenario C1 - Defer Five Years

Line No.	NPV @ 8.00%	0 Dec-08	1 Dec-09	2 Dec-10	3 Dec-11	4 Dec-12	5 Dec-13	6 Dec-14	7 Dec-15	8 Dec-16	9 Dec-17	10 Dec-18	15 Dec-23	20 Dec-28	25 Dec-33
Summary															
Discounted Cash Flow															
1	Capital Costs														
2	Meter Costs														
3	New	665	89	91	81	66	51	51	51	49	49	47	41	28	29
4	Replacement	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4		665	89	91	81	66	51	51	51	49	49	47	41	28	29
5	Meter Reading Equipment	455	0	0	0	0	250	0	0	0	0	250	250	250	250
6	Network Infrastructure	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	IT infrastructure and upgrades	455	0	0	0	0	250	0	0	0	0	250	250	250	250
8	Project Management	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9		1,574	89	91	81	66	551	51	51	49	49	547	541	528	529
10	Operating Costs														
11	Meter Reading														
12	Labour	31,075	1,595	1,687	1,778	1,864	1,947	2,033	2,123	2,216	2,312	2,411	2,512	3,070	3,695
13	Non-Labour	11,755	515	552	590	627	663	702	733	776	821	868	918	1,193	1,970
14		42,830	2,111	2,239	2,367	2,491	2,610	2,736	2,856	2,992	3,132	3,279	3,430	4,263	5,229
15	T&D operating cost	4,869	281	294	306	318	329	340	351	363	375	387	399	464	533
16	Customer service	4,465	265	276	286	295	303	312	320	329	338	347	357	406	458
17	Income taxes	62	0	0	0	0	0	(2)	3	3	3	3	2	6	10
18		52,225	2,657	2,809	2,959	3,104	3,242	3,385	3,530	3,686	3,849	4,017	4,188	5,139	6,230
19	GHG Reduction (217.6 tonnes)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	Net Cash Flow	53,800	2,746	2,900	3,040	3,169	3,293	3,936	3,581	3,737	3,898	4,065	4,735	5,680	6,758
21	Discounted Cash Flow	53,800	2,746	2,685	2,606	2,516	2,420	2,679	2,257	2,181	2,106	2,034	2,193	1,790	1,177

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

Requestor Name: BC Utilities Commission

Information Request No: 2 Amended Application

To: FortisBC Inc.

Request Date: March 5, 2008

Response Date: March 28, 2008

1 **15.0 Reference: Exhibit No. B-2, FortisBC Response to BCUC Q12.0, p. 14-27**
2 **Project Costs**

3 **Q15.1 Please re-run the economic analysis using a “least cost meter”, that is, a**
4 **project replacing existing meters with meters that have only the**
5 **functionality necessary to provide all the savings included in the**
6 **economic analysis?**

7 A15.1 The functional requirements outlined in the Original Application are a reflection
8 of the “least cost meter” which contains only the required functions and features
9 to deliver on the economic and soft benefits described in the Original
10 Application.

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

Requestor Name: BC Utilities Commission

Information Request No: 2 Amended Application

To: FortisBC Inc.

Request Date: March 5, 2008

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1 **Q15.2 Please also prepare economic analysis or comment on the economics for**
2 **a drive-by AMR system?**

3 A15.2 With the Amended Application, only the capital costs change as follows:

4 **Table A15.2 Amended: Benefits Comparison with AMI**

Features Available	AMI	AMR	Status Quo
Bi-Monthly Meter Readings	▲	▲	▲
Monthly Meter Readings	▲	▲	
Daily Meter Readings	▲		
Outage Notification	▲		
Restoration Verification	▲		
Virtual Disconnects	▲		
Flexible Billing Dates	▲		
Bill Consolidation for Customers	▲		
Voltage Readings	▲		
System Modeling	▲		
Customer Load Profiles	▲		
Capital Costs (\$000)			
Meters and Modules	20,684	17,784	0
Network Infrastructure	7,771	35	0
IT Infrastructure and Upgrades	5,014	235	0
Project Management	2,701	599	0
Total Capital Costs	36,170	18,563	0

5 **Q15.3 Please provide a description of the functionality of the “least cost meter”,**
6 **and a description of the functionality required to deliver the savings**
7 **included in the economic analysis?**

8 A15.3 Please refer to Table 7.1 from the Original Application (Exhibit B-1). Please
9 also refer to the responses to BCOAPO IR No. 1 Q10.2 (Exhibit B-2), and
10 BCUC IR No. 2 Q15.1, (Exhibit B-3).

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

Requestor Name: BC Utilities Commission

Information Request No: 2 Amended Application

To: FortisBC Inc.

Request Date: March 5, 2008

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1 **Q15.4 Please comment on whether or not the Commission should either 1) only**
2 **approve the project using "least cost meters" or 2) delay approval until**
3 **the Company can provide economic analysis to justify the incremental**
4 **functionality?**

5 A15.4 As stated in the Amended Application, FortisBC believes that the additional
6 requirements are prudent expenditures to ensure flexibility for future innovative
7 rates and DSM initiatives.

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

Requestor Name: BC Utilities Commission

Information Request No: 2 Amended Application

To: FortisBC Inc.

Request Date: March 5, 2008

Response Date: March 28, 2008

1 **16.0 Reference: Exhibit No. B-2, FortisBC Response to BCUC Q12.0 and Wait**
2 **Q22, p. 8**

3 **Q16.3 Please provide an updated discount rate sensitivity for the DCF analysis**
4 **(Scenario A1) also assuming a real WACC of ~4.3%.**

5 A16.3 As noted in the table below, the project would yield a net cost DCF of
6 approximately \$2.6 million assuming a real WACC of 4.3 percent.

A1	Discount Rate	FBC WACC		
		4.3 Percent	8.0 Percent	10.0 Percent
		<i>(In Real \$000s)</i>		
	Status Quo	50,644	35,896	30,675
	AMI	53,209	45,520	42,613
	Net Benefit (Cost)	(2,565)	(9,624)	(11,938)

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

Requestor Name: BC Utilities Commission

Information Request No: 2 Amended Application

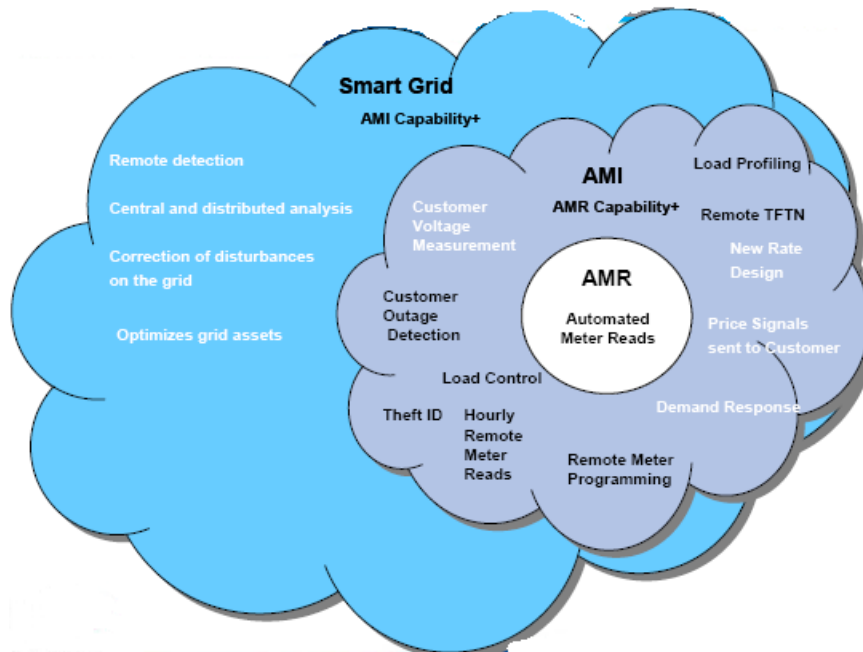
To: FortisBC Inc.

Request Date: March 5, 2008

Response Date: March 28, 2008

1 **21.0 Reference: Exhibit No. B-2, FortisBC Response to BCUC Q15.5, Set C –**
2 **Capital Cost Sensitivities, p. 23**
3 **AMI Deferral**

4 **Q21.2 As a Smart Grid can be approximately characterized by the diagram**
5 **below, would FortisBC please confirm the elements that their AMI**
6 **proposal lacks to be classified as a Smart Grid?**



7 **A21.2 The Amended Application supports more aspects of the “Smart Grid” concept**
8 **including:**

- 9 • Price signals sent to customers;
- 10 • Demand response;
- 11 • Hourly remote meter reads;
- 12 • Load control;
- 13 • Load profiling; and
- 14 • Support for net metering

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

Requestor Name: BC Utilities Commission

Information Request No: 2 Amended Application

To: FortisBC Inc.

Request Date: March 5, 2008

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1 **Q21.3 Would FortisBC please identify all features available to an AMI system**
2 **and those features that they are currently not providing at this time and**
3 **those features that they have decided not to provide in the future as well?**

4 A21.3 FortisBC's original response to BCUC IR No. 2 Q21.3 identified two features
5 that would not be provided:

6 • Provision for hourly or more frequent readings through a Validation,
7 Estimation and Editing ("VEE") equipped Meter Data Management
8 Repository ("MDMR")

9 • In-home display capability through a Home Area Network ("HAN")

10

11 Both of features are now included in the Project.

12 **Q21.7 Would FortisBC please explain why it would not be a reasonable and**
13 **prudent decision to defer the AMI project until the BC Hydro Smart**
14 **Metering Initiative has been determined by the Commission? Has**
15 **FortisBC and BC Hydro had any discussions on this issue? If so, please**
16 **explain.**

17 A21.7 FortisBC continues to consult with BC Hydro to share information in regards to
18 their respective AMI projects. BC Hydro has provided the attached letter in this
19 regard.

Joanna Sofield

Chief Regulatory Officer

Phone: (604) 623-4046

Fax: (604) 623-4407

regulatory.group@bchydro.com

Via Email: regulatory@fortisbc.com

March 20, 2008

Mr. David Bennett
Vice President, Regulatory Affairs
and General Counsel
FortisBC Inc.
1290 Esplanade Box 130
Trail, BC V1R 4L4

Dear Mr. Bennett:

**RE: British Columbia Hydro and Power Authority (BC Hydro)
FortisBC - Advanced Metering Infrastructure (AMI) Project**

BC Hydro is of the view that programs such as FortisBC's AMI project and BC Hydro's Smart Metering Infrastructure (SMI) project are supported by the B.C. Government as demonstrated in its 2007 Energy Plan. Specifically Policy Action No. 4 of the 2007 Energy Plan, in addition to encouraging utilities to explore, develop and propose additional innovative rate designs for efficiency, conservation and the development of clean and renewable energy, also encourages utilities to consider "the benefits of 'smart' or advanced metering technology, which offer potential for much greater consumption information and control being available to the consumer."

BC Hydro and FortisBC have been and will continue to exchange details on our respective SMI and AMI programs. BC Hydro sees such information exchange as a way to leverage both companies' knowledge to the benefit of our respective ratepayers.

Yours sincerely,



Joanna Sofield
Chief Regulatory Officer



Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

Requestor Name: BC Utilities Commission

Information Request No: 2 Amended Application

To: FortisBC Inc.

Request Date: March 5, 2008

Response Date: March 28, 2008

- 1 **23.0** **Reference: Exhibit No. B-2, FortisBC Response to BCUC Q14.3, p. 30**
- 2 **Project Costs**
-
- 3 **Q23.2** **Please provide an updated rate impact model incorporating a scenario**
- 4 **where the net book value of existing meters is written off over five years.**
- 5 **A23.2** **Please see Amended Table A23.2 below.**

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project
Requestor Name: BC Utilities Commission
Information Request No: 2 Amended Application
To: FortisBC Inc.
Request Date: March 5, 2008
Response Date: March 28, 2008

Amended Table A23.2

Revenue Requirements Template
Option "AMI" (Write-off Existing Meters over 5 Years)

Line No.	NPV @ 10.00%	0 Dec-08	1 Dec-09	2 Dec-10	3 Dec-11	4 Dec-12	5 Dec-13	6 Dec-14	7 Dec-15	8 Dec-16	9 Dec-17	15 Dec-23	20 Dec-28	25 Dec-33	
Summary															
Revenue Requirements															
1	Operating Expense (Incremental)	(24,605)	0	0	(516)	(2,377)	(2,497)	(2,624)	(2,746)	(2,883)	(3,026)	(3,174)	(3,735)	(4,635)	(5,725)
2	Depreciation Expense	16,356	0	0	1,164	2,783	2,786	2,789	2,781	2,380	1,665	1,668	1,671	1,669	212
3	Carrying Costs	15,491	0	641	2,013	2,684	2,565	2,436	2,307	2,188	2,068	1,948	1,198	572	(0)
4	Income Tax	(583)	0	(490)	(1,071)	(896)	(541)	(296)	(98)	61	191	297	604	629	45
5	Total Revenue Requirement for Project	6,659	0	151	1,591	2,195	2,313	2,306	2,244	1,746	898	739	(263)	(1,765)	(5,468)
Rate Impact															
6	Forecast Revenue Requirements	3,042,076	219,817	240,023	255,139	272,208	287,690	293,400	299,300	305,300	311,400	317,600	357,700	394,900	436,100
7	Rate Impact		0.00%	0.06%	0.62%	0.81%	0.80%	0.79%	0.75%	0.57%	0.29%	0.23%	-0.07%	-0.45%	-1.25%
8	NPV of Project / Total Revenue Requirements	0.22%													

1

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

Requestor Name: BC Utilities Commission

Information Request No: 2 Amended Application

To: FortisBC Inc.

Request Date: March 5, 2008

Response Date: March 28, 2008

1 **24.0 Reference: Exhibit No. B-2, FortisBC Response to BCUC Q15.2, p. 32**

2 **Project Costs**

3 "The inclusion and complexity of the MDMR can impact the overall cost of an
4 AMI system. For example, most Ontario utilities do not require an MDMR as
5 the Ontario Energy Board (OEB) will be developing and maintaining the MDMR
6 system. Utilities that are implementing an MDMR with validation and estimation
7 capability will have a higher IT cost than those with a basic MDMR."

8 **Q24.1 Please explain the capability of the MDMR or MDMS that FortisBC is**
9 **proposing for the AMI system and why it should or should not be**
10 **implemented with validation and estimation capability?**

11 A24.1 In addition to the functionality described in BCUC IR No. 2 Q2.4, the MDMR will
12 also now have Validation, Estimation and Editing (VEE) capabilities.

13 VEE is an important addition to the MDMR in order to make use of the hourly
14 data that will now be provided by the AMI meters. The VEE functionality will
15 validate the hourly readings coming into the MDMR and will provide estimates
16 for any missing readings to ensure complete data for use in analysis and in the
17 creation of time buckets.

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

Requestor Name: BC Utilities Commission

Information Request No: 2 Amended Application

To: FortisBC Inc.

Request Date: March 5, 2008

Response Date: March 28, 2008

1 **26.0 Reference: Exhibit No. B-2, FortisBC Response to BCUC Q15.3, p. 36**

2 **AMI Non-Project and Estimated Future Costs**

3 **Q26.1 Would FortisBC, on a best efforts basis, complete the following table of**
4 **non-project and future related project costs for adding 36,000 new**
5 **customers, adding the 34,000 existing municipal customers, adding water**
6 **meters, adding gas meters, adding remote disconnect/reconnect features**
7 **to an estimated number of residences with chronic issues?**

Non-Project and Future Costs	Direct Costs	Indirect Costs	Total
Incremental Meter Costs			
Gas Meters			
Water Meters			
34,000 Municipal Meters			
36,000 Future Electrical Meters			
Incremental Metering Operational Expenses			
Incremental Other Operational Expenses			
Incremental Other Admin Expenses			
Avoided Future Capital Costs			
Innovative Rate Structures			
Load Control			
Remote Disconnect/Reconnect for ___ meters.			
Meter Reading Frequency			

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

Requestor Name: BC Utilities Commission

Information Request No: 2 Amended Application

To: FortisBC Inc.

Request Date: March 5, 2008

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1 A26.1 FortisBC, on a best efforts basis, has updated the categories that have been
2 impacted by the Amended Application.

3

Amended Table A26.1: Future Related Costs (\$000's)

Line No.	Non-Project and Future Costs	Direct Costs	Indirect Costs	Total
10	Innovative Rate Structures	0 - 2,000	0 - 140	0 - 2140
11	Load Control	0	0	0

4 10 – Actual cost will depend on the structure and complexity of the rates, the
5 number of customers on those rates.

6 11 – Reflects the upgrades to FortisBC's internal systems only and not the
7 purchase of load control devices for appliances at an approximate cost of \$75
8 each.

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

Requestor Name: BC Utilities Commission

Information Request No: 2 Amended Application

To: FortisBC Inc.

Request Date: March 5, 2008

Response Date: March 28, 2008

1 **29.0 Reference: Exhibit No. B-2, FortisBC Response to BCUC Q16.6, p. 39**
2 **AMI Internal Costs**

3 **Q29.1 As the internal cost is only an AACE Class Four, would FortisBC please**
4 **supply the estimate magnitude of cost for this item and its percentage**
5 **cost of the total project cost?**

6 A29.1 As stated in response to BCUC IR No. 1 Q28.4 (Exhibit B-2), internal costs
7 account for approximately \$2.8 million or 8 percent of the total project cost.

**FortisBC Responses to BCOAPO et al. IR No. 2 – Amended
Application**

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

Requestor Name: BCOAPO et al.

Information Request No: 2 Amended Application

To: FortisBC Inc.

Request Date: March 5, 2008

Response Date: March 28, 2008

1 **19.0 Reference: Exhibit B-1, page 40**

2 **BCUC Staff IR #1.2**

3 **Q19.1 Would this capability to display real time prices be one of the required**
4 **attributes of the meters being acquired or would an upgrade to the meter**
5 **be required to incorporate this into the AMI system at a later date?**

6 A19.1 Please refer to the response to BCUC IR No. 1 Amended Application Q1.2.

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

Requestor Name: BCOAPO et al.

Information Request No: 2 Amended Application

To: FortisBC Inc.

Request Date: March 5, 2008

Response Date: March 28, 2008

1 **21.0 Reference: BCUC Staff IR #15.1; Appendix 15.2.2; 17.3.2 and 29.1, Exhibit**
2 **B-1, pages 36-37**

3 **Q21.5 Please re-do the rate impact analysis using a 15 year amortization period**
4 **for smart meters as prescribed by the OEB for the Brampton Hydro**
5 **analysis (see Appendix 15.2.2, second last page). Note: Please clearly**
6 **indicate assumptions regarding smart meter replacement costs after year**
7 **15.**

8 A21.5 Assuming a 1.0 percent real escalation rate on labour and a 3.0 percent real
9 escalation rate on vehicle costs and a 15 year amortization period results in a
10 real NPV cost of the project of approximately \$8.8 million. The amortization
11 period would not impact the replacement costs after year 15 since the service
12 life of the meters is 25 years.

**FortisBC Responses to Mr. Hans Karow IR No. 2 – Amended
Application**

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

Requestor Name: Mr. Hans Karow

Information Request No: 2 Amended Application

To: FortisBC Inc.

Request Date: March 5, 2008

Response Date: March 28, 2008

- 1 **Q10** How often each day/week etc will the reader transmitter (although not
2 chosen yet) typical be active and for how long each time (in seconds) at
3 low, normal/average and at peak use periods?
- 4 A10 AMI systems vary from constantly transmitting a signal to transmitting once per
5 hour. The length of the transmission can also vary from continuous to several
6 seconds.

**FortisBC Responses to Horizon Technologies IR No. 2 – Amended
Application**

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

Requestor Name: Horizon Technologies Inc. (Mr. Ludo Bertsch)

Information Request No: 2 Amended Application

To: FortisBC Inc.

Request Date: March 6, 2008

Response Date: March 28, 2008

1 **1.0** **References: Exhibit B-2, BCUC A1.2 and B-1 Table 7.1:**
2 **FortisBC states in A1.2 that “*Following implementation, FortisBC will be***
3 ***able to provide customers access to their usage data and electricity costs***
4 ***in some manner such as a secure internet logon.”*** Table 7.1 lists
5 ***“Interface to Customer Web Access”*** within ***“AMI Functions and***
6 ***Features”***.

7 **Q1.2** **Please specify the maximum time lag from consumption of energy to its**
8 **accessibility on the Internet that would be acceptable. Will this function**
9 **be included in table 7.1; if not, why not?**

10 A1.2 The maximum time lag from consumption of energy to accessibility on the
11 internet would occur if daily meter readings were transmitted via PLC. With
12 daily readings, there is a maximum lag of one hour between consumption and a
13 meter reading. Once the reading is obtained, it will take a maximum of 24
14 hours for the data to be processed by the MDMR and made accessible on the
15 internet for a total of 25 hours from consumption to display on the internet.
16 The maximum allowable time lag will be specified in the RFP.

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

Requestor Name: Horizon Technologies Inc. (Mr. Ludo Bertsch)

Information Request No: 2 Amended Application

To: FortisBC Inc.

Request Date: March 6, 2008

Response Date: March 28, 2008

1 **Q1.3 Will the “usage data and electricity costs” be available in an open**
2 **standard form useful for third party developers? If not, why not? Will this**
3 **feature be specified as a requirement for AMI vendors and added to Table**
4 **7.1? If not, why not?**

5 A1.3 Information will be provided to customers on their specific usage data and
6 electricity costs through the internet. In addition, the AMI system will have
7 Home Area Network (HAN) capabilities to support the future addition of in-
8 home display units. Although not specified as a requirement in the Application,
9 the availability of this information in an open standard will be considered
10 providing this does not add additional cost to the project and provided that the
11 security is in place to ensure the confidentiality of customer data.

Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

Requestor Name: Horizon Technologies Inc. (Mr. Ludo Bertsch)

Information Request No: 2 Amended Application

To: FortisBC Inc.

Request Date: March 6, 2008

Response Date: March 28, 2008

1 **2.0** **References: Exhibit B-2, BCUC A1.2 and B-1 Table 7.1:**
2 **FortisBC states in A1.2 that “*The real-time display of system***
3 ***consumption or electricity prices could be provided to customers over***
4 ***the internet today.” [emphasis added]. Table 7.1 lists “AMI Functions and***
5 ***Features”.***

6 **Q2.2** **Please specify how this feature is referenced in AMI Functions and**
7 **Features Table 7.1.**

8 A2.2 The capability for customers to access their consumption data and the price
9 that they are paying for electricity is covered in Table 7.1 as amended -
10 “Interface to Customer Web Access”. In the future, it could also be provided
11 through in-home displays communicating with the HAN.

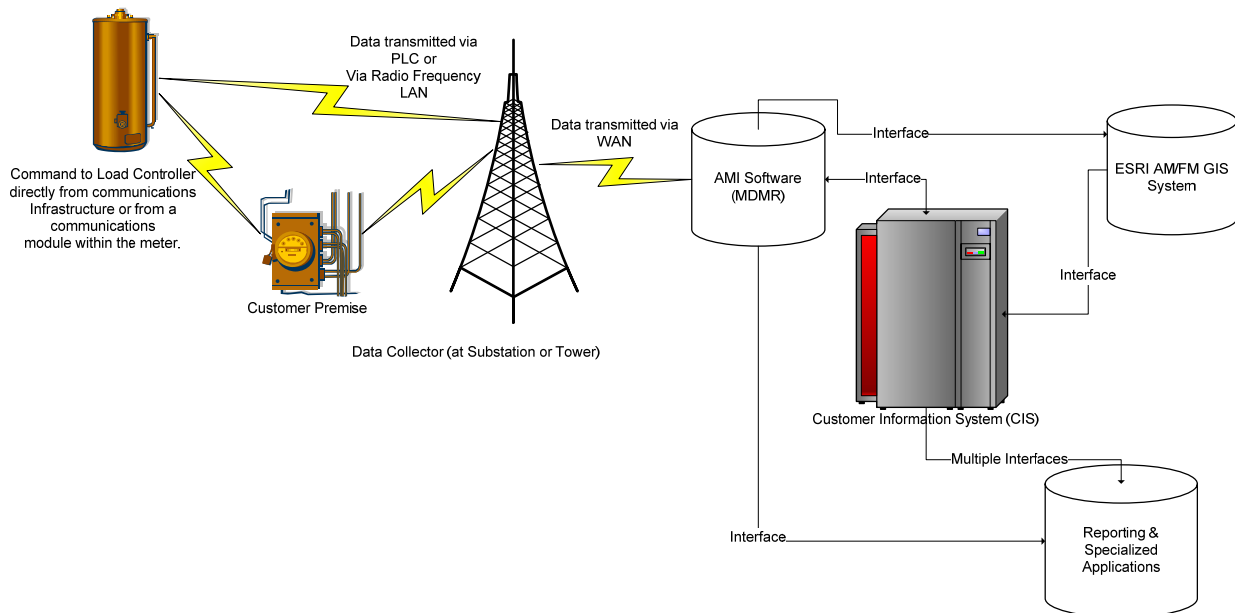
1 **4.0 Reference: Exhibit B-2, BCOAPO A10.3:**

2 **Q4.1 FortisBC indicates the “AMI infrastructure would allow for a program to**
3 **place load-controlling devices onto appliances in customers’ premises”**
4 **yet would not work with existing meters. Please elaborate on specifically**
5 **how the AMI infrastructure enables this. Please use a diagram to explain.**

6 A4.1 As a point of clarification, this answer refers to “existing meters and
7 infrastructure” (emphasis added). Load controlling devices cannot be
8 controlled through the existing meters and/or through existing communications
9 infrastructure.

10 FortisBC will require a HAN that supports load controlling devices through the
11 AMI-enabled meter and/or directly through the LAN communications
12 infrastructure. Please see Figure 4.1 below which illustrates these options.

Figure 4.1: AMI Communications Network



Project No. 3698493: Advanced Metering Infrastructure (AMI) Project

Requestor Name: Horizon Technologies Inc. (Mr. Ludo Bertsch)

Information Request No: 2 Amended Application

To: FortisBC Inc.

Request Date: March 6, 2008

Response Date: March 28, 2008

1 **6.0 Reference: Exhibit B-2, BCOAPO A16.2:**

2 **Q6.1 FortisBC indicates at least thirty days of readings will be required. Please**
3 **indicate if this feature will be added to Table 7.1. If readings are taken**
4 **every half hour or quarter hour, will this requirement remain?**

5 **A6.1 It is still expected that the meters will be able to accommodate thirty days of**
6 **readings with the new hourly reading requirement.**