

D Barry Kirkham, QC\*  
Josephine M Nadel\*  
Allison R Kuchta\*  
James L Carpick\*  
Patrick J Haberl\*  
Gary M Yaffe\*  
Jonathan L Williams\*  
Scott H Stephens\*  
James W Zaitsoff  
Jocelyn M Le Dressay

Robin C Macfarlane\*  
James D Burns\*  
Jeffrey B Lightfoot  
Christopher P Weafer\*  
Michael P Vaughan  
Heather E Maconachie  
Michael F Robson\*  
Zachary J Ansley  
Pamela E Sheppard

J David Dunn\*  
Duncan J Manson\*  
Daniel W Burnett\*  
Ronald G Paton  
Gregory J Tucker\*  
Terence W Yu\*  
James H McBeath\*  
Susan C Gilchrist  
George J Roper

Douglas R Johnson\*  
Alan A Frydenlund\*  
Harvey S Delaney\*  
Paul J Brown\*  
Karen S Thompson\*  
Harley J Harris\*  
Paul A Brackstone\*  
Edith A Ryan  
Daniel H Coles

OWEN · BIRD

LAW CORPORATION

PO Box 49130  
Three Bentall Centre  
2900-595 Burrard Street  
Vancouver, BC  
Canada V7X 1J5

Telephone 604 688-0401  
Fax 604 688-2827  
Website [www.owenbird.com](http://www.owenbird.com)

Direct Line: 604 691-7557

Direct Fax: 604 632-4482

E-mail: [cweafer@owenbird.com](mailto:cweafer@owenbird.com)

Our File: 23841/0079

Carl J Pines, Associate Counsel\*  
R Keith Thompson, Associate Counsel\*  
Rose-Mary L Basham, QC, Associate Counsel\*

Hon Walter S Owen, QC, QC, LLD (1981)  
John I Bird, QC (2005)

\* Law Corporation  
\* Also of the Yukon Bar

April 25, 2013

**VIA ELECTRONIC MAIL**

British Columbia Utilities Commission  
Sixth Floor, 900 Howe Street  
Vancouver, BC  
V6Z 2N3

**Attention: Erica M. Hamilton, Commission Secretary**

Dear Sirs/Mesdames:

**Re: FortisBC Energy Inc. FortisBC Inc. Application for a Certificate of Public Convenience and Necessity for the Advanced Metering Infrastructure Project ~ Project No. 3698682**

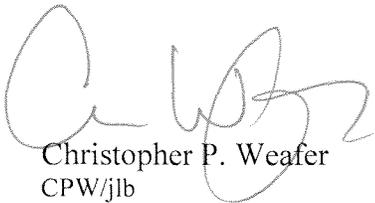
We are counsel to the Commercial Energy Consumers Association of British Columbia ("CEC"). Attached please find the CEC's Final Submission pertaining to the above-noted matter.

A copy of this letter and attached Final Submission has also been forwarded to FortisBC and registered interveners by e-mail.

If you have any questions regarding the foregoing, please do not hesitate to contact the undersigned.

Yours truly,

**OWEN BIRD LAW CORPORATION**



Christopher P. Weafer  
CPW/jlb  
cc: CEC  
cc: FortisBC Energy Inc.  
cc: Registered Intervenors

**COMMERCIAL ENERGY CONSUMERS  
ASSOCIATION OF BRITISH COLUMBIA**

**FINAL SUBMISSION**

**FortisBC Inc. Application for a Certificate of  
Public Convenience and Necessity for the  
Advanced Metering Infrastructure Project  
Project No. 3698682**

**April 24, 2013**

## Table of Contents

PART I - INTRODUCTION .....	4
A. Approvals Sought.....	4
B. Summary Position .....	4
PART II - OVERVIEW .....	5
A. Summary by the Numbers.....	6
PART III - BACKGROUND .....	7
PART IV - REGULATORY .....	7
A. Regulatory Context .....	7
B. Decision Making.....	9
C. Adequacy of Commission Process.....	9
D. Certificate of Public Convenience and Necessity .....	9
PART V - PROJECT NEED .....	12
PART VI - PROJECT BENEFITS.....	13
A. Quantified Benefits .....	13
B. Theft Reduction .....	14
C. Measurement Canada - Meter Exchanges.....	16
D. Remote Disconnect/Reconnect Capability.....	17
E. Remote Connect.....	17
PART VII - PROJECT UNDERSTATEMENTS AND POTENTIAL UPSIDES .....	18
A. Conservative Assumptions in Inputs.....	21
(1) Discount Rate Reduced to 6%.....	22
(2) Forecast Customer Growth Rate Reduced to 1.2% Starting in 2016 .....	22
(3) All Inflationary Escalations Increased to 3% .....	23
(4). CIP and IHD Benefits Included in the Analysis.....	23
F. 20 Year Term for Financial Analysis.....	24
G. NPV of Costs and Benefits .....	27
H. Cost of New Supply Underestimated .....	29
I. Aggregated Value of Potential Financial Benefits .....	31
PART VIII - NON QUANTIFIED BENEFITS .....	32
A. Fairness for Ratepayers.....	33
B. Improved Customer Service.....	33
C. Consolidated and Flexible Billing.....	33
D. Fewer Meter Reading Errors.....	34
E. Improved Customer Information.....	34
F. Home Area Networks and In Home Devices .....	34
G. Zigbee .....	35
H. Time of Use/ Critical Peak Pricing/Customer Pre-pay .....	36
I. Culture of Conservation .....	37
J. Commercial Perspective .....	37
PART IX - FUTURE BENEFITS .....	38
A. Demand Response.....	38
B. Electric Vehicles .....	39
C. Customer Pre-pay Tariff .....	40
PART X - PROJECT COSTS .....	40
PART XI - REVENUE REQUIREMENTS AND RATE IMPACTS.....	40
A. Discount Rate .....	40
B. General Inflation Rate.....	41

C.	Composite Depreciation Rate .....	42
D.	Composite CCA Rate; Combined Income Tax Rate and Carrying Costs .....	42
E.	Accounting Treatment of Existing Meters .....	42
PART XII - PROJECT CHALLENGES .....		43
A.	Health and Safety .....	43
B.	The Evidence for a Commission Set Standard .....	45
C.	Health Effects of Radiofrequency Signals and Smart Meters .....	47
D.	Precautionary Principle .....	48
E.	Canadian Regulations of Health for RF Emissions and Supporting Evidence .....	49
F.	Basics of Compliance with Safety Code 6 and Additional Safety Benefits .....	54
G.	Intervener Contentions with Respect to Safety Code 6 and AMI Meter Safety .....	56
H.	Evidence of Witnesses in Oral hearing Regarding Safety Code 6 and AMI Meter Safety .....	62
I.	Radio Frequency Exposure .....	79
J.	Onus of Evidence .....	79
K.	The Measure of RF Signal Exposure .....	80
L.	Other Factors Affecting the RF Signal Exposure .....	83
M.	Credibility of Witnesses .....	91
N.	Citizens for Safe Technology Witnesses .....	91
(1)	Dr David O Carpenter .....	92
(2)	Dr. Donald Maisch .....	99
(3)	Dr. Margaret Sears .....	102
(4)	Dr. Martin Blank .....	106
(5)	Dr. Jamieson .....	115
O.	Privacy .....	118
P.	Security .....	118
Q.	Fires .....	118
R.	High Bills and Meter Accuracy .....	119
S.	Remote Disconnect .....	120
T.	Public Opposition .....	120
PART XIII - OPT OUT PROVISIONS .....		121
PART XIV - ADEQUACY OF PUBLIC CONSULTATION AND REVIEW .....		129
PART XV - CONCLUSIONS AND RECOMMENDATIONS .....		129
A.	The Net Benefits of the AMI Project .....	130
B.	Future Benefits of the AMI Project .....	130
C.	Health Impacts of AMI Meters – Safety Code 6 .....	131
D.	Opt Out Provisions .....	132

COMMERCIAL ENERGY CONSUMERS ASSOCIATION OF BRITISH  
COLUMBIA

FINAL SUBMISSION

FortisBC Inc. Application for a Certificate of Public Convenience and  
Necessity for the Advanced Metering Infrastructure Project  
Project No. 3698682

---

**PART I - INTRODUCTION**

1. The Commercial Energy Consumers Association of British Columbia (“CEC”) represents the interests of commercial ratepayers in applications before the British Columbia Utilities Commission (the “Commission”).
2. The CEC promotes the development of efficient, cost-effective measures that meet the energy and capacity requirements of the province; that advance fair, stable energy rates; avoid undue discrimination between customer groups; and contribute to an environment of energy conservation and efficiency. The CEC supports measures that contribute positively to the BC economy and the environment as a whole.
3. The CEC has reviewed the 2012 FortisBC Automated Metering Infrastructure Application (“FortisBC Application”) and offers the following submissions and recommendations to the Commission for its consideration.
  - A. *Approvals Sought***
  4. FortisBC seeks approval of its application for a Certificate of Public Convenience and Necessity for the Automated Metering and Infrastructure (AMI) Project and a revised depreciation rate of 5% for the proposed meters to be installed as part of the AMI project<sup>1</sup>.
  - B. *Summary Position***
  5. The CEC supports the FortisBC Application for a Certificate of Public Convenience and Necessity and submits approval of the FortisBC Application is in the public interest on

---

<sup>1</sup> FortisBC Final Submissions, Page 1

key tests including cost effectiveness, reliability, rate impact and socio-economic considerations<sup>2</sup>. The CEC recommends minor changes for consideration by the Commission. The CEC submits that the FortisBC Application understates the benefits and overstates the risk of the AMI implementation to a significant degree. The CEC considers the potential upside of the project to be an order of magnitude larger than identified, and the assessment of key potential risks from the challenges identified to be two orders of magnitude lower than that identified by FortisBC.

6. The CEC submits that FortisBC has provided more than sufficient analysis of all the issues to warrant a high level of public confidence in the project from a financial as well as socio-economic standpoint. The Commission should find approval of the FortisBC Application to be in the public interest and find that there is no public health concern to be attributed to the AMI meters or associated radiofrequency signal emissions which is in agreement with the Public Health Officers of British Columbia and Health Canada.
7. The CEC also supports the FortisBC Application for a revised depreciation rate of 5% for the proposed meters.

## **PART II - OVERVIEW**

8. The CEC Argument in respect to the FortisBC Application is very simple. At the highest level, it is summed up in two key concepts, which the CEC submits are the essence of the evidence before the Commission.
  - a) The FortisBC business case, summarized in the costs and benefits of the project and providing a net benefit for the project of \$17.6 million, is exceptionally conservative and does not incorporate all of the potential benefit by at least a multiple greater than the proposed benefits.
  - b) The FortisBC challenges to the project as advanced by certain intervener witnesses, and particularly as it relates to health concerns, are almost all universally overstated and the expected average exposures to RF emissions from

---

<sup>2</sup> FortisBC Final Submissions, Page 38

AMI meters for the public are likely to be 1/1000000<sup>th</sup> of the Safety Code 6 Canadian standard.

9. The CEC submits that when the Commission reviews the evidence and weighs it, the case for approval of the FortisBC Application will become a clear case.
10. The CEC argument that follows will make this case in detail. The CEC to support the Commission's approval of the FortisBC Application.

**A. *Summary by the Numbers***

11. The CEC submits that the Commission should focus on six key numbers that help to summarize the essence of the evidence supporting approval of the FortisBC Application.
  - a) 1 – The number of times greater, the net benefits of the project may be than FortisBC estimates due to the enduring benefits of the technological change will be implemented with the FortisBC project;
  - b) 6 – Safety Code 6 is the threshold standard for protecting public health in Canada and the Commission has no jurisdiction to vary them and the FortisBC Application complies with them;
  - c) 1/1000000<sup>th</sup> – The proportion of exposure related to the Safety Code 6 standard that most people will experience RF from the AMI Project if implemented as requested under the FortisBC Application. This figure supports the health authority opinions that the meters are not a public health concern.
  - d) 25000+ – The number of relevant RF biological effects studies which would be necessary to assess in determining appropriate standards, and which would make it impossible for the Commission to duplicate the role of Health Canada. This is the key reason the Commission should decline to adjudicate specific health issues;
  - e) 5% - The probable number of customers who may have concerns and need extended customer service attention to accommodate them into a transition to the new technology through the use of Opt Out provisions; and

- f) \$24 – The bi-monthly opportunity cost of the lost benefit per Opt Out premises, to be avoided and incorporated into the costing of the Opt Out provisions to protect the public interest and other customers from loss of benefits.
12. The CEC will review the evidence in support of its summary view of the FortisBC Application. The CEC will discuss many aspects of the evidence in detail and will develop support in the evidence for its summary view of the FortisBC case but the Commission needs to focus on and weigh the evidence represented in these key numbers to best assess the public interest in this case.
13. The CEC acknowledges that there are other important numbers and will comment on other important numbers in this proceeding but it has highlighted these six key numbers and submits that they are essential to understanding in simple straightforward terms the essence of the FortisBC Application and the vast body of evidence on the record.

### **PART III - BACKGROUND**

14. The CEC has reviewed the FortisBC summary of the background to their FortisBC Application and accepts this as a reasonable description of background material to the key elements of the hearing and evidentiary record discussed later in this CEC submission.

### **PART IV - REGULATORY**

#### **A. *Regulatory Context***

15. The CEC submits that in the case of the FortisBC Application, the Commission will have a particularly high profile in its decision-making relative to the size of the project. The FortisBC Application is part of a global trend of smart meter and smart grid implementation. Over 250 million smart meters will be installed worldwide by 2015.<sup>3</sup> There has been considerable controversy over several aspects of the technology, with particular emphasis on the radiofrequency signal which is employed in many instances, including this case. Further, because BC Hydro is installing approximately 1.8 million

---

<sup>3</sup> Exhibit B-1 Application, Appendix C-4, Page 6

smart meters<sup>4</sup> throughout BC without Commission oversight the FortisBC Application has attracted attention that might otherwise have been addressed to the larger BC Hydro installation.

16. The CEC submits that as high-profile, quasi-judicial bodies, utility regulators such as the Commission contribute significantly to the quality of debate on public issues, influence the direction of public opinion and scope of concern and can affect public confidence in society's institutions. Given the nature of the issue and the current information systems available, the Commission's influence can be expected to extend beyond BC borders and into the national and or international arenas. The CEC notes that in this proceeding many references have been made to the opinions of utility regulators, governmental organizations, non-governmental organizations and other high profile entities throughout the world<sup>5</sup> which have been held up as examples of leadership for the Commission. There has also been considerable news coverage of the issues.
17. The CEC submits that given its influential position, the Commission has an obligation to ensure that its decisions in high profile proceedings such as this are well-founded, provide clear direction and serve to inform the public and any other processes or policy that may rely upon it. The Commission must bear in mind the size of the FortisBC Application before it relative to the issues being raised.
18. The CEC submits that the Commission's overriding duty is to protect the public interest and the Commission should ensure that the public interest is well communicated. In particular, the CEC submits the Commission has an obligation to protect against the possibility of perpetuating any position or information that is without merit.

---

<sup>4</sup> Exhibit B-1, Application, Page 126

**B. Decision Making**

19. The CEC submits that several of the challenges raised in this proceeding, particularly those issues related to possible health effects of radiofrequency signals are not only broad and ill-defined, but are also scientific and complex and should be adjudicated by the best and most capable bodies available. In this proceeding, the Commission should provide direction by determining the appropriate jurisdictions and expertise required for how each challenge should be addressed considering both the information available and its context within the public domain.
  
20. The CEC submits that it is important that the Commission not only examine the information before it, but place this in context by assessing the scope of the issues raised, evaluating the completeness, or lack thereof, of the evidence available and identifying the expertise necessary to evaluate it. The Commission, as a first step, should consider and determine what expertise, time and resources are necessary to establish decision-making criteria, and then determine who and/or which organization is in the best position to make the relevant decisions or set policy in relation to the issues.

**C. Adequacy of Commission Process**

21. The CEC submits that the Commission has adequately canvassed the issues and that there is sufficient information on the record for the Commission to make an appropriate determination on the FortisBC Application. The process has included several public consultation days, two rounds of written information requests and ten days of oral hearing.

**D. Certificate of Public Convenience and Necessity**

22. FortisBC seeks approval for a Certificate of Public Convenience and Necessity (CPCN) under sections 45 and 46 of the Utilities Commission Act (UCA)<sup>6</sup>. Section 45(8) requires that the Commission be satisfied that the FortisBC Application is ‘necessary for the public convenience and properly conserves the public interest’. The test for approval has

---

<sup>6</sup> FortisBC Final Submissions, Page 37

been described as being whether the project is in the ‘public convenience and necessity’<sup>7</sup>. The Commission has been found to have broad discretion to consider a variety of factors and evidence and weigh a ‘broad range of interests’.<sup>8</sup> With respect to the FortisBC Application, FortisBC states that the ‘the pertinent public interest concerns that the Commission should consider with respect to the FortisBC Application include:

- a) cost effectiveness;
- b) reliability of service;
- c) rate impact; and
- d) socio-economic considerations (including public health, security, and environmental impact).<sup>9</sup>

23. FortisBC also states that pursuant to Section 46(3.1) of the UCA, the Commission must consider ‘inter alia, applicable British Columbia energy objectives as set out in section 2 of the Clean Energy Act (CEA) of which it finds three sections most applicable. These are ‘to take demand-side measures and to conserve energy’, ‘to use and foster the development in British Columbia of innovative technologies that support energy conservation and efficiency and the use of clean or renewable resources’; and ‘to reduce BC greenhouse gas emissions’.<sup>10</sup>
24. In declining the FortisBC 2007 AMI Application, the Commission considered it prudent for FortisBC to consider the regulations applying to Smart Meters under subsection 17(2) of the CEA.<sup>11</sup> Further, the Commission requested that FortisBC hold discussions with BC Hydro to review opportunities and the benefits of collaboration on advanced metering and consult with the municipal electric utilities within FortisBC’s service area<sup>12</sup>.
25. The CEC agrees with FortisBC that the above are the appropriate criteria by which to assess the public interest. In determining the public interest the Commission may also consider whether the project has been sufficiently analyzed and documented to justify a

---

<sup>7</sup> FortisBC Final Submissions, Page 38

<sup>8</sup> FortisBC Final Submissions, Page 38

<sup>9</sup> FortisBC Final Submissions, Page 38

<sup>10</sup> FortisBC Final Submissions, Page 39

<sup>11</sup> FortisBC Final Submissions, Page 15

<sup>12</sup> FortisBC Final Submissions, Page 14

high level of public confidence in an informed public. In particular the CEC will make the case that the range of potential benefits is understated and the potential radio frequency exposure effects are overstated.

26. The CEC submits that FortisBC has adequately met all of the above criteria and recommends that the Commission approve the FortisBC Application.
27. The CEC submits that the FortisBC Application is cost effective. The project has a minimum Net Present Value of \$17.629 million and believes the project to be conservatively estimated. The FortisBC Application could be reasonably considered to have a probable Net Present Value of \$80 million and a maximum Net Present Value of up to \$350 million which is discussed in Section 5, Project Benefits, of these submissions.
28. The CEC submits that the project contributes to reliable service and notes in particular the improvements in outage identification and management.<sup>13</sup>
29. The CEC submits that the FortisBC Application will have a positive rate impact. The CEC notes the expected impacts include a cumulative rate impact of (1.02) % and a levelized rate impact of (0.05) %.<sup>14</sup>
30. The CEC submits that the project is in line with government energy objectives and submits that while the specific requirement to install Smart Meters throughout the province relates specifically to BC Hydro,<sup>15</sup> it is a clear indicator of government intent. In addition to the specific goals outlined in government legislation<sup>16</sup> such as the Clean Energy Act<sup>17</sup> and the Smart Meter and Smart Grid regulation<sup>18</sup> another objective of the government is to instill a culture of conservation, to which the FortisBC Application can reasonably be expected to contribute. Customer conservation activities will be made easier by the smart home technologies afforded by the AMI program<sup>19</sup>, and conservation

---

<sup>13</sup> Exhibit B-1, Application, Page 2

<sup>14</sup> B-1-1 Application Errata AMI Excel NPV Analysis Net AMI

<sup>15</sup> Exhibit B-6, BCUC 1.9.2

<sup>16</sup> Exhibit B-1, Application, Pages 21-24

<sup>17</sup> Exhibit B-1, Application, Pages 22-23

<sup>18</sup> Exhibit B-1, Application, Page 10

<sup>19</sup> Exhibit B-15, CEC 2.8.3.1

practices are likely to increase with familiarity of the rate programs and technology<sup>20</sup>. The FortisBC Application will reduce wasteful energy theft and enable demand-side measures (such as IHDs)<sup>21</sup>. The simple provision of customer consumption information is expected to have an immediate impact on customer decisions regarding the timing and amount of energy consumption.<sup>22</sup>

31. The CEC submits that that the FortisBC Application meets all the socio economic considerations including public health, security and privacy all of which have been fully aired throughout the proceeding. The test of public health as related to the radiofrequency exposure has not only been adequately met, but that FortisBC has significantly overstated the possible exposure. The possible exposure of radiofrequency to be 1/1,000,000<sup>th</sup> of the relevant Canadian standard which is discussed in Section 11 of these submissions.
32. The CEC submits that that an informed public can have a high level of confidence in the project. The FortisBC Application has been thoroughly analyzed and well-documented and all issues have been appropriately aired and addressed.

#### **PART V - PROJECT NEED**

33. The CEC has reviewed the section of the FortisBC Application dealing with the project need and accepts this submission as valid and appropriate. The CEC would like to add a few additional points to complement the case made for the need for the project. The project is being proposed in the context of BC Hydro having nearly fully implemented its Smart Meter installations and BC Hydro is now operating under an undeclared Opt Out while it is focusing on customer service to transition more of the customers who have been skeptical. The BC Hydro project will have the effect of driving grow operations to the interior if the electric system has an inferior ability to detect them and prevent the revenue loss. There is a need for the FortisBC electric system to be engaged with the new technology capabilities to avoid detriment to its customers. The FortisBC business case is understated and conservative. Delay in realizing an opportunity of this nature with the high upside potential benefits for customers, many not quantified or included, is very

---

<sup>20</sup> Exhibit B-11, CEC 1.89.1.1

<sup>21</sup> FortisBC Final Submissions, Page 39

<sup>22</sup> FortisBC Final Submissions, Page 39

costly for customers. The CEC estimates the range of cost of delaying the project by 1 year as approximately \$1 million/year for the low end FortisBC probable case. The CEC estimates that a delay of 1 year for the potential higher benefits if they were all quantified could range up to \$25 million/year. The CEC expects the delay cost to be in between these estimates and that is significant. Lost opportunity of this size and nature present a strong case of need for the project and the CEC encourages the Commission to acknowledge this and approve the project for implementation as soon as reasonably practical.

## **PART VI - PROJECT BENEFITS**

34. The CEC submits that the FortisBC Application is a necessary component of the transition to the Smart Grid and will result in substantial financial and non-financial benefits as a direct result of this transition. In addition to the financial and non-financial benefits that are associated with more typical projects, the FortisBC Application will achieve three key changes in the functionality of the electric grid which result in advantages that last long into the future. These encompass:
- a) the transition from analogue and digital meters to smart meter platform;
  - b) energy balancing and loss management from increased granularity and synchronicity of customer consumption information; and multiple attribute sensing capabilities;
  - c) two way communication between the customer and the utility<sup>23</sup>.
35. This functionality creates a substantive difference in the capability, usefulness and technological life of the electric system and should be considered by the Commission in its evaluation of the AMI package of benefits.
- A. Quantified Benefits**
36. The CEC has reviewed the costs and benefits of the FortisBC Application and submits that there is substantial financial benefit. FortisBC anticipates that the FortisBC Application will produce a minimum net present value of \$17.629 million over the

---

<sup>23</sup> Exhibit B-15, CEC 2.1.1.1; CEC 2.2.1; and CEC 2.3.1

economic life of the project<sup>24</sup> which will mitigate rate increases<sup>25</sup> that might otherwise have been required. This is a significant and worthwhile benefit to pursue, but also finds it to be a conservative estimate as discussed below. The CEC notes that FortisBC has utilized conservative assumptions, particularly in its analysis of theft benefits<sup>26</sup>, which accounts for \$38.386 million or 55% of the total benefits<sup>27</sup>. The CEC recommends that the Commission consider \$17,629,000 Net Present Value<sup>28</sup> as a lower bound for the potential financial impact of the FortisBC Application.

37. The FortisBC Application can be expected to benefit all customer classes<sup>29</sup> directly through reduced rates and improved service<sup>30</sup> and indirectly by reducing the cost of servicing residential customers. Quantified financial benefits of the FortisBC Application are expected to total \$69,556,000<sup>31</sup> and are derived primarily from an anticipated reduction in energy theft (55%), manual meter reading savings (34%), savings from employing remote disconnect and reconnect (8%), savings in meter exchanges (2%) and savings from establishing a contact centre (1%)<sup>32</sup>. The CEC submits that these, on the whole, are reasonably quantified in the analysis provided, but submits that upside potential of the financial benefits could be an order of magnitude larger if examined from a more strategic perspective which is discussed in Section 5, Project Understatements, of these submissions. The CEC offers the following analysis of the financial benefits.

### **B. Theft Reduction**

38. Theft reduction/deterrence is a key benefit of the FortisBC Application and is expected to contribute over \$38 million NPV in financial benefits<sup>33</sup>. The FortisBC calculation of theft benefits includes two components. These are reduced power purchase expenses from deterrence

---

<sup>24</sup> Exhibit B-1-1 Application Errata, Page 69, Table 5.0

<sup>25</sup> Exhibit B-1, Application, Page 30

<sup>26</sup> Exhibit B-6, BCUC 1.83.1; 1.85.3.1; 1.87.1.4; 1.87.2

<sup>27</sup> Exhibit B-1-1, Application Errata, page 69, Table 5.0

<sup>28</sup> Exhibit B-1-1, Application Errata, page 69, Table 5.0

<sup>29</sup> Exhibit B-6, BCUC 118.1

<sup>30</sup> Exhibit B-11, ICG 1.1.1

<sup>31</sup> Exhibit B-1-1, Application Errata, Page 69, Table 5.0

<sup>32</sup> Exhibit B-1-1, Application Errata, Page 69, Table 5.0

<sup>33</sup> Exhibit B-1-1, Application Errata, Page 69, Table 5.0

of grow operations and an increase in billable load from grow operators paying for, rather than stealing electricity<sup>34</sup>.

39. The CEC has reviewed FortisBC's analysis of expected savings from theft reduction and finds it to be thoroughly analyzed and agrees with FortisBC that it is a conservative and reasonable<sup>35</sup> estimate. The CEC recognizes that there is considerable uncertainty in predicting long term customer behavior related to marijuana production in an environment of political debate and evolving legislative decisions.<sup>36</sup>The CEC submits that assessing the quantifying existing theft, predicting its potential to decline or increase depending upon circumstances and assessing the opportunity for deterrence are by nature very difficult. A conservative approach is appropriate in this circumstance.
40. FortisBC has provided four possible scenarios<sup>37</sup> and elected to use its 'Probable' scenario in its analysis of theft reduction under the FortisBC Application. The CEC submits that this retains a conservative approach because of the conservative assumptions used. These include the number of lights employed by grow ops,<sup>38</sup> theft rate,<sup>39</sup> detection rate,<sup>40</sup> inflation rate<sup>41</sup> among others. The CEC notes that the tamper detection feature included in the AMI meters is expected to detect all types of meter tampering, which is estimated to account for approximately 5% of electricity theft<sup>42</sup> and is expected to occur immediately upon implementation<sup>43</sup>. The CEC considers the savings predicted from tamper detection to be highly certain.
41. The CEC submits that FortisBC's conservative approach and extensive analysis is more than sufficient to provide the Commission with confidence in this assessment of risk and benefit. FortisBC provided an analysis of the four different scenarios<sup>44</sup> with multiple

---

<sup>34</sup> FortisBC Final Submissions, Page 44

<sup>35</sup> Exhibit B-6, BCUC 1.87.2

<sup>36</sup> Exhibit B-1, Application, Page 83

<sup>37</sup> Exhibit B-1, Application, Page 87

<sup>38</sup> Exhibit B-1 Application, Page 82

<sup>39</sup> Exhibit B-6, BCUC 1.85.3.1

<sup>40</sup> Exhibit B-6, BCUC 1.87.1.4

<sup>41</sup> Exhibit B-6, BCUC 1.58.2

<sup>42</sup> Exhibit B-6, BCUC 1.88.1

<sup>43</sup> Exhibit B-1, Application, Page 87

<sup>44</sup> Exhibit B-1, Application, Page 87

sensitivities in response to interrogatories<sup>45</sup>. The primary scenarios modeled by FortisBC include Low (\$29 million NPV), Probable (\$38 million NPV), Potential (\$52 million NPV) and High (\$93 million NPV).<sup>46</sup> In contrast, the High scenario constitutes a very high increase of \$55 million NPV or 145%.<sup>47</sup>

42. FortisBC conducted a what if scenario analysis in response to a Commission information request that did not include an increase in the net billable load of grow operations paying for electricity. This scenario resulted in a net present value of \$10,900,000 over 20 years.<sup>48</sup> The CEC agrees with FortisBC that including the increase in net billable load of grow operations paying for electricity is a reasonable assumption and submits that a positive net present value of \$10 million remains a valuable contribution.
43. The CEC submits that the Commission should consider the possible upside as well as possible risk in evaluating the expected benefits from theft reduction and deterrence and submits that the risk is low relative to the potential upside. The CEC notes that the possible Low scenario constitutes only a moderate reduction of approximately \$9 million NPV<sup>49</sup> or 24% and that the project retains a positive NPV. While several of the scenarios modeled in response to interrogatories have resulted in reduced benefits<sup>50</sup>, FortisBC has provided detailed explanations as to the likelihood of their occurrence and the CEC accepts these explanations as reasonable.

### **C. Measurement Canada - Meter Exchanges**

44. The evidence shows that FortisBC will soon be required to replace its existing meters due to anticipated changes in Measurement Canada regulations that will result in increasing failure rates and rising costs<sup>51</sup>. FortisBC anticipates replacing a total of 88,000 meters including 80,000 electromechanical and 8,000 digital meters over a 21 year period<sup>52</sup> on this basis. These replacements will be required either under the AMI project or another project. By replacing the meters in the AMI project FortisBC expects to save

---

<sup>45</sup> Exhibit B-6, BCUC 1.87.2

<sup>46</sup> FortisBC Final Submission, Page 50

<sup>47</sup> Exhibit B-1, Application, Page 87

<sup>48</sup> FortisBC Final Submission, Page 44

<sup>49</sup> FortisBC Final Submission, Page 50

<sup>50</sup> Exhibit B-6, BCUC 1.85.2

<sup>51</sup> Exhibit B-1, Application pages 92-93

<sup>52</sup> FortisBC Final Submission page 70

\$9.8 million in avoided capital costs<sup>53</sup> which results in an avoided revenue requirement.<sup>54</sup> The AMI project is expected to deliver \$0.8 million NPV in saved costs from revised sampling and testing.<sup>55</sup> The CEC submits that it is appropriate for FortisBC to adopt the most reliable and advanced technology when required to upgrade its meters, and that the avoided capital costs and operating savings are a clear benefit to customers.

**D. Remote Disconnect/Reconnect Capability**

45. FortisBC has reported remote disconnect/reconnect savings of \$13.267 million<sup>56</sup> to be derived from a significantly reduced need for site visits<sup>57</sup> which are expected to decline to less than 300 annually.<sup>58</sup> Savings related to reconnections and disconnections are identified as being roughly equal because remote reconnections and disconnections are approximately equal, and the reported savings reflect the fully avoided costs. Site visits required for disconnections will be conducted by CSPs with spare capacity under a different budget, which is already included in the company's 2012 and 2013 revenue requirement.<sup>59</sup>

46. The CEC submits that it would be acceptable for FortisBC to separately account for the site visits related to disconnection and the 'capacity savings' of CSP staff in other budgets, rather than to report a \$0 cost of site visits for disconnection. While the CEC does not dispute the final figure calculated by FortisBC, the cost of site visits for disconnection is significant, and believes that they should be reflected in the costs and benefits of the FortisBC Application.

**E. Remote Connect**

47. FortisBC notes that once the FortisBC Application is implemented the marginal cost of a remote reconnection is expected to be less than \$10<sup>60</sup>. However, FortisBC is intending to continue to charge the existing (standard) connection fee of \$100 until the next COSA 'in

---

<sup>53</sup> Exhibit B-1, Application page 93

<sup>54</sup> Exhibit B-11, BCSEA 1.30.1

<sup>55</sup> Exhibit B-1, Application page 94

<sup>56</sup> Exhibit B-14, BCUC 1.14.2

<sup>57</sup> Exhibit B-1, Application, Page 90

<sup>58</sup> Exhibit B-6, BCUC 1.91.2

<sup>59</sup> Exhibit B-14, BCUC 1.14.1

<sup>60</sup> Exhibit B-6, 1.92.2.1

order to better understand all costs associated with the new processes.’<sup>61</sup> Further, FortisBC states that the reconnection charge ‘deters disconnections, the costs of which are borne by all the ratepayers. Although disconnection costs would go down with the FortisBC Application, there are still related costs such as site visits for 50% of vacant sites and 100% of non-pay sites and the contact centre processes related to non-pay disconnects.’<sup>62</sup>

48. The CEC does not accept FortisBC’s rationale for continuing to charge \$100 for reconnection, particularly given that FortisBC has stated that site the visits referenced will be assumed by ‘spare capacity’ staff under a different budget<sup>63</sup> and has not provided information as to what the \$10.00 cost would cover. FortisBC would not be expecting to conduct a COSA until at least 2017<sup>64</sup> which is several years after the proposed implementation of the FortisBC Application. FortisBC submitted COSAs in 1993, 1997 and 2009<sup>65</sup>. Maintaining the \$100 reconnection charge is not consistent with cost causation principles, does not distinguish between (possible) opt out customers and compliant customers, and that customers who do not opt out are entitled to enjoy the benefits of the FortisBC Application as they are realized. The cost reduction of approximately \$90.00 is a substantial difference and should be passed on to the consumer as soon as the remote reconnection capability is implemented. A fee of \$10 is not insignificant, and that the interruption of electrical service is a major deterrent to non-payment in and of itself. The CEC recommends that FortisBC be directed to reduce the reconnection fee to \$10 or apply for and justify an alternative amount more in keeping with the actual costs.

## **PART VII - PROJECT UNDERSTATEMENTS AND POTENTIAL UPSIDES**

49. The CEC has reviewed the FortisBC Application and finds it to be financially understated in several areas. The Net Present value of the project could be estimated in the range of \$200 million to \$350 million, which is more than an order of magnitude higher than that estimated by FortisBC. FortisBC has used a set of assumptions which results in very

---

<sup>61</sup> Exhibit B-6, BCUC 1.92.2.1

<sup>62</sup> Exhibit B-6, BCUC 1.92.2.1.

<sup>63</sup> Exhibit B-14, BCUC 1.14.1

<sup>64</sup> Exhibit B-11, CEC 1.84.4.2

<sup>65</sup> Exhibit B-11, CEC 1.84.4.3

conservative estimates, has curtailed the long term financial benefits that will be derived to a 20 year planning horizon, and has understated the cost of new supply and the value of possible savings from avoided energy purchases. Together these assumptions create a view of the project that is skewed toward a low net present value estimate. There is a likely tenfold increase in the possible net financial benefits that may be attributed to the project from these considerations alone. Additionally, FortisBC has not accounted for the financial effects of some elements of the project and anticipated future benefits have also not been quantified or included in the analysis.

50. The CEC submits that the following summary of a probable present value for the FortisBC AMI project is relevant and still remains as quite a conservative summary. It is very important for the Commission to acknowledge that the AMI Project is not a marginally beneficial project but is a very substantially beneficial project.

CEC Estimate of the Probable Benefit of the AMI Project		
Benefit Contribution	Net Present Values \$ in millions	Range to the Maximum Value \$ in millions
Base Case FortisBC Assumptions plus Kelowna	\$20	
Technological Change Enduring Benefits	\$20	\$60
Overly Conservative Assumptions Adjustment ¼ As Probable	\$20	\$80
Future Benefits & Quantifiable Unquantified Benefits	\$20	\$80
Expected Probable Benefit Estimate	\$80	

51. The CEC submits that the technological change increment is a virtual certainty as a probable benefit addition because it is a terminal value of making the change. Taking ¼ of the documented conservatism understatement in the FortisBC application provides a reasonably high probability of being realized. The evidence on the record documents

potential benefits not included in the FortisBC summary including at least one future function benefit so the likelihood of achieving at least the base increment is very high because the list of potential future benefits and unquantified benefits is quite large. This cumulative presentation above of the following detailed discussion is important information developed in the evidence on the record in this proceeding and supporting a strong assessment from the Commission that this AMI Project proposal is in the public interest.

52. FortisBC has employed conservative assumptions throughout its analysis such as by incorporating the following conservatism in its argument; (1) use of a 20 year study period<sup>66</sup> (2) use of conservative energy theft assumptions<sup>67</sup> (3) use of a 75% deterrence factor for status quo theft<sup>68</sup> (4) use of lower energy cost values with no recognition of long run marginal costs for revenue loss calculation<sup>69</sup> (5) conservative theft detection assumptions of 25%<sup>70</sup> (6) contact centre call volume reduction<sup>71</sup> (6) conservative project cost assumptions<sup>72</sup> (7) a safety factor has been applied to health safety<sup>73</sup>
53. FortisBC has provided an appropriate analysis is to identify the lower bounds of the project, but has not adequately examined the magnitude of the potential upside. While it may not be necessary or appropriate to devote the time and resources necessary to detail, quantify and predict the total project upside, a general assessment of the scale of potential benefits is a valid means of critiquing the proposal.
54. The probable AMI scenario as presented by FortisBC can reasonably be considered as a lower bound which may be set at \$17.63 million NPV. As noted, FortisBC has consistently utilized conservative assumptions in all its inputs, used a conservative planning horizon and has used a conservative cost of energy.

---

<sup>66</sup> FortisBC Final Submissions page 42

<sup>67</sup> FortisBC Final Submissions page 48

<sup>68</sup> FortisBC Final Submissions page 51

<sup>69</sup> FortisBC Final Submissions page 51

<sup>70</sup> FortisBC Final Submissions page 52

<sup>71</sup> FortisBC Final Submissions page 74

<sup>72</sup> FortisBC Final Submission page 96

<sup>73</sup> FortisBC Final Submission page 135- 136

55. The following analysis assesses the upper bounds of the project.

**A. *Conservative Assumptions in Inputs***

56. FortisBC has adopted conservative assumptions for several factors in its analysis such as inflationary models, population forecasts, theft and grow op, among others. FortisBC provided Low, Probable, Potential and High sensitivities for the theft portion of its benefit analysis, and utilized conservative assumptions throughout. It is unlikely that all the conservative assumptions adopted by FortisBC will individually come to bear and suggests that a reasonable expectation would be that there will be a mix of results. In aggregating all the conservative assumptions, the FortisBC Application is in fact a very conservative analysis of the proposed project. Using consistently “conservative” assumptions can aggregate into overly cautious results that can ultimately serve to jeopardize valuable projects by limiting the capture of their potential benefits. The CEC recommends that in evaluating the FortisBC Application, the Commission consider both the very conservative model as developed by FortisBC and a less conservative, but still rationale model by which to compare it as a maximum. In response to a CEC information request, FortisBC recalculated the maximum NPV based on a set of revised assumptions, In this scenario, FortisBC calculated a \$103.779 million NPV<sup>74</sup> and agreed that the revised assumptions were not unreasonable.

57. Revised assumptions as calculated by FortisBC included:

- a) 5% annual growth of marijuana production sites;
- b) declining deterrence rate from 75% (2012) to 60% (2019) for status quo theft;
- c) grow operations diverting electricity are 50% larger than grow operations not diverting electricity;
- d) discount rate is 6%;
- e) forecast customer growth rate at 1.2% starting in 2016;
- f) all inflationary escalations at 3%
- g) CIP and IHD benefits included in the analysis.

---

<sup>74</sup> Exhibit B-15, CEC 2.12.1.2

58. The CEC submits that though the above assumptions may not necessarily all occur together, they are all reasonably likely to occur on their own<sup>75</sup>. Thus they are not unreasonable and a potential fivefold increase in the NPV of the project is an important consideration and should be included as a possible upside in the Commission's determinations. Of the total increase in (gross) benefits \$72.203<sup>76</sup> or 76% is due to an increase in benefits from Theft Reduction, and a further \$12.59 million or 13% is due to the inclusion of the Customer Information Portal and In Home Devices. The CEC submits that the Net Present Value might be increased by a further \$1.7 million if the forecast customer growth rate was to remain at 1.8% instead of being reduced to 1.2%.<sup>77</sup> Thus, a total maximum recalculated Net Present Value with less conservative assumptions would be \$105.479 million.

**(1) Discount Rate Reduced to 6%**

59. A discount rate of 6% is not an unlikely possibility for the future. The discount rate for FortisBC is currently 6.7% for 2012 and 6.6% for 2013<sup>78</sup> (nominal rates).<sup>79</sup>

**(2) Forecast Customer Growth Rate Reduced to 1.2% Starting in 2016**

60. FortisBC considers 1.8% population growth rate as a reasonable prediction. The CEC notes that a 1.2% growth rate could be a conservative estimation and submits the NPV of the project could be increased by a further \$1.7 million from the estimate calculated by FortisBC. FortisBC's proposed growth rate is 1.8%<sup>80</sup>. FortisBC is forecasting population growth of 1.8% using Population Extraction for Organizational Planning with Less Error (PEOPLE35) which FortisBC considers as reasonable<sup>81</sup> and the CEC accepts that.

---

<sup>75</sup> Exhibit B-15, CEC 2.12.1

<sup>76</sup> Exhibit B-15, CEC 2.12.1.2 and Exhibit B-1-1 Application Errata Updated, Page 69

<sup>77</sup> Exhibit B-11, CEC 1.61.1

<sup>78</sup> FortisBC Final Submission, Page 100

<sup>79</sup> Exhibit B-6, BCUC 1.52.1

<sup>80</sup> Exhibit B-11 CEC 1.61.1 (\$17.6 million - \$15.9 million)

<sup>81</sup> Exhibit B-15, CEC 2.22.2

**(3) All Inflationary Escalations Increased to 3%**

61. FortisBC considers 1.8% to be the likely and the most conservative estimate for all inflationary escalations<sup>82</sup>. The 1.8% figure was based on the Conference Board of Canada Provincial Forecast for the period of 2012-2016<sup>83</sup> and held steady. The 1.8% figure was based on an expected average over a four year period while the project is calculated for 20 years and that almost all of the benefits are enduring and can be expected to extend beyond that<sup>84</sup>. The CEC considers that 3% could be a reasonable estimate of inflation into the future particularly if central bank expansion of money supply continues to be required to support western economies. The CEC agrees with FortisBC that it is unlikely that only New Operating Costs would rise with inflation<sup>85</sup> and thus considers that an overall increase of 3% for all inflationary escalations is reasonably considered as a likely scenario. This results in an increase of the NPV of the project to \$26.688 million<sup>86</sup>.

**(4). CIP and IHD Benefits Included in the Analysis**

62. The CEC submits that it is appropriate to include the savings derived from the CIP and the In Home Devices as part of the project analysis. The CIP has an estimated NPV of \$3.8 million<sup>87</sup>. The CEC notes that the \$0.25 million<sup>88</sup> cost of capital for the customer information portal is included in the overall project cost.<sup>89</sup>

63. The benefits from conservation rate structures with IHDs have an estimated NPV of \$9.8 million<sup>90</sup>

64. The following depicts the NPV effects of combining conservative assumptions including accounting for variation in theft scenarios<sup>91</sup>. As illustrated, the maximum derived from combining assumptions, all of which could reasonably be expected to occur results in a

---

<sup>82</sup> Exhibit B-11, CEC 1.67.2

<sup>83</sup> Exhibit B-6, BCUC 1.67.2

<sup>84</sup> Exhibit B-15, CEC 2.1.1, CEC 2.2.2, CEC 2.3.1

<sup>85</sup> Exhibit B-6, BCUC 1.96.2

<sup>86</sup> Exhibit B-6, BCUC 1.58.2

<sup>87</sup> Exhibit B-15, CEC 2.1.1 Table CEC IR2 Q1.1(sic)- Non Quantified Benefits

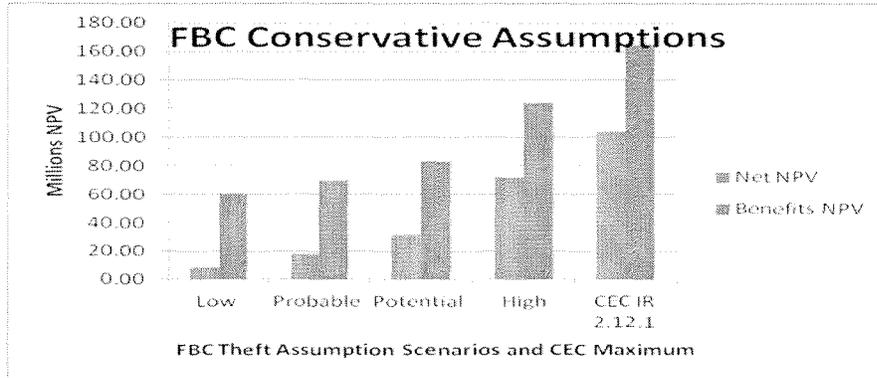
<sup>88</sup> Exhibit B-6, BCUC 1.8.1.3

<sup>89</sup> Exhibit B-6, BCUC 1.12.3

<sup>90</sup> Exhibit B-11 CEC 1.61.1

<sup>91</sup> Information derived from Exhibit B-1, Page 87, Exhibit B-1-1, Application Errata NPV Analysis, and Exhibit B-15, CEC 2.12.1

NPV of over \$103 million<sup>92</sup> which is a fivefold increase over the Probable scenario presented by FortisBC, and an approximately 50% increase even over FortisBC’s High theft scenario.



65. The CEC further notes that improved system planning and improved power quality monitoring the AMI may have financial benefits which have also not been recorded in the financial analysis<sup>93</sup> and could raise the benefits further.

66. The CEC recommends that the Commission adopt approximately \$100 million as a possible maximum NPV for the FortisBC Application based on a 20 year planning horizon.

**F. 20 Year Term for Financial Analysis**

67. The CEC submits that FortisBC has also unnecessarily curtailed the attribution of many of the financial benefits from the FortisBC Application by assuming a 20 year economic life of the project<sup>94</sup> and matching the financial benefit stream to the service life of the smart meters<sup>95</sup>. FortisBC has assumed a 20 year horizon for which the AMI benefits may be accrued. The CEC acknowledges that the service life of the smart meters is reasonably estimated as approximately 20 years<sup>96</sup> and submits that, in typical projects, this is an appropriate means of measuring the benefits.

<sup>92</sup> Exhibit B-15, CEC 2.12.1.2

<sup>93</sup> Exhibit B-15, CEC 2.2.1 Table CEC IR2 Q1.1 (sic) Non Quantified Benefits

<sup>94</sup> Exhibit B-1-1 Application Errata Updated, Page 69

<sup>95</sup> Exhibit B-6, BCUC 1.69.1

<sup>96</sup> Exhibit B-6, BCUC 1.69.1 and Exhibit B-11, CEC 1.6.1

68. The FortisBC Application is not a typical project but is instead a key technological change in the transition to the benefits afforded by digital meters, energy balancing, increased granularity and two way communication<sup>97</sup> contained in the Smart Grid. The vast majority of the financial benefits to be derived from the FortisBC Application are related to the significant technological transition being undertaken and are not limited to the AMI meter or its service life any more than a new capability set, such as learning to ride a bicycle, is limited to the life of the equipment employed. Further, even if new technology does develop, it can be expected to build upon the technology in existence and does not diminish the value of the capability set already developed.
69. FortisBC has indicated that enduring benefits of the AMI program include the transition to automated meter reading, improved theft detection and deterrence, reduced manual meter reading expenses, reduced contact centre costs and savings from remote disconnect and reconnect<sup>98</sup>. The CEC notes that the avoided capital cost savings are considered a 'life of the project' benefit<sup>99</sup> and as such are appropriately quantified over the 20 year horizon.
70. The enduring financial benefits of the FortisBC Application, or those that can be expected to continue beyond the 20 year planning horizon and indefinitely into the future account for \$68.078 million PV<sup>100</sup> in savings or 98% of total quantified benefits. These will be permanently embedded into revenue requirements after implementation.<sup>101</sup> The CEC notes that on-going sustaining capital replacements of meters will preserve the enduring benefits of the FortisBC Application beyond the 20 year horizon.<sup>102</sup> However, as sustaining capital replacements do not generally require or result in business case justification<sup>103</sup> the ongoing benefits will not be accounted for at any other point in the future. The ongoing financial benefits should be examined in this proceeding as a significant potential terminal value upside to the FortisBC Application.

---

<sup>97</sup> Exhibit B-15, CEC 2.1.1 Table CEC IR2 Q1.1 - Quantified Benefits

<sup>98</sup> Exhibit B-15, CEC 2.1.1 Table CEC IR2 Q1.1 – Quantified Benefits

<sup>99</sup> Exhibit B-15, CEC 2.1.1 Table CEC IR2 Q1.1 – Quantified Benefits

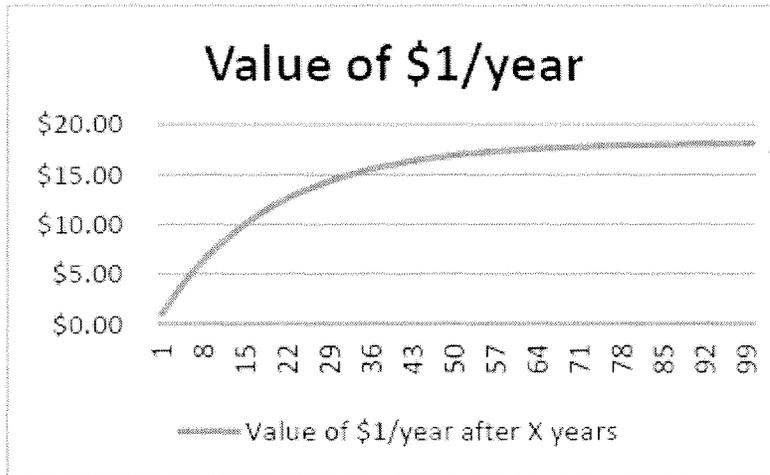
<sup>100</sup> Exhibit B-15, CEC 2.1.1 Table CEC IR2 Q1.1 – Quantified Benefits

<sup>101</sup> Exhibit B-15, CEC 2.21.1

<sup>102</sup> Exhibit B-11, CEC 1.46.2

<sup>103</sup> Exhibit B-15, CEC 2.21.2

71. As illustrated in the following chart, only about 66% of benefits that are ongoing and derived from a permanent transition<sup>104</sup> will have been achieved within 20 years, compared to what will be achieved over the future. Consequently, approximately 34% of the benefits will occur over the future, which is slightly higher than a 50% increase. A 50% increase in enduring financial benefits would increase them from about \$68 million to just over \$100 million PV.



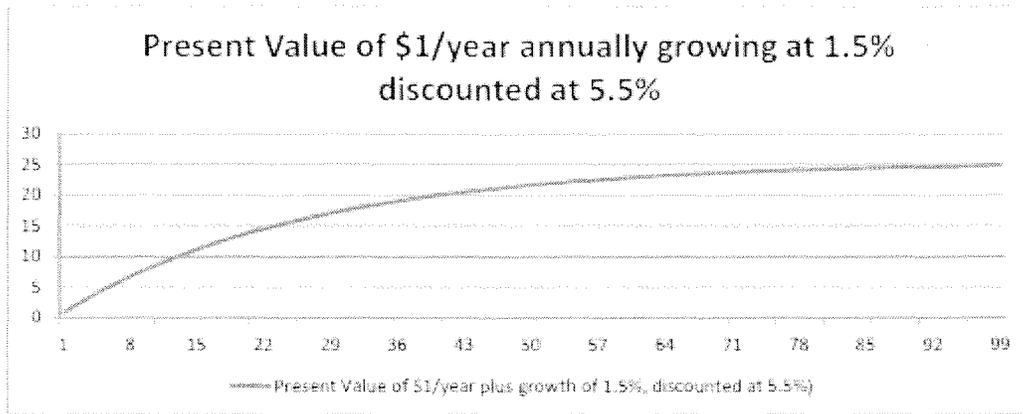
105

72. This benefit would be larger still considering a factor for growth. If the financial benefits were growing at 1.5%, only 55% of the benefits (just over half) would be achieved within 20 years, with approximately 45% (almost half) remaining unaccounted for as per the following chart.<sup>106</sup> This would represent an 81.8% increase in the total benefits.

<sup>104</sup> Represented by 100 years

<sup>105</sup> Terminal value of \$1 discounted at a rate of 5.5% and assuming 0 growth in the cost structure.

<sup>106</sup> Exhibit B-15, CEC 2.21.2



73. Under this scenario, financial benefits could be estimated at approximately \$123 million PV<sup>107</sup>. At 1.8% population growth and 1.8% inflation<sup>108</sup>, the CEC the total financial benefits would be higher still.

**G. NPV of Costs and Benefits**

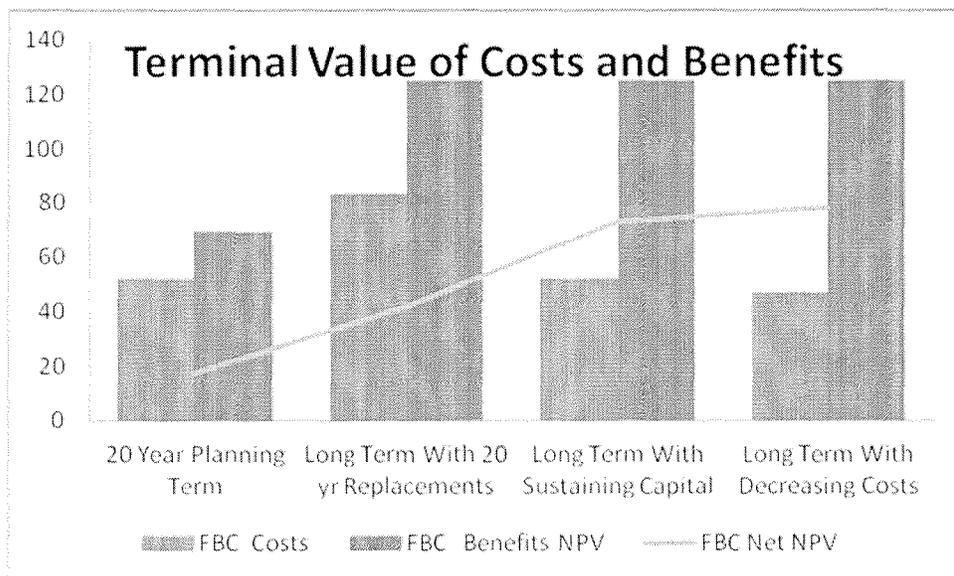
74. Under the most rough calculation that the Net benefits of the FortisBC Application (\$17.6 million NPV) were to increase at a rate of 1.5% per year, and were discounted at 5.5% on a long term basis, the NPV of the project could be expected to increase by approximately 81.8% to nearly \$32 million simply by including the full duration over which benefits will accrue.
75. The CEC however does not consider that costs would grow at the same rate as net benefits, and submits that the increase in benefits would considerably outpace any growth in costs over the long term resulting in a much larger net benefit.
76. The CEC notes that sustaining capital can be expected to preserve the enduring benefits<sup>109</sup> on an ongoing basis without requiring an incremental financial burden. Consequently, the financial stream of benefits is expected to continue without any further cost outlays resulting in a NPV of over \$73 million or about a 300% increase above FortisBC's probable scenario.

<sup>107</sup> 68 million \* 1.818 (NPV of Total enduring benefits \* (1 + 45%/55%))

<sup>108</sup> Exhibit B-15, CEC 2.22.1 and Exhibit B-15, CEC 2.22.2

<sup>109</sup> Exhibit B-15, CEC 2.21.2

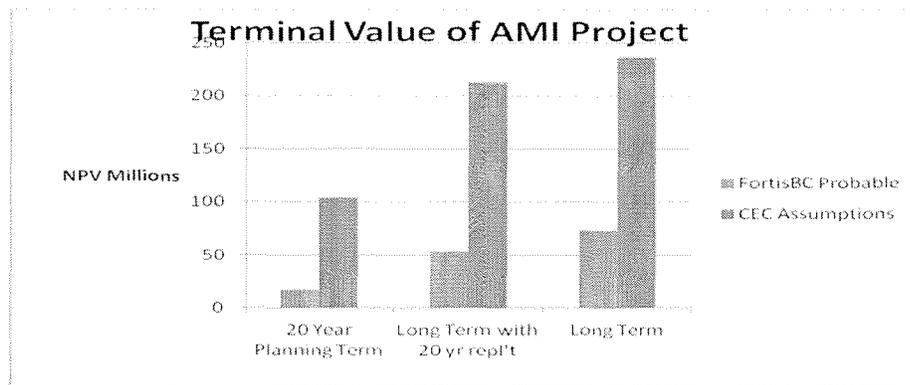
77. Even adopting the conservative assumption that there could be continued replacement of new technology every 20 years for 100 years<sup>110</sup>, the CEC calculates that the value of the FortisBC Application<sup>111</sup> could be estimated as resulting in an NPV of approximately \$42 million, or a 138% increase above FortisBC’s probable scenario. As depicted in the chart below, the costs arising from technology replacements consume a much lower proportion of the benefit stream than occurs under a twenty year planning horizon.
78. The CEC also considers that it is not unreasonable to conceive that costs for sustaining capital could ultimately decline as the technology becomes more standardized and ubiquitous. It is not atypical for substantial technological changes to result in reduced costs and the transition to the Smart Grid may well be one such change. A net 10% decrease is presented below for illustrative purposes.



79. The CEC has also examined the impact of accounting for the enduring nature of benefits under the CEC “maximum” assumptions discussed above. In the Long Term with 20 year technology replacements analysis, the NPV of the FortisBC Application under CEC assumptions rises to \$200.52 million and reaches approximately \$237 million assuming sustaining capital will cover ongoing costs. This is depicted as the terminal value of the FortisBC Application below.

<sup>110</sup> Assume technology is replaced at years 20, 40, 60 and 80.

<sup>111</sup> Based on Application ‘Probable’ scenario.



#### **H. Cost of New Supply Underestimated**

80. The CEC submits that FortisBC's financial analysis of the FortisBC Application is also conservative in its use of the Midgard<sup>112</sup> short-term avoided cost of energy (\$54.68 /MWh in 2012)<sup>113</sup> when modeling anticipated financial benefits and that it could be reasonably adjusted upward to reflect the benefits of avoided energy purchases using the Long Run Marginal Cost of energy, including line losses of 11% but no distribution cost. This is estimated at \$125.80/MWh.<sup>114</sup> FortisBC has stated that they would not object to calculating the cost of energy theft by using the full long-run marginal cost of acquiring energy from new resources which was found by the Commission to be the appropriate reference for the residential block 2 energy rate but did not do so because they believe an overall conservative approach is appropriate.<sup>115</sup>
81. The CEC agrees that it is important for FortisBC to provide conservative estimates of savings for discussion purposes, but submits that the final analysis should also include a full, reasonable range of costs and benefits in assumptions for comparative purposes.
82. Recalculation of the theft reduction benefit using the BC New Market Energy Forecast including transportation and distribution costs estimated at 11 percent increases the NPV of theft benefits from \$38.386 million to \$42.1 million and improves the economics of

<sup>112</sup> Exhibit B-6, BCUC 1.81.2

<sup>113</sup> Exhibit B-14, BCUC 2.62.6

<sup>114</sup> Exhibit B-14, BCUC 2.61.0 and Exhibit B-14, BCUC 2.61.1

<sup>115</sup> Exhibit B-14, BCUC 2.61.2.1

the project to approximately \$22.3 million NPV.<sup>116</sup> This is a 26.3% improvement in the NPV of the project.

83. The CEC submits that the BC New Market Energy Forecast including transportation and distribution costs is the appropriate figure to use in calculating impacts for projects with benefits spanning twenty years or more such as those associated with the FortisBC Application. The probable AMI theft reduction scenario could be increased to \$42.062 million NPV<sup>117</sup> to reflect a more likely cost of energy. This results in the NPV of the project being increased by \$4.638 million to \$22.265 million<sup>118</sup>. In rough estimations, it is reasonable to attribute an approximate 25% increase to using the Long Run Marginal Cost of Energy.
84. The CEC notes that in addition to the above some of the non-quantified benefits such as improved system planning and power quality monitoring<sup>119</sup> can be expected to have financial value. The CEC also notes that certain items that were included in the BC Hydro Smart Metering Infrastructure financial evaluation were only included in the FortisBC Application as Future benefits.<sup>120</sup>
85. Importantly, almost all of the future benefits identified by FortisBC may have financial value and all may be considered enduring in nature<sup>121</sup>. These include distribution loss reduction, conservation voltage regulation, distribution automation, real time transmission line rating, future conservation rate structures, customer pre-pay improved outage management, distribution generation, electric vehicle integration and demand response<sup>122</sup>. Many of these savings can be very significant in and of themselves and should be considered as an important additional financial benefit of the FortisBC Application. For instance, time-of-use, critical peak pricing and customer pre-pay are important elements in reducing the cost of energy to all customer groups through capacity and energy savings. FortisBC has estimated indicative avoided power purchase costs as

---

<sup>116</sup> Exhibit B-14, BCUC 2.61.2.1

<sup>117</sup> Exhibit B-14, Electronic Attachment BCUC IR 2 61.2.1, Theft Reduction

<sup>118</sup> Exhibit B-14, Electronic Attachment BCUC IR2 61.2.1, Net AMI

<sup>119</sup> Exhibit B-15, CEC 2.2.1, Table; CEC IR2 Q.1.1 (sic) Non-Quantified Benefits

<sup>120</sup> Exhibit B-11, BCPSO 1.57.2, Table; BCPSO IR1 Q57.2

<sup>121</sup> Exhibit B-15, CEC 2.3.1, Table; CEC IR2 Q3.1 Future Benefits

<sup>122</sup> Exhibit B-15, CEC 2.3.1, Table; CEC IR2 Q3.1 Future Benefits

being \$1,665,000 in 2016; \$1,882,000 in 2020 and \$2,342,000 (gross) in 2030<sup>123</sup> based on 20% participation rates for TOU and CPP and 8% pre-pay using the BC Wholesale cost of energy and capacity. The CEC has roughly interpolated these savings as increasing at approximately 2.5% per year. At a 6.5% discount rate savings such as these equate to about \$21 million NPV over 20 years commencing in 2016 assuming a \$750,000 ‘set up’ cost<sup>124</sup>. Adding a 25% improvement based on the Long Run cost of energy and recognizing the enduring nature of this benefit would add a total of about \$45 million to the NPV of the project.

86. Many of the future benefits such as those derived from distribution loss reduction are difficult to estimate until after the FortisBC Application is implemented<sup>125</sup>, or may even show a negative payback under current assumptions such as the analysis of conservation voltage regulation<sup>126</sup>. Accordingly, FortisBC is planning to conduct future business case or other analyses to determine the value of introducing these functions. FortisBC would be providing the appropriate applications before the Commission as the proposals arise.
87. The CEC submits that although these projects will come before the Commission for approval on their merits, it is nonetheless appropriate to consider the financial value of these proposals as part of the FortisBC Application as they could not be undertaken without the project having been implemented. Given the extensive range of additional functionality which can be added to a smart electric system it is reasonable to add a range of potential benefits when considering the base investment to start the technology change. These could be in the range of \$50 million to \$100 million.

***I. Aggregated Value of Potential Financial Benefits***

88. As illustrated in the following chart, the CEC considers that the combination of conservative assumptions, the Probable theft scenario, use of Midgard cost of energy and twenty year planning horizon serves to vastly underestimate the total potential value of the FortisBC Application.

---

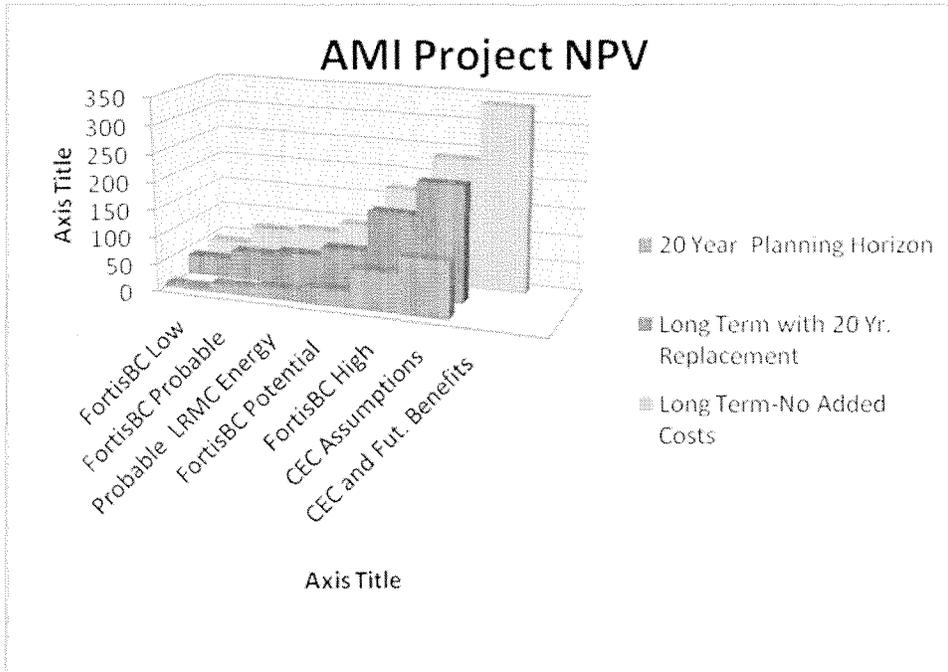
<sup>123</sup> Exhibit B-1, Application, Page 104, Table 6.5

<sup>124</sup> Exhibit B-1, Application, Page 104; \$250,000 to each to establish three rate structures

<sup>125</sup> Exhibit B-1, Application, Page 98

<sup>126</sup> Exhibit B-1, Application, Page 100

89. It is important for the Commission to bear in mind the upside potential in evaluating the FortisBC Application and recommends estimating the possible upside as being in the order of \$200 - \$350 million NPV. At \$350 million, the NPV of the FortisBC Application could be approximately 20 times that accounted for in the FortisBC Application. The following chart illustrates graphically the magnitude of the potential benefits compared to that being presented in the FortisBC Application.



**PART VIII - NON QUANTIFIED BENEFITS**

90. The non-financial benefits associated with the FortisBC Application to be significant and clearly in the public interest. The non-quantified benefits will contribute to increased fairness for all rate payers, improved customer service, improved health and safety for the public, reduced environmental impact and improved financial reporting and forecasting<sup>127</sup>. The CEC considers and finds of significant importance that the FortisBC Application may also promote a culture of conservation<sup>128</sup> that would otherwise not

<sup>127</sup> Exhibit B-15, CEC 2.2.1, Table; CEC IR2Q1.1 (sic) Non Quantified Benefits

<sup>128</sup> Exhibit B-15, CEC 2.8.3.3

occur. Many of the presently Non-Quantified benefits may also have a financial value that has not been incorporated into the AMI financial analysis<sup>129</sup>.

**A. *Fairness for Ratepayers***

91. Increased fairness for all ratepayers can be expected from the permanent transition from analogue to digital meters<sup>130</sup> which provide for improved accuracy of metered consumption<sup>131</sup> and improved billing accuracy<sup>132</sup>. This reduces potential subsidization of those being under-billed by faulty analog meters<sup>133</sup>. The CEC notes that the AMI project is expected to facilitate more accurate cost of service analyses.<sup>134</sup> The FortisBC Application reasonably preserves intergenerational equity in that the benefits from the project will be accrued in the near term and extend for many years into the future. FortisBC is anticipating a net cumulative rate decrease by 2016 and, as such did not require any rate smoothing measures.<sup>135</sup> The CEC submits that increased fairness is an important goal of utility planning and is an important benefit of the project.

**B. *Improved Customer Service***

92. The CEC notes that the FortisBC Application can be expected to result in many improvements to customer service through a variety of enhanced billing options and rate structures, improved outage management and faster response times, reduced need to access customer premises<sup>136</sup> and fewer errors<sup>137</sup>.

**C. *Consolidated and Flexible Billing***

93. The CEC considers consolidated and flexible billing to be important customer advantages and recommends that the Commission consider these as important advantages of the FortisBC Application. FortisBC receives as many as 20-30 calls per month requesting consolidated billing which they are unable to accommodate. Flexible billing dates are

<sup>129</sup> Exhibit B-15, CEC 2.2.1, Table; CEC IR2Q1.1 (sic) Non Quantified Benefits

<sup>130</sup> Exhibit B-15, CEC 2.2.1, Table; CEC IR2Q1.1 (sic) Non Quantified Benefits

<sup>131</sup> Exhibit B-15, CEC2.9.1.1

<sup>132</sup> Exhibit B-1, Application, Page 33

<sup>133</sup> Exhibit B-15, CEC 2.9.1.1

<sup>134</sup> Fortis BC Final Submission page 83

<sup>135</sup> Exhibit B-14, BCUC 2.80.1

<sup>136</sup> Exhibit B-15, CEC 2.2.1, Table; CEC IR2 Q1.1 (sic) Non Quantified Benefits

<sup>137</sup> Exhibit B-1, Application, Page 77

requested by customers as frequently as 10 times per week, and is of particular interest to those on fixed incomes<sup>138</sup>. As many as 47% of customers selected flexible billing as an option. Consolidated billing may be established at a cost of \$8 per account and flexible billing may be established for as little as \$5. FortisBC does not intend to charge for these services<sup>139</sup>.

**D. Fewer Meter Reading Errors**

94. The CEC notes that the FortisBC Application is expected to result in fewer meter reading errors for both residential and commercial customers, and that commercial customers are proportionately more likely to suffer from errors.<sup>140</sup> An average meter reading error is estimated in the neighbourhood of \$6.<sup>141</sup>

**E. Improved Customer Information**

95. The CEC notes that the Customer Information Portal will provide immediate information for customers about their energy use<sup>142</sup> and that customer service representatives will also have much more detailed information available with which to address customer concerns.  
143

**F. Home Area Networks and In Home Devices**

96. The CEC submits that the FortisBC Application to be valuable in enabling customers to monitor their energy consumption<sup>144</sup> by supporting the introduction of Home Area Networks (HAN) and In Home Devices (IHDs) which could not be cost effectively implemented with manual meter reading<sup>145</sup>. The CEC agrees with FortisBC that, coupled with appropriate education outreach, the IHD and CIP will contribute to a culture of

---

<sup>138</sup> Exhibit B-6, BCUC 1.22.1

<sup>139</sup> Exhibit B-6, BCUC 1.22.1 and BCUC 1.22.2

<sup>140</sup> Exhibit B-11, CEC 1.15.2

<sup>141</sup> Exhibit B-11, CEC 1.15.6

<sup>142</sup> FortisBC Final Submissions, Page 77

<sup>143</sup> FortisBC Final Submissions, Page 78

<sup>144</sup> Exhibit B-11, BCSEA 1.44.2

<sup>145</sup> Exhibit B-1, Application, Page 22

conservation.<sup>146</sup> Customers who actively use an IHD can reduce their consumption of electricity by approximately 7%.<sup>147</sup>

97. IHDs have an estimated NPV of \$9.8 million<sup>148</sup> which is a significant financial benefit of the FortisBC Application. Commercial customer use results in an additional NPV of \$3.8 million<sup>149</sup> assuming the same adoption and savings rates as those used for residential. It is more likely that commercial customers will adopt IHDs and employ conservation measures given that they have specifically requested more detailed consumption information<sup>150</sup> and have been found to have higher elasticities<sup>151</sup>. The \$3.8 million may be considered as a lower bound for commercial use.
98. The CEC submits that a rental program would be a valuable option for customers wishing to understand their energy usage from time to time without the expense and clutter of purchasing an IHD. An IHD rental program could be inexpensive for FortisBC to provide and could stimulate the adoption of conservation measures. The CEC recommends that the Commission direct FortisBC to investigate the possibility of introducing an IHD rental program.

### **G. Zigbee**

99. The CEC accepts that it was appropriate for the Zigbee protocol to have been built into the AMI meters at this time, and does not anticipate a significant risk from the possibility of the protocol becoming unsupported in the future. Zigbee is the dominant protocol currently in the market, is the only protocol currently available in Measurement Canada certified meters, is the protocol adopted by BC Hydro<sup>152</sup> and bridging technology can be expected to be available in the event there is a change in the market.<sup>153</sup>

---

<sup>146</sup> Exhibit B-15, CEC 2.8.3.3 and Exhibit B-11, BCSEA 1.43.3 and Exhibit B-11, NCGPCA 1.5 and 1.6

<sup>147</sup> Exhibit B-11, CEC 1.15.4

<sup>148</sup> Exhibit B-11, CEC 1.61.1

<sup>149</sup> Exhibit B-15, CEC 2.7.2

<sup>150</sup> Exhibit B-15, CEC 2.7.1

<sup>151</sup> Exhibit B-1, Application, Appendix C-1, Page 31 of 65, and Exhibit B-11, CEC 1.92.1

<sup>152</sup> Exhibit B-6, BCUC 1.30.2

<sup>153</sup> Exhibit B-6, 1.30.2.1

**H. Time of Use/ Critical Peak Pricing/Customer Pre-pay**

100. The CEC supports the introduction of (voluntary) time-of-use rates and conservation rate structures and submits that the FortisBC Application to be a key element in facilitating their introduction<sup>154</sup>. The CEC considers the opportunity to manage costs to be a key benefit to commercial customers and notes that commercial and industrial customers have been found to have higher elasticities than residential customers and are more likely to take advantage of the opportunity to reduce rates.<sup>155</sup> FortisBC did not adopt different participation rates for commercial, industrial or wholesale customers in their analysis because there was limited information, but acknowledges that the benefits would be increased.<sup>156</sup>
101. Time-of-use and other conservation rate structures such as critical peak pricing are important elements in reducing the cost of energy to all customer groups through capacity and energy savings which could run up to \$2,332,000 (gross) by 2030<sup>157</sup>. Additionally, critical peak pricing provides the opportunity to mitigate the impacts of events such as loss of generation or transmission, unanticipated load growth or extreme weather by reducing the need for expensive market based power during outages.<sup>158</sup> FortisBC expects that a reasonable cost estimate of \$500,000 or more could be associated with even a short-term regional shortfall, and that this could occur three or four times in a ten year period.<sup>159</sup>
102. Advanced rates structures will provide customers with additional flexibility in lowering their cost of service by allowing them to manage rather than simply reduce their consumption<sup>160</sup>. While FortisBC has not yet formulated policy with respect to Time of Use rates, it anticipates that it would do so as a voluntary alternative to its default rates<sup>161</sup> and would require a separate approval process.<sup>162</sup> This approval process will provide the

---

<sup>154</sup> Exhibit B-1 Application, Page 103

<sup>155</sup> Exhibit B-1, Application, Appendix C1, Page 31 of 65

<sup>156</sup> Exhibit B-11, CEC 1.92.1

<sup>157</sup> Exhibit B-1, Application, Page 103, Table 6.5

<sup>158</sup> Exhibit B-11, CEC 1.91.2

<sup>159</sup> Exhibit B-11, CEC 1.90.2

<sup>160</sup> FortisBC Final Submissions, Page 76

<sup>161</sup> Exhibit B-11, NCGP 1.15

<sup>162</sup> Exhibit B-11, BCRUC 1.6.1

opportunity for a full airing of the issues but should be reassuring for those concerned as to their implementation. The CEC recommends that the Commission direct FortisBC undertake to introduce Time of Use and Conservation Rate structures as soon as practicable

**I. Culture of Conservation**

103. The CEC submits that the FortisBC Application will further the public interest and contribute to provincial energy objectives by contributing to a culture of conservation. The FortisBC Application is expected to build a culture of conservation by facilitating the customer information portal (CIP) and in-home displays (IHD) which will better inform customers of their electricity usage and patterns. Coupled with the appropriate education outreach customers will be made aware of how they can reduce or change their consumption and patterns thereof.<sup>163</sup>

**J. Commercial Perspective**

104. The CEC submits that several of the benefits arising from the FortisBC Application have a particular benefit to commercial, industrial and wholesale customers such as those arising from improved facilities management and load balancing. Opportunities to reduce energy bills through conservation or other measures is of particular importance for those with high energy consumption. Commercial and industrial customers have been found to have higher elasticities than residential customers and are more likely to take advantage of the opportunity to reduce rates.<sup>164</sup> FortisBC has received requests for higher resolution time based information from commercial customers to assist them in mitigating demand spikes and thereby reducing bills<sup>165</sup>. The FortisBC Application is expected to result in fewer meter reading errors for both residential and commercial customers, and that commercial customers are proportionately more likely to suffer from errors.<sup>166</sup> An average meter reading error is estimated in the neighbourhood of \$6.<sup>167</sup> FortisBC has confirmed that the ACEEE report on Long-term Energy Efficiency Potential shows

---

<sup>163</sup> Exhibit B-15, CEC 2.8.3.3

<sup>164</sup> Exhibit B-1, Application, Appendix C1, Page 31 of 65

<sup>165</sup> Exhibit B-11, CEC 1.16.3

<sup>166</sup> Exhibit B-11, CEC 1.15.2

<sup>167</sup> Exhibit B-11, CEC 1.15.6

significant potential savings in consumption may be facilitated in the Commercial sector and FortisBC has no reason to believe similar savings couldn't be expected in its BC service territory.<sup>168</sup>

## PART IX - FUTURE BENEFITS

105. The CEC notes that the AMI project is expected to facilitate several future improvements such as distribution loss reduction, conservation voltage reduction, distribution automation, real time transmission line rating, future conservation rate structures, customer pre-pay, improved outage management, distribution generation, electric vehicle integration, Home Area Networks and demand response. power voltage optimization, outage management, customer prepay tariff and conservation rate structures.<sup>169</sup> The CEC submits that virtually all of these opportunities may have financial value<sup>170</sup> which could be very significant. The CEC agrees with FortisBC that benefits from future opportunities will accrue to all ratepayers<sup>171</sup> and submits that the facilitation of all the future benefits decidedly in the public interest.

### **A. Demand Response**

106. The CEC notes that the two-way communication provided by the FortisBC Application supports demand response initiatives which may have an enduring financial benefit for all customers.<sup>172</sup> The CEC supports the development of Demand Response initiatives. Demand response initiatives will provide customers with increased flexibility to manage their costs related to electricity consumption by enabling optional responses to pricing signals sent by the utility. They will provide the opportunity for individual customers to reduce total annual billings and can positively impact all customers if the aggregate customer response results in savings to the utility.<sup>173</sup> Demand response initiatives will be important to non-residential customers in that commercial and industrial customers are considered more responsive to price changes<sup>174</sup>. Demand response is of particular value to commercial customers that have large loads that can be interrupted or reduced on short

---

<sup>168</sup> Exhibit B-15, CEC 2.40.2

<sup>169</sup> Exhibit B-15, CEC 2.3.1 Table CEC IR2 Q3.1 – Future Benefits

<sup>170</sup> Exhibit B-15, CEC 2.3.1 Table CEC IR2 Q3.1 – Future Benefits

<sup>171</sup> FortisBC Final Submission page 86

<sup>172</sup> Exhibit B-15, CEC 2.3.1

<sup>173</sup> Exhibit B-11, CEC 1.24.1

<sup>174</sup> Exhibit B-6, BCUC 1.110.2

notice<sup>175</sup> and will allow customers to manage their energy consumption with less effort.<sup>176</sup> The CEC submits that demand response is an important aspect of the move to conservation afforded by the Smart Grid . The CEC recommends that the Commission consider Demand Response capability as a significant added benefit of the FortisBC Application, particularly for commercial and industrial customers.

## **B. *Electric Vehicles***

107. FortisBC has not accounted for the impact of electric vehicles in their analysis of the FortisBC Application. FortisBC assumes that some level of uptake of electric vehicles will occur in the service area over the next 20 years but states they have little solid information on which to base a forecast.<sup>177</sup> FortisBC cites Pike Research as indicating that Canadian PEV annual sales are expected to be approximately 107,000 by 2020 and further states that plug-in electric vehicles will likely have a minimal impact because sales are predicted to occur mainly in large metropolitan centres such as Toronto, Montreal and Vancouver, which FortisBC does not service<sup>178</sup>. FortisBC also does not accept BC Hydro's forecast as being relevant because of the discrepancy in the nature of their service territories, FortisBC's being primarily rural in nature<sup>179</sup>.
108. Providing for the adoption of electric vehicles is an important element of provincial policy regarding Smart Meters<sup>180</sup> and the CEC recommends that the Commission consider this aspect as an additional benefit of the FortisBC Application. The FortisBC Application has sufficient capacity, flexibility and expandability to facilitate the use of electric vehicles<sup>181</sup>. It supports the uptake of electric vehicles in the population, and is necessary for the wide scale integration of this clean mode of transportation<sup>182</sup>. The FortisBC Application facilitates the inclusion of electric vehicles (EV) by enabling them to be charged at lower rates during non-peak hours, and in the future can provide

---

<sup>175</sup> Exhibit B-15, CEC 2.8.2.1

<sup>176</sup> Exhibit B-15, CEC 2.8.1

<sup>177</sup> Exhibit B-11, CEC 1.23.2

<sup>178</sup> Exhibit B-11, CEC 1.23.6

<sup>179</sup> Exhibit B-11, CEC 1.23.6.2

<sup>180</sup> Exhibit B-1, Application, Page 10, Smart Meters and Smart Grid Regulation (BC Reg. 368/2010)

<sup>181</sup> Exhibit B-11, BCSEA 1.4.1

<sup>182</sup> Exhibit B-15, CEC 2.20.3

customer benefits by economically facilitating a separate vehicle tariff via sub-metering or provide reverse-charging options<sup>183</sup>.

109. The CEC submits that FortisBC's electric vehicle projection both for the province and FortisBC's service territory is possibly underestimated and not considering the longer term forecast (20-30 years) for electric and hybrid vehicles and could result in another underestimation of the value of the FortisBC Application. BC Hydro's electric load forecast anticipates very significant growth over the next 20 – 30 years and expects hybrid and plug-in electric vehicles to account for up to 25% to 30% of all vehicles on the road by 2031. It is estimated that standard electric vehicles use up to 75KW hrs of electricity.<sup>184</sup>

**C. Customer Pre-pay Tariff**

110. The CEC considers that the opportunity for a prepay tariff is an added benefit of the FortisBC Application. AMI meters support customer pre-pay options with minimal additional costs<sup>185</sup>.

**PART X - PROJECT COSTS**

111. Total project costs amount to \$51,929,000 and include operating costs (28%), depreciation costs (32%), carrying costs (33%) and income tax (8%).<sup>186</sup> The project includes avoided capital costs in the amount of \$9.8 million due to the need for compliance with new Measurement Canada regulations<sup>187</sup> that would otherwise be attributable to another project.
112. The CEC also submits that the project costs to are appropriately quantified and prudently undertaken.

**PART XI - REVENUE REQUIREMENTS AND RATE IMPACTS**

**A. Discount Rate**

---

<sup>183</sup> Exhibit B-11, CEC 1.94.1 (Requires time based rates)

<sup>184</sup> <http://www.bchydro.com/news/conservation/2013/fast-charging-stations.html>

<sup>185</sup> Exhibit B-11, BCUC 1.50.2

<sup>186</sup> Benefits calculated from 2015 to 2030; Exhibit B-1-1 Errata Updated, Page 69

<sup>187</sup> Exhibit B-1, Page 94

113. The CEC accepts 8.0% as the appropriate nominal discount rate by which to evaluate the FortisBC Application for its traditional conservative approach to escalation. Although 8% represents a significant reduction from the historically used 10%, the CEC agrees that lower figure is more representative of the cost of debt as it is likely to occur over the 20 year study period<sup>188</sup>. The CEC considers the 10% rate, which was based on a 25 year weighted average<sup>189</sup> to be unrealistically conservative given the current economic climate and submits that such a rate would artificially diminish the projected NPV of the project.
114. The CEC acknowledges that the 8.0% discount rate does not reflect an assessment of risk for the project<sup>190</sup>, but notes that FortisBC has undertaken a conservative approach in all aspects of its analysis<sup>191</sup> which the CEC submits has been more than sufficient to account for possible risk. The CEC also notes that FortisBC's after tax weighted average cost of capital is currently lower than 8%, being forecast at 6.7% for 2012 and 6.6% for 2013<sup>192</sup> (nominal rates).<sup>193</sup>
115. The CEC further notes that the project would retain a \$13.131 million NPV at a 10% discount rate<sup>194</sup>.

**B. General Inflation Rate**

116. The CEC accepts FortisBC's expected rate of inflation as 1.8%<sup>195</sup> for its traditional conservative approach to evaluation.

---

<sup>188</sup> Exhibit B-6, BCUC 1.52.2.2

<sup>189</sup> Exhibit B-6, BCUC 1.52.2

<sup>190</sup> Exhibit B-6, BCUC 1.52.2.1

<sup>191</sup> FortisBC Final Submissions, Pages 43, 48, 51, 52, 66, 74, and 96

<sup>192</sup> FortisBC Final Submission, Page 100

<sup>193</sup> Exhibit B-6, BCUC 1.52.1

<sup>194</sup> Exhibit B-1-1, Application, Errata 1, AMI Excel NPV Analysis Net AMI

<sup>195</sup> Exhibit B-15, 2.23.1

**C. Composite Depreciation Rate**

117. FortisBC is seeking a revised depreciation rate of 5.40% as part of the FortisBC Application. The CEC accepts the composite depreciation as appropriately estimated for the asset classes in this project in that the rate for meters (5%) is based on the twenty year useful life as observed through industry experience and manufacturers' recommendations<sup>196</sup>, and the computer equipment and software (5.01%) and communications structures and software (8.05%) rates are based on the 2011 depreciation study<sup>197</sup>. FortisBC expects the depreciation rate to be reasonable for three to five years<sup>198</sup>, and would not expect a revision to be necessary in the absence of a significant change in the composition of the meter population.<sup>199</sup> The CEC submits that it is in the customers' best interests to maintain stable depreciation rates as it contributes to stable rates.<sup>200</sup>
118. The CEC notes that FortisBC has no plans to complete a new depreciation study<sup>201</sup> and is willing to maintain the 5% depreciation rate<sup>202</sup> and recommends that the Commission approve this depreciation rate for the duration of the project.

**D. Composite CCA Rate; Combined Income Tax Rate and Carrying Costs**

119. The CEC accepts and agrees with FortisBC's approach in assessing its Composite CCA rate, Combined Income Tax Rate and Carrying Costs and recommends that the Commission adopt them as proposed by FortisBC.

**E. Accounting Treatment of Existing Meters**

120. The CEC agrees with FortisBC that the preferred accounting treatment is to write off the existing meters as they are removed from service over the 2014 and 2015 year period. In addition to not requiring an accounting variance, the CEC submits that this is a more accurate reflection of the costs of the FortisBC Application.

---

<sup>196</sup> Exhibit B-6, BCUC 1.69.1

<sup>197</sup> FortisBC Final Submissions, Page 101

<sup>198</sup> Exhibit B-6, BCUC 1.1.1

<sup>199</sup> Exhibit B-11, CEC 2.2.1

<sup>200</sup> Exhibit B-11, CEC 2.3.1

<sup>201</sup> Exhibit B-6, BCUC 1.1.1

<sup>202</sup> Exhibit B-6, BCUC 1.1.1.1

## PART XII - PROJECT CHALLENGES

### A. *Health and Safety*

121. The Commission derives its authority from the *BC Utilities Commission Act*. Under Section 23.1 the Commission has ‘general supervision of all public utilities and may make orders about Section 23.1(a) - equipment, Section 23.1(c) - safety devices, and Section 23.1(g)(i) - the safety, convenience or service of the public. Under Section 23.2 the commission ‘may make regulations requiring a public utility to conducts its operations in a way that does not unnecessarily interfere with, or cause unnecessary damage or inconvenience to the public’.
122. The CEC submits that in evaluating the FortisBC Application and the equipment and technology employed, the Commission must consider how the public interest and convenience may be affected by any course of action the Commission could take, including the effects of withholding approval based on safety or health concerns. In a high profile application such as the FortisBC Application the Commission’s decision may have far-reaching effects either by way of the influencing the public’s perception of issues, or by way of precedent for policy which may extend beyond the energy industry. The FortisBC Application has attracted considerable media attention and that the hearing itself has included expert evidence from around the world. The Commission decision is likely to be cited in other proceedings of a similar nature, will be fully aired in the media particularly if it finds cause for a health concern, and will affect the public perception of the safety of similar devices and will be influential in many other proceedings. There are hundreds of millions of smart meters installed around the world, including 1.8 million in BC alone and that the radiofrequency technology is employed ubiquitously worldwide in cellular telephones and other wireless applications. The Commission must be therefore be particularly cognizant when assessing possible safety concerns of its potential to affect future policy beyond the immediate FortisBC Application.
123. The CEC submits that the Commission must examine the breadth of the issues before it, and their social context, and determine the best criteria for its decision-making processes. At the highest level, the issues include the potential for negative health effects from the radiofrequency signal, the amount and type of privacy properly afforded an individual in

their interaction with public utilities, the possibility of fire hazards arising from automated metering equipment in general, the of security of the information being passed to the utility and the security of the electricity grid overall. In particular, the use of radiofrequency signals as a means of transmitting information is at issue.

124. The CEC submits that in reaching its determinations relating to broad, social issues or complex, scientific issues of public significance the Commission should critique the quality and quantity of information before it and adopt a public interest role by identifying the best means of resolution. The Commission must also consider its own jurisdiction and areas of expertise and any limitations thereof with respect to the size and complexity of the issues raised. In particular, the Commission should examine the scope of the issue, the amount and comprehensiveness of the information available and necessary to make that decision, the expertise and resources required to assess the information and all the implications that arise from any determinations made. In industrialized countries there are typically clearly defined organizations with the public mandate, expertise and resources to address broad social issues or those with complex information of high significance and set regulations on behalf of the public. This is the case in British Columbia and in Canada. Governmental decision-making bodies or regulatory bodies are important in the social and political structure of the province and the country and that it is clearly in the public interest to act in accordance with these bodies unless it is imperative to do otherwise. The CEC submits that should the Commission act in a manner inconsistent with these bodies it undermines their authority and indicates a lack confidence in their decision-making. The CEC submits this should only be done in extreme circumstances.
125. The CEC recommends that in fulfilling its duty to act in the public interest and ensure public safety and convenience, the Commission establish a clear set of decision-making criteria as to the scope of the decision required, critically examine the quality and comprehensiveness of the information available, and should identify what organization has the expertise and mandate to make the best decisions on behalf of the citizens of the province and the country, depending on the issue at hand. There are other more capable or appropriately mandated organizations than the Commission, the Commission's

appropriate role is to identify any applicable regulations and evaluate the FortisBC Application in terms of compliance. The test for the Commission to override any applicable regulations made by a mandated Canadian authority with more relevant expertise is if the Commission determines that there is an immediate and catastrophic result likely to occur, that the Commission could effectively avert by acting independently. The evidence in this proceeding does not support such a step.

**B. *The Evidence for a Commission Set Standard***

126. If the Commission is going to consider the proposition proposed by some interveners in this proceeding, which is to undertake to set a standard itself, it will need to determine if the evidence supports an immediate, severe, highly probable and non-mitigatable hazard to people in the province.
127. The hazard being raised by the health issues in this proceeding have been about cancers and in particular cancers of the brain.
128. The first place the Commission needs to look for such evidence is the epidemiological data for incidence and mortality related to the hazard. In this case the Commission has the data on the record in this proceeding for Canada and BC specifically. The cancer rates using age adjusted incidence and age adjusted mortality data shown in rates per 100,000 and the rates of change are shown as annual % change with most of the effects being sustained steadily over 30 years.
129. In BC the brain cancer incidence and death rates are at a very low rate of 6 for men with 5 deaths and 5 for women with 3 deaths<sup>203</sup>. Across Canada there is a continuously decreasing incidence and mortality rate for brain cancers of -.4% for men with -.7% for deaths and -.8% for women with -1.4% for deaths<sup>204</sup>.
130. In Canada the cancers with somewhat increasing incidence rates are thyroid cancer 6.8% for men and 6.9% for women with no significant death rates, kidney cancer 2.9% for men and 2.8% for women with decreasing mortality of -.8% for men and -.9% for women, liver cancer 3.6% for men and 2.4% for women with increasing mortality of 2.2% for

---

<sup>203</sup> Exhibit C17-8, Appendix E, Page 17, Table 2.3 and Page 19, Table 2.5

<sup>204</sup> Exhibit C17-8, Appendix E, Page 44, Table 4.5

men and 1.1% for women and leukemia .6% for men and 1.2% for women with decreasing death rates of -1.2% for men and -.9% for women<sup>205</sup>.

131. In fact the overall cancer rates appear to be relatively flat for men with some very significant declining death rates, while for women the increasing lung cancer rates due to smoking have left women with somewhat increasing rates for cancer but declining overall mortality rates<sup>206</sup>.
132. The epidemiological evidence in the US is similar in that it is not showing the kinds of cancer rates for brain cancers that would be predicted by the Interphone study and the Hardell studies, which are the basis for the IARC classification of RF emissions as a possible carcinogen. Modeling the prediction of these two studies has shown a lack of support for their in the observable epidemiological evidence. While the epidemiological evidence does not rule out the possibility of some milder effects and longer term latency effect it is one of the many studies, which are narrowing the likelihood that there is an urgent significant issues arising out of the RF emission exposure levels to which people are exposed<sup>207</sup>. These studies all focus around cell phones because of their much greater exposure levels than for instance the RF exposure levels from AMI meters.
133. The evidence is that the AMI meters would take 20 years of exposure to create the equivalent of a single 30 minute cell phone call in the same time period. The AMI meter RF signals are barely measured above the background levels and are on average 1/1000000<sup>th</sup> of the Safety Code 6 standard. The AMI meter signals affecting any given premises can be mitigated by simple shielding or simple adjustment of location in space by a few feet both of which can reduce exposure by a factor of 10 or more.
134. The evidence is such that there is no severe, immediate, high probability hazard with respect to the most concerning statistics for the brain cancers and there is little evidence for there to be such evidence with respect to other cancers.

---

<sup>205</sup> Exhibit C17-8, Appendix E, Page 44, Table 4.5

<sup>206</sup> Exhibit C17-8, Appendix E, Pages 34 and 35, Table 4.3 & Table 4.4

<sup>207</sup> Exhibit C17-8, Appendix F, Abstract

135. The extent of studies around RF emissions has been in regard to cell phones because they result in the largest potential exposures to people and that the AMI RF emissions are so small in comparison that there is not likely to be any future development of standards, which might compromise the evident relative safety of their communication signals.
136. In the event an individual has a concern about RF levels and or that there is a need to act to reduce the RF levels further there are mitigation options which enable both personal response and utility response if necessary. While there is no compelling evidence suggesting that mitigations would be necessary the Commission can be further assured that the FortisBC Application is a prudent investment from a health issues point of view and does not represent a public health risk.

**C. *Health Effects of Radiofrequency Signals and Smart Meters***

137. The CEC notes that the issue regarding any potential health effects from the use of radiofrequency signals includes concerns regarding DNA damage, sleep disruption, autism, electro hypersensitivity syndrome, brain cancer among several others. These issues are vast in scope, highly scientific, complex in nature, and require critical analysis of extraordinarily large amounts of information.
138. The CEC submits that although the information before the Commission elicited in 3 rounds of Information Requests, written submissions from ten expert witnesses and several oral hearing days is exceedingly vast and complex for a relatively small application, it has nonetheless not provided a comprehensive overview of the issues nor in any way provided a reasonable foundation for independently assessing the possibility of negative health effects arising from smart meters. The Commission does not have comprehensive information before it, nor the medical and scientific expertise to appropriately scope and critique the expert evidence on even very narrowly defined questions, which the CEC submits this is not. The Commission must rely on others for appropriate analysis, and must determine on which others it must rely.
139. The CEC submits that the information necessary to address the issue of potential health effects from radiofrequency signals is most appropriately analyzed by Health Canada

which has the requisite expertise and resources and the mandate to protect the health and safety of the public by making appropriate regulations.

140. The World Health Organization (WHO) has indicated that there have been over 25,000 studies conducted on this topic,<sup>208</sup> and it is clear that only a very small proportion have been raised in this hearing. Further, there are new studies proliferating on almost every aspect of potential health implications. Each of these studies must be subjected to careful scrutiny for its integrity and value to informing the issue. While expert opinion can serve to provide an objective overview of evidence and clarify a scientific point, it is clear that a comprehensive, factual analysis of even a small issue has not been demonstrated. The expert opinion put forth has been contradictory on several issues, even including the issue of which types of studies are relevant. Dr. Margaret Sears and Dr. Donald Maisch have both been clear that it is beyond the scope of this hearing process to adequately assess the health information.
141. The CEC recommends that the Commission consider Health Canada and the Provincial Health Officer as being the appropriate regulatory and decision-making bodies regarding health effect from radiofrequency signals. These organizations have the public mandate, resources and expertise to assess the vast and complex information surrounding radiofrequency signals and are in the best position to provide rational decision-making that contributes to public awareness and confidence. The CEC submits that the appropriate regulation provided by Health Canada is Safety Code 6.
142. The CEC also recommends that the Commission consider the advice of the Provincial Health Officer as it relates to the FortisBC Application and submits that the Provincial Health Officer has found smart meters to be safe.

**D. *Precautionary Principle***

143. The CEC has reviewed the information before the Commission and notes that substantial discussion has been directed to the concept of the ‘Precautionary Principle’ with respect to radiofrequency signals. The Commission should adopt Health Canada’s regulations

---

<sup>208</sup> Exhibit B-15-1, WKCC 2.27

addressing radiofrequency signals. It is clear that Health Canada has incorporated precautionary measures into Safety Code 6.<sup>209</sup>

**E. Canadian Regulations of Health for RF Emissions and Supporting Evidence**

144. FortisBC confirms that Safety Code 6 is the legally binding standard in Canada<sup>210</sup> and confirms its applicability in the frequency range of 3KHz to 300GHz and that it has been adopted as the scientific basis for the equipment certifications provided in Industry Canada's regulatory compliance documents<sup>211</sup>. FortisBC has confirmed that the federal government sets regulatory requirements for radio sensitive equipment in Canada under section 5(1)(d) of the *Radio Communications Act* and regulations setting out the Category I and II lists published by the Department of Industry<sup>212</sup>. FortisBC has confirmed that the Category I and Category II lists include the Radio Standards Specifications (RSS) 102 for RF emitting device compliance at all frequencies and which sets out the requirements for use of RF in relations to a human body and that proponents and operator of the equipment are responsible for compliance<sup>213</sup>. FortisBC confirms that the BC Occupational Health and Safety regulation 7.23 requires compliance with Safety Code 6<sup>214</sup>. FortisBC goes on to confirm that its FortisBC Application will comply with Safety Code 6 and that compliance includes calculation using the duty cycle<sup>215</sup>. FortisBC confirms its calculation of compliance with Safety Code 6, shown in Table 8.4.2a in the FortisBC Application Exhibit B-1, and references further calculations using real world data<sup>216</sup>. This data shows just how small the AMI meter RF signal is relative to the background and measured at an unreasonable 20 cm from the face of the meter.

---

<sup>209</sup> FortisBC Final Submission, Page 137

<sup>210</sup> Exhibit B-15-1, BCH 2.1.1

<sup>211</sup> Exhibit B-15-1, BCH 2.1.2

<sup>212</sup> Exhibit B-15-1, BCH 2.1.3

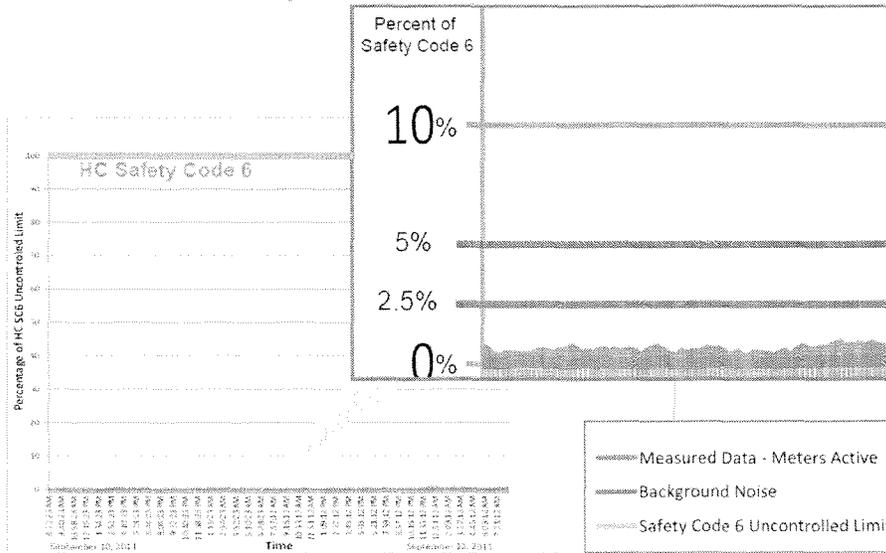
<sup>213</sup> Exhibit B-15-1, BCH 2.1.4

<sup>214</sup> Exhibit B-15-1, BCH 2.1.5

<sup>215</sup> Exhibit B-15-1, BCH 2.1.6 and BCH 2.1.7

<sup>216</sup> Exhibit B-15-1, BCH 2.1.8 and CEC 2.34.1, Appendix 2.34.1a

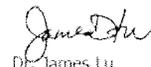
- \* At 20 cm from the meter, the average strength of a meter is 0.3795% of Health Canada's Safety Code 6.



145. FortisBC has provided the Statement of the Chief Medical Health Officer of the Province in which he confirms that RF from cellular base stations is far too low to cause adverse health effects in the community and prudent avoidance of RF is not protective of public health<sup>217</sup>. FortisBC has provided the statement of the Public Health Officer for Vancouver Coastal Health, which concludes as follows<sup>218</sup>.

In conclusion, the public may be opposed to the BC Hydro Smart Meter Program for a number of reasons. That these Smart Meters are health hazards should not be one of them. These devices are active only for an extremely short amount of time each day. They add so little to the existing background radio-frequency fields that it is very difficult to separate them apart from our everyday environment. We recognize that some may disagree with our assessment. We respectfully differ. We are confident however that our assessment is in agreement with the overall scientific understanding regarding radio frequency electromagnetic fields.

Respectfully,

  
 Dr. James Lu  
 Medical Health Officer – Richmond  
 Vancouver Coastal Health

  
 Dr. Patricia Daly  
 Chief Medical Health Officer  
 Vancouver Coastal Health

  
 P.R.W. Kendall  
 OBC, MBBS, MHSc, FRCPC  
 Provincial Health Officer

<sup>217</sup> Exhibit B-15-1, BCH 2.2.1

<sup>218</sup> Exhibit B-15-1, BCH 2.3.1

146. FortisBC has confirmed that Health Canada on its website says the following<sup>219</sup>.

“Since RF energy exposure levels are far below Canadian and international safety limits, Health Canada does not consider that any precautionary measures are needed to reduce RF energy exposure from smart meters.”

147. FortisBC has confirmed that the BC Health Ministry of Health has said the following<sup>220</sup>.

“The evidence, therefore, does not support a conclusion that RF fields, whether from cell phones or Smart Meters, can cause brain tumours in adults.”

“Smart Meters emit RF radiation, but only intermittently, and at a level several times below that of the highest level of personal exposures from cell phones, and well below existing limits for RF exposure to the public. Smart Meters generate an RF signal an average of only one minute per day. In addition, Smart Meters emit very low power – about one watt. This is less than 2 microwatts per square centimetre ( $\mu\text{W}/\text{cm}^2$ ) when standing adjacent to the meter. A microwatt is one millionth of a watt. And, exposure to RF drops quickly with distance from the device. Three meters (10 feet) from the smart meter, the radio frequency signal drops to less than 0.001 per cent ( $0.005 \mu\text{W}/\text{cm}^2$ ) of the Health Canada exposure limits. This exposure level is much less than exposure to RF from cell phone use.”

148. FortisBC has confirmed the following has been said by the World Health Organization<sup>221</sup>.

“EHS [Electromagnetic hypersensitivity] is characterized by a variety of non-specific symptoms that differ from individual to individual. The symptoms are certainly real and can vary widely in their severity. Whatever its cause, EHS can be a disabling problem for the affected individual. EHS has no clear diagnostic criteria and there is no scientific basis to link EHS symptoms to EMF exposure. Further, EHS is not a medical diagnosis, nor is it clear that it represents a single medical problem.”

149. FortisBC has confirmed that the WHO America’s has said the following<sup>222</sup>.

---

<sup>219</sup> Exhibit B-15-1, BCH 2.4.1

<sup>220</sup> Exhibit B-15-1, BCH 2.5.1

<sup>221</sup> Exhibit B-15-1, BCH 2.6.1

"The World Health Organization is concerned about cell phones, but not smart meters. "It sort of sounds, I wouldn't say specious, but far-fetched, really," said Daniel Epstein, spokesman for the WHO's Americas region. "If the U.S. or some other country wanted help with that, we'd provide some expertise, but this is not really an issue on our radar at all, with all the major public health problems that we have."

A review of the literature on cell phone use is due out sometime this year, he said, and a 2007 WHO review found that low-frequency electromagnetic fields in general are not associated with cancer, depression, suicide, cardiovascular disorders, reproductive dysfunction, developmental disorders, immunological modifications, neurobehavioral effects or neurodegenerative disease. In the case of childhood leukemia, which has been found to have a positive association with low-frequency fields, WHO did not find a causal relationship."

150. FortisBC at the request of BC Hydro goes on to provide supporting evidence from the following:

- a) Michigan Public Service Commission<sup>223</sup>
- b) California Council on Science and Technology (CCST)<sup>224</sup>
- c) Edison Electric Institute (EEI)<sup>225</sup>
- d) Electric Power Research Institute (EPRI)<sup>226</sup>
- e) The Institute of Electrical and Electronic Engineers (IEEE)<sup>227</sup>
- f) The International Commission on Non-Ionizing Radiation Protection (ICNIRP)<sup>228</sup>
- g) The IEEE 802.15 Working Group<sup>229</sup>

151. FortisBC at the request of BC Hydro goes on to provide the critique evidence of the Bio-initiative report:

---

<sup>222</sup> Exhibit B-15-1, BCH 2.7.1

<sup>223</sup> Exhibit B-15-1, BCH 2.8

<sup>224</sup> Exhibit B-15-1, BCH 2.9

<sup>225</sup> Exhibit B-15-1, BCH 2.10

<sup>226</sup> Exhibit B-15-1, BCH 2.11

<sup>227</sup> Exhibit B-15-1, BCH 2.12

<sup>228</sup> Exhibit B-15-1, BCH 2.13

<sup>229</sup> Exhibit B-15-1, BCH 3.1

- a) Health Council of the Netherlands<sup>230</sup>
  - b) The European Commission Joint Research Centre EMF<sup>231</sup>
  - c) The Australian Centre for Radiofrequency Bio-effects Research<sup>232</sup>
152. FortisBC also provided the Royal Society 2003 update to the 1999 report<sup>233</sup>.
153. FortisBC also confirmed the Norwegian Institute of Public Health (NIPH), C17-8, Appendix G.<sup>234</sup>
154. The Commission also has the:
- a) COMAR 2009 critique of the Bio-initiative Report;<sup>235</sup>
  - b) AGNIR 2009 report;<sup>236</sup>
  - c) SCENIHR 2009 report;<sup>237</sup>
  - d) ICNIRP 2009 report;<sup>238</sup> and
  - e) NRBP 2004 report.<sup>239</sup>
155. The weight of the evidence of the Canadian Health Authorities and the BC Health Authorities as well as the international health agencies, and various standard setting organizations is very substantive and detailed. These reports take years to write and assemble and many if not all are continuously monitoring the state of the scientific evidence. For the Commission to try to set a standard other than the ones applicable in Canada would be a very ill-advised course of action.

---

<sup>230</sup> Exhibit B-15-1, BCH 4.1

<sup>231</sup> Exhibit B-15-1, BCH 4.2

<sup>232</sup> Exhibit B-15-1, BCH 4.3

<sup>233</sup> Exhibit B-41, Undertaking No. 3

<sup>234</sup> Exhibit B-15, CEC 2.38.1

<sup>235</sup> Exhibit C17-19

<sup>236</sup> Exhibit C17-19

<sup>237</sup> Exhibit C17-19

<sup>238</sup> Exhibit C17-19

<sup>239</sup> Exhibit C17-19

156. The Commission has a wealth of evidence placing the RF emissions for the FortisBC proposed AMI meters far below the accepted standards of exposure.
157. The Commission has some evidence from a few advocates opposed to wireless RF technology and a considerable array of concern from some people in the community which appears to be based on poor or misleading information.
158. The CEC submits that the credibility of Dr. Bailey and Dr. Shkolnikov far outweighed the credibility of the CSTS witnesses and the evidence shows a distinct demarcation between expert evidence of the FortisBC witnesses and the largely advocacy evidence of the CSTS witnesses on health issues.
159. The CEC submits that the record before the Commission is inadequate for the purpose of overruling the Canadian accepted standards. The CSTS have not in any way met the onus or burden that would be required to have the Commission embark on setting its own standard.
160. The CEC submits that the Commission does not have the resources or capacity to compete at the level of standard setting for the RF exposures and that it would be unfair to utility customers to have to pay for a continuing of the RF health concerns, particularly when through their taxes they are already paying for the health infrastructure to monitor and manage these issues.
161. The CEC submits the best the Commission can do in the circumstances is to recognize the transition nature of adoption of new technology and ensure that the utilities it regulates are fully engaged with customers to build understanding and provide customer service and the Commission should back up these efforts with clear cost allocation principles and transition principles to direct the public interest.

**F. *Basics of Compliance with Safety Code 6 and Additional Safety Benefits***

162. The FortisBC Application makes it clear that the requirement for any applied radio communication device in Canada is compliance with Health Canada's Safety Code 6 requirements and that the FortisBC Application complies with Safety Code 6's limit of

0.6 mW/cm<sup>2</sup> or 600 µW/cm<sup>2</sup>, which protects the public from radio frequency non-ionizing radiation health effects<sup>240</sup>.

163. FortisBC has provided evidence that safety will improve for its employees and for its customers and the public as a consequence of the implementation of the FortisBC Application. Meter reader safety incidences will be substantially reduced by reducing the need for meter reading through communication of the meter readings<sup>241</sup>. Health of the public will be improved by virtue of reduced use of gasoline in the meter reading process<sup>242</sup>. In addition safety will be improved by power quality monitoring and by immediate outage detection and earlier restoration<sup>243</sup>.
164. The FortisBC Application will also reduce GHG emissions contributing to global efforts to limit the climate change impacts of GHGs<sup>244</sup>.
165. Reduction of theft of electricity because of improved detection will result in improved customer safety by deterring the unsafe diversion of electricity from the FortisBC electric system<sup>245</sup>.
166. FortisBC has commissioned a Report by Exponent to determine if its FortisBC Application is compliant with Health Canada Safety Code 6<sup>246</sup>. This report shows an evaluation of the RF emission exposure using the methodology required by Health Canada as being on average 10,000 times lower than the Safety Code 6 standard and at peak duty cycle being 1,000 lower than the Safety Code 6 standard<sup>247</sup>.
167. Health Canada acknowledges in its media communication It's Your Health that the infrequent pulsed burst of RF signals means that AMI meters are not emitting RF energy

---

<sup>240</sup> Exhibit B-1, Page 3 and Page 7

<sup>241</sup> Exhibit B-1, Pages 36 to 38

<sup>242</sup> Exhibit B-15, CEC 2.31.2, CEC 2.31.3, CEC 2.31.4, CEC 2.31.5, CEC 2.31.6, CEC 2.31.7, CEC 2.31.8

<sup>243</sup> Exhibit B-1, Pages 38 and 39

<sup>244</sup> Exhibit B-1, Page 38

<sup>245</sup> Exhibit B-1, Pages 80 and 81

<sup>246</sup> Exhibit B-1, Page 134

<sup>247</sup> Exhibit B-1, Page 135

when not communicating and that when measured indoors and outdoors the measured RF energy is far below the limits specified in Safety Code 6<sup>248</sup>.

**G. *Intervener Contentions with Respect to Safety Code 6 and AMI Meter Safety***

168. Intervener's contention that Safety Code 6 only protects against thermal heating effects and is not designed to protect against biological effects has been thoroughly tested in the evidence. There is no specific standard for a biological effect related to RF signals<sup>249</sup>. Those that believe there are biological effects are a minority opinion and the majority opinion that there is sufficient evidence to support a biological effect based standard are well documented in the official health agency reports of numerous countries and independent agencies<sup>250</sup>. FortisBC also quotes the Royal Panel's 1999 Report as saying that there is insufficient evidence to conclude that non-thermal exposures are associated with adverse biological effects and that non-thermal biological effects would require clarification before they are considered for Safety Code 6 (Page 4)<sup>251</sup>.
169. The CEC submits that the evidence on the record supports the fact that Health Canada does continuously monitor the scientific literature and consults with scientific experts in order to do so.
170. An intervener contention that the Health Effects of RF signals, for AMI meters, have not been studied and are different from other RF signals has been thoroughly tested in the evidence. The Exponent Report references studies which have dealt with similar RF signal to the AMI meters in terms of frequency, on/off bursts of communication, intensities and duty cycles<sup>252</sup>.
171. The CEC submits that the evidence on the record supports the fact that the RF signals of AMI meters are substantially the same as GSM cell phones, only with significantly less exposure to people, and have therefore been the subject of considerable health effect investigation for a long time.

---

<sup>248</sup> Exhibit B-15, CSTS 2.4.3

<sup>249</sup> Exhibit B-15, CSTS 2.22.1, WKCC 2.32

<sup>250</sup> Exhibit B-15, CSTS 2.23.1

<sup>251</sup> Exhibit B-15, WKCC 2.9

<sup>252</sup> Exhibit B-15, CSTS 2.21.1

172. An intervener contention is that FortisBC should have considered the range of studies of the health effects of RF signal energy and FortisBC has responded that it has not reviewed the studies but rather relies on the regulations contained in Safety Code 6 and the guidance of Health Canada, Provincial Health Authorities, the Centre for Disease Control and the BC Cancer Agency<sup>253</sup>. This approach applies to reviewing any given individual study approach or theory or thesis put forward by anyone in any publication<sup>254</sup>.
173. The CEC submits that FortisBC cannot and should not attempt to evaluate all of or any of the scientific literature but must rely on the work of others and in particular must rely on the competent designated authorities in BC and Canada. It would be patently unfair to FortisBC customers for them to pay for such a process. The Commission is in a similar position to FortisBC and has extended the bounds of accommodation to CSTS in an extraordinary way and that it is now time for a rational and sensible decision to be made.
174. An Intervener contention is that AMI meters on the opposite side of a bedroom wall may be a health hazard and Fortis has responded that the measured RF intensity would be well below the Health Code 6 standards<sup>255&256</sup>.
175. The CEC submits that the evidence on the record supports the Fortis contention and while showing an increased level at the wall directly behind the meter the signal quickly fades with distance toward the background RF levels. The CEC submits that at the known and measured levels available in the evidence before the Commission the RF energy levels are exceptionally low and are below levels recommended by the Bio-initiative 2007 report. Anyone concerned can reduce their own levels of exposure with simple shielding and distance location techniques, though in the CEC's assessment of the evidence, no such measure would be necessary for public health reasons.
176. An intervener contention is that funding source is a source of bias in studies of health effects of RF energy and FortisBC has responded that the hidden effects of funding bias

---

<sup>253</sup> Exhibit B-15, CSTS 2.43.1

<sup>254</sup> Exhibit B-15, WKCC 2.26

<sup>255</sup> Exhibit B-15, CSTS 2.43.3

<sup>256</sup> Exhibit B-15, WKCC 2.21

need not be considered in evaluation of scientific merit because the best insurance to test results with replication studies by others<sup>257</sup>.

177. The CEC submits that funding bias and many other source of bias are at work all the time and affect all sides of the debate. The evidence on the record shows most if not all of the CSTS witnesses to have a personal financial stake in the anti-RF consultancy or study funding market. The evidence on the record shows that the Exponent Report witnesses for FortisBC have a personal financial stake in the defense of their view of the scientific literature and physics of exposure. The Commission must understand the interests of the witnesses and still balance its perception of the value and weight to be provided to the evidence and testimony of the witnesses. The CEC is not persuaded that independence of bias is available except in degrees, which the Commission must weigh.
178. An intervener contention is that RF signal energy would have a greater effect on children, expectant mothers, elderly and the disabled and FortisBC has responded that research has not shown that there is a differential effect on these groups or that they would not be protected by Safety Code 6<sup>258</sup>.
179. The evidence on the record supports the thesis that smaller bodies and thinner skulls are more likely to absorb RF emission more deeply but the evidence on the record also supports the assessment that there is no consistently demonstrated adverse health effects for these categories of people at the RF level of the AMI meters.
180. An intervener contention is that RF signal energy would have long term cumulative effects and FortisBC has responded that Safety Code 6 on Page 9 states that at this time there is no scientific basis for the premise of chronic or cumulative health effects from RF energy at levels below the Safety Code 6 limits<sup>259</sup>.
181. The CEC submits that the evidence on the record is that IARC is investigation a potential cumulative health effect of long term high level exposure to cell phone energy but that the evidence shows little evidence for any significant adverse health effects from RF

---

<sup>257</sup> Exhibit B-15, CSTS 2.44.5

<sup>258</sup> Exhibit B-15, CSTS 2.44.10

<sup>259</sup> Exhibit B-15, WKCC 2.7

energy levels such as would be experienced from AMI meters. For cell phones there are longer latency period which cannot yet be assessed fully because of constraints on population exposure periods. The Public Health Officers have made a direct assessment of the AMI meter potential for adverse health effects and have quite properly assessed that smart meters do not represent a public health risk.

182. An intervener contention has been that because IARC has listed RF energy as a class 2B carcinogen that Safety Code 6 would need to be reviewed as would the various health officer opinions and FortisBC has responded that Safety Code 6 is known to be constantly under review and that further review is being considered in response to public concerns, particularly with the content of public discussion<sup>260</sup>.
183. The CEC submits that the evidence on the record shows that the designation as a class 2B carcinogen does not establish that RF signal emissions are carcinogenic but does establish an interest in further study and examination of the issues. The CEC notes that the Hardell studies have been a key reason for the IARC classification and that they stand out as not being supported by epidemiological evidence that would need to be present to confirm the studies. This issue will continue to be studied for an indefinite period of time into the future and that the Commission must make a reasoned determination based on the evidence on the record at this time. Society lives with a known carcinogen, diesel exhaust, constantly put into the urban environment and that authorities continue to regulate this pollution to lower levels slowly but have not banned the use. The RF signal emissions of AMI meters that people will be exposed to are so far below potential adverse health risk levels that the Commission has little risk that future studies will result in standards that the AMI meters will not meet. In relative terms the Health Authorities have far more important public health issues to be concerned about and AMI meters will not register as significant scientific issue.
184. An intervener contention is that there are a number of reports/appeals/resolutions of individuals and or groups that should have some weight in considering safety of RF energy and FortisBC responds that it is aware of such resolutions and understands that

---

<sup>260</sup> Exhibit B-15, WKCC 2.14

they do not represent the kind of scientific evidence that agencies like Health Canada would rely on. FortisBC relies on the scientists and physicians at Health Canada<sup>261</sup>.

185. The CEC submits that FortisBC and the Commission should look to the scientific evidence on the record which does not support RF energy levels of AMI meters as having any adverse health effects.
186. An intervener contention is that a precautionary principle should apply to the FortisBC Application and FortisBC says that the Commission has not made such a determination and legal and other arguments to the Commission on the applicability of the precautionary principle have yet to be made in this proceeding<sup>262</sup>.
187. The CEC submits that the Commission will find on the record evidence that makes it clear that precaution with respect to AMI meters RF emissions will achieve no public health benefits.
188. An intervener contention is that people with electro-hypersensitivity sensitivity deserve to have special treatment to enable an RF free environment and FortisBC has responded that it will always consider individual customer circumstances and make exceptions to policies to the extent there are extenuating circumstances it is able to do so in ways that are consistent with the Electric Tariff<sup>263</sup>.
189. The CEC submits that EHS is a known claim of some individuals and that scientific establishment of a cause related to RF emissions at the AMI meter levels is not available. FortisBC should continue to follow its policies of being sensitive to customers and engaged in customer service responses to customers at all times balancing the public interest implementation with customer service implementation.
190. An intervener contention is that this is a case of the government forcing its citizens to use something that is dangerous with reference to a classification of RF energy as a class 2B carcinogen and FortisBC responds that it does not believe that its AMI meters are dangerous then references a BC Hydro website which addresses the question of WHO

---

<sup>261</sup> Exhibit B-15, WKCC 2.18

<sup>262</sup> Exhibit B-15, WKCC 2.20.2

<sup>263</sup> Exhibit B-15, WKCC 2.22

requiring further studies with respect to cell phones and what this would mean with respect to smart meter safety<sup>264</sup>. BC Hydro's partial quote from WHO is shown below referencing a body of scientific literature on biological effect of 25,000 articles.<sup>265</sup>

3           The WHO stated: "In the area of biological effects and medical applications of  
4           non-ionizing radiation, approximately 25,000 articles have been published over  
5           the past 30 years. Despite the feeling of some people that more research needs  
6           to be done, scientific knowledge in this area is now more extensive than for most  
7           chemicals. Based on a recent in-depth review of the scientific literature, the WHO  
8           concluded that current evidence does not confirm the existence of any health  
9           consequences from exposure to low level electromagnetic fields. However, some  
10          gaps in knowledge about biological effects exist and need further research."

11          While smart meters and cell phones both communicate wirelessly, they have  
12          different parameters. Smart meters are located outside of the home and transmit  
13          less than one minute a day at one hundredth the power of a cell phone. The  
14          exposure to radio frequency from a smart meter – over its entire 20-year lifespan  
15          – is the equivalent to a 30-minute cell phone conversation.

191. The CEC submits that the Commission cannot and should not try to evaluate the extensive scientific literature and that it should rely on those designated authorities who are competent to do so.
192. An intervener contention is that statements by parties, often with MD or PhD degrees, make a solid case for there being an irrefutable danger related to RF signal energy and the case of statements by Dr. Kane of this nature to which FortisBC responds demonstrating that the claims quoted are erroneous and completely illogical<sup>266</sup>.
193. There is a very active market in anti-RF promotion and advocacy and that the Commission needs to be acutely aware of the potential for information on the record in this proceeding to be potentially based on unfounded bases such as in this example. The Commission must look for the reliable information in the evidence and must frequently weigh other information as potentially unreliable. On the other hand, the Commission must not retreat into understatement and conservatism to avoid critique. The Commission should describe the reasonable range of the reliable evidence available and make a reasoned assessment of the likely realities, because this is in the public interest to do so

---

<sup>264</sup> Exhibit B-15, WKCC 2.27

<sup>265</sup> Exhibit B-15, WKCC 2.27

<sup>266</sup> Exhibit B-15, WKCC 2.29.4

and the conservatism retreat is less in the public interest in terms of informing the public of the basis for a sound decision in this case.

194. An intervener contention is that RF signal energy entering a home and the home wiring will be amplified by the materials and increase exposure inside the home and FortisBC responds that this view would violate the fundamental laws of physics, is not true and that exactly the opposite happens the RF signal energy is attenuated by the materials in the home including the wiring<sup>267</sup>.
195. The CEC submits that the evidence on the record supports the view that this issue is a false concern.
196. An intervener contention is that RF signal energy from AMI meters involves an assault on the customers by the utility and FortisBC responds that the assertions are fundamentally in error in fact and in law as well as being offensive and incorrect<sup>268</sup>.
197. The CEC submits that as with so many of the intervention contentions the evidence on the record supports the view that the AMI meters will be safe and that FortisBC has generally been exceptionally well informed and that the many controversial views circulating in the public domain to the contrary are not well founded as the above listing shows. The CEC submits that the Commission in its final decision could inform the public debate well by citing the numerous contentions and making findings with regard to the realities it understands to be the case based on the best evidence on the record in this proceeding.

***H. Evidence of Witnesses in Oral hearing Regarding Safety Code 6 and AMI Meter Safety***

198. The FortisBC reason for providing the Safety Code 6 compliance exposures as opposed to estimates of the actual exposures to people in the FortisBC service territory is that this

---

<sup>267</sup> Exhibit B-15, WKCC 2.29.5 and 2.29.6

<sup>268</sup> Exhibit B-15, WKCC 1.30

was the least controversial way to present the information using the Health Canada Safety Code 6 guidelines for determining the compliance with the exposure limits<sup>269</sup>.

199. The CEC submits that FortisBC is correct and that this least controversial view is always a helpful part of the range, which people should understand. It is vitally important for the full range to be made available to the public and in the Commission decision as well as the likely outcome that may be the reality (itself expressed in a range).
200. The FortisBC witness Mr. Lotski has set out the position of the company, that the radio frequency communications technology is normal course (of business) today, that it is clear to FortisBC they must use equipment which complies with Safety Code 6, that they do not get to make the rules and that all of the equipment they do use including the AMI meters they are proposing to use comply with Safety Code 6<sup>270</sup>.
201. The CEC submits that FortisBC is correct in this view and that the Measurement Canada decisions are further evidence that there is an important transition for the utility business and ultimately the public interest will be served in getting there with respect for and service to customers but not capitulation.
202. FortisBC's position is that the test the Commission should be using is that compliance with Safety Code 6 is what is required and compliance with Measurement Canada are both necessary and sufficient for approval from the Commission<sup>271</sup>.
203. The CEC agrees with FortisBC and submits that this is the most sound basis for a Commission decision.
204. FortisBC is clear that its RFP process requested proposals that would be compliant with Safety Code 6 and Measurement Canada criteria<sup>272</sup>.
205. The CEC submits that the RFP process is a complete answer to the question of alternatives accompanied by the evidence that 95% of smart meters in North America are wireless meters.

---

<sup>269</sup> Transcript Volume 3, Page 454

<sup>270</sup> Transcript Volume 3, Page 461

<sup>271</sup> Transcript Volume 3, Page 483

<sup>272</sup> Transcript Volume 3, Page 488

206. FortisBC commissioned the Exponent Report in order to ensure that its proposed AMI meters were compliant with Safety Code 6 and to provide them with an understanding of the current status of the science with respect to the health issues<sup>273</sup>.
207. The Exponent Report did meet its objectives and was ably defended. While the Exponent Report might well have been better with a more fulsome discussion of the in vitro evidence, but the CEC recognizes that all of the evidence put before the Commission is necessarily incomplete and that this does not negate its value. The Exponent Report and particularly the witnesses were very credible in their explanations under cross-examination and they have met the test of providing reliable expert witness assistance to the Commission.
208. The Exponent Report was intended to provide a summary of recent health related review related to radio frequency exposure and for Dr. Shkolnikov to provide computations with respect to the exposures related to the AMI meters being proposed<sup>274</sup>. The CEC submits that this objective was achieved.
209. Dr. Bailey was clear that the Exponent Report contains information on studies, which if proven valid, would project serious health problems, not necessarily for smart meters but for higher power RF sources like cell phones<sup>275</sup>.
210. The CEC submits that this is a very balanced assessment of the evidence in the scientific literature and that the Commission should take note of this distinction as it is important to this hearing and the Commission's tasks.
211. The American Academy of Environmental Medicine report has been raised by interveners as a source of information reporting negative health effects from RF emissions and Dr. Bailey has reviewed the report and concludes that there is no comparison of the validity of study between this report and the more comprehensive work done by agencies such as ICNIRP or the Health Protection Agency in Great

---

<sup>273</sup> Transcript Volume 3, Page 485

<sup>274</sup> Transcript Volume 3, Page 486

<sup>275</sup> Transcript Volume 3, Page 492

Britain<sup>276</sup>. The CEC submits that the Commission can rely on Dr. Bailey's assessment with respect to the AAEM report.

212. Some interveners are looking for absolute answers with respect to the safety of smart meters and Dr. Bailey provides qualified answers with respect to the science not indicating any likely adverse biological effects of exposure at these very, very low levels. He goes on to clarify that in science answers are always qualified<sup>277</sup>.
213. The CEC submits that the care Dr. Bailey took to qualify his answers and to stay closely within his expertise area was notable and should provide the Commission with strong comfort as to his credibility.
214. The documentation behind the Health Canada Safety Code 6 does not appear in their documents but reference to the Royal Society of Canada and its reports would indicate reliance on detailed review of extensive literature with respect to the health impacts of RF exposure<sup>278</sup> by the authors of Safety Code 6. The CEC submits this is a complete answer to the critique that Health Canada does not look at non-thermal health effects.
215. The Bio-initiative Report 2007 and or 2012 do not represent reasonable quality reviews of the scientific literature because among other criticisms they inadequately deal with the long term studies of effects on for instance animals over a whole life time and the Bio-initiative Report is a view of a minority of scientists and non-scientists whereas there is a much larger majority of scientists whose views are summarized in the reports reviewed by Dr. Bailey<sup>279</sup>.
216. The CEC submits that the evidence on the record does not show that the BIR is widely well regarded. The CEC submits that skeptics rarely are and that the role of skeptic in our society is very valuable and that we all benefit from the open and transparent process of the Commission in addressing skeptical concerns about our utilities, whether those are expressed by the CEC, the CSTS or others.

---

<sup>276</sup> Transcript Volume 3, Page 496 to 498

<sup>277</sup> Transcript Volume 3, Page 502

<sup>278</sup> Transcript Volume 3, Pages 523 to 525

<sup>279</sup> Transcript Volume 3, Pages 525 to 527

217. Dr. Bailey explained why it is not appropriate to set standards on the basis of an IARC Class 2B carcinogen classification and that the various agencies assessing this are vigilant about following the science and recommending studies when these classifications are made but that setting standards without scientific evidence could lead to providing no health protection at all<sup>280</sup>. There is no sound basis for the Commission to set a threshold for public health safety based on the IARC classification of 2B carcinogen.
218. Persuasive evidence comes when Dr. Shkolnikov under cross-examination from Mr. Aaron, deals with the quantitative version of the potential effect occurring at limit of detectable harm being 1 degree of temperature rise at 300 watts per meter squared. He then explains that the Safety Code 6 limit is 1/50<sup>th</sup> of 1 degree and when one deals with the AMI meters it would be 1/10,000<sup>th</sup> of that at the average duty cycle or 1/500,000<sup>th</sup> of 1 degree. He explains that at this level the effects become immeasurable and are well below the normal fluctuations to which the body is responding all the time both from the environment and from within the body<sup>281</sup>.
219. The CEC notes that this same level for the AMI meters is well below most perceived possible non-thermal biological effects as well and further demonstrates the extraordinarily low risk associated with AMI meters.
220. Mr. Aaron in trying to elicit testimony agreeing that FortisBC will be imposing biological effects on its customers continues to pursue the Safety Code 6 document where the document states that there are biological effects but he fails to acknowledge the meaning and Dr. Bailey points out that at page 1-11 there is an explanation that this is like a phone ringing and a person hearing the ring, which is cause by a biological effect but is not harmful<sup>282</sup>.
221. The CEC submits that there is a clear basis for biological effect to be observed but not necessarily to be adverse to human health and that this is an important distinction in the evidence.

---

<sup>280</sup> Transcript Volume 4, Pages 553 to 555

<sup>281</sup> Transcript Volume 4, Pages 592 to 594

<sup>282</sup> Transcript Volume 4, Pages 598 to 600

222. Mr. Aaron goes on to pursue the possible effects on the central nervous system, quoting from the Safety Code 6 document, and then he attempts to get agreement in regard to the conclusion in the report which Dr. Bailey points out is from a 1999 report and he attempts to provide a current status on the subject based on a report from 2012 of the Independent Advisory Group on Non-Ionizing Radiation review of literature for the Health Protection Agency of the United Kingdom. This is one of the more important exchanges with respect to Safety Code 6. Dr. Bailey demonstrates that information is being upgraded all the time in science and that the end result in this case is that the studies do not demonstrate acute cognitive effects and it is unclear as to whether they have any health implications<sup>283</sup>.
223. The CEC submits that the Commission needs to pay close attention to this because it has become clear on the record that this literature base is growing rapidly all the time and is constantly under reassessment all over the world. The Commission must form some judgment as to the potential risk of the AMI meter becoming obsolete with a standard change and the CEC submits that this is an extremely low to non-existent risk.
224. Mr. Aaron goes on to try to establish an effect with respect to leakage across the blood brain barrier quoting from the 1999 Royal Society report. Dr. Bailey agrees with what is in the 1999 report but then references other later reports which have addressed the topic such as the 2009 ICNIRP report, which concludes that most studies do not show field-dependent response in either gene expression or permeability of the blood brain barrier and some studies which show some effects at high dosage but equivocal evidence for performance of any behavioural tasks<sup>284</sup>.
225. The CEC submits that the ease with which Dr. Bailey navigated the challenges and accessed information from his experience provides convincing evidence of solid expertise upon which the Commission can rely.
226. Mr. Aaron then goes on to deal with the potential effects of the modulation of the RF signal, referencing the Royal Society 1999 report again particularly as it relates to RF

---

<sup>283</sup> Transcript Volume 4, Pages 603 to 616

<sup>284</sup> Transcript Volume 4, Pages 616 to 623

signals below 300 Hz, which is ELF. He then quotes a section which refers to the potential for further study with respect to cumulative effects of RF energy, with respect to time averaging and with respect to modulation of the RF signal. Dr. Shkolnikov then makes it clear that there is nothing new in the AMI meter RF signal, given that the technology has been around since the 1970s. Dr. Bailey goes on to explain that the reason he has not referenced any studies with specific respect to the modulation characteristics of the RF signal is because the scientific consensus is that such modulations do not produce replicable differences in the response of organisms to radio signals<sup>285</sup>. Upon undertaking Dr. Bailey provided information from animal studies which show a mix of evidence supporting in some cases some effects, in other cases no effects and in some cases positive benefits from long term chronic exposure to RF signal energy with modulations similar to the AMI meter signals<sup>286</sup>.

227. The evidence on the record shows support for Dr. Bailey's contentions.
228. Mr. Aaron then goes on to discuss the relationship of health effects to dose and starts from an Exponent Report assessment that cell phones would be the logical place to look for dose response because they have the highest exposure intensity, much higher than AMI meters<sup>287</sup>.
229. Mr. Aaron then referenced The Royal Society review 1999 for Safety Code 6 with regard to the power density window, which Dr. Bailey went on to discuss with respect to whether or not the studies involved with the claimed effect were relevant and demonstrated that they were in vitro studies with little relevance and were done with power intensities beyond the levels of Safety Code 6. Dr. Bailey cautioned about the pitfalls of taking any particular study and inferring anything because of the difficulties of understanding the studies and interpreting them<sup>288</sup>.
230. This exchange provides ample evidence of the risks involved in the Commission trying to take on an assessment of this exceptionally large pool of scientific information.

---

<sup>285</sup> Transcript Volume 4, Pages 624 to 635

<sup>286</sup> Exhibit B-43, Undertaking No. 5

<sup>287</sup> Transcript Volume 4, Pages 635 to 640

<sup>288</sup> Transcript Volume 4, Pages 640 to 649

231. Mr. Aaron returns to the pulsed modulation topic referencing Karl Maret's report. Karl Maret's evidence says there have been no studies and Dr. Bailey replies that there have been studies. Dr. Shkolnikov then references GSM cell phones which dominate in the world as having similar characteristics as the AMI meters in that they turn on and off 217 times a second (more frequently than AMI meters). Dr. Bailey testifies that these were studied in the Interphone epidemiological study and many other studies and that Dr. Maret is incorrect. Dr. Shkolnikov adds that Dr. Maret is also incorrect in ascribing PCM to the FortisBC AMI meters, the AMI meters use FHSS-FSK modulation. Dr. Maret says that Safety Code 6 does not consider modulation or low level chronic exposure to RF emissions. Dr. Bailey clarifies that the Safety Code 6 does not carve out a specific standard for these but that they were considered in the research leading up to the establishment of Safety Code 6. Dr. Bailey goes on to give references to specific studies considered by the authors of Safety Code 6. By undertaking Dr. Bailey then provided a comprehensive list of the studies which incorporated modulation and power density windows<sup>289</sup>. Dr. Bailey confirms that Dr. Maret is correct in saying that some studies have reported some biological response to modulation. Dr. Bailey concludes that the discussion in the Exponent Report did not consider modulation specifically because it is a general scientific consensus that modulation is not an important issue<sup>290</sup>.
232. The CEC submits that this discussion provides the Commission evidence that the CSTS witnesses do not necessarily have a sound grasp of the facts.
233. Next Mr. Aaron goes to Dr. Carpenter's evidence and the Maisch evidence to discuss whether or not the averaging of exposure over 6 minutes was a flaw in the standards as posed by Carpenter and Maisch. Dr. Shkolnikov provided the background to the Safety Code 6 calculations and the fact that the AMI meters meet the standard with respect to peak exposure and with respect to averaging over 6 minutes. Dr. Bailey distinguished between averaging for the standard and that for biological assessment there is not averaging just the actual exposure and the effects that are studied. The criticism of the CSTS witnesses is of Safety Code 6 and the Exponent Report has accepted the Safety

---

<sup>289</sup> Exhibit B-45, Undertaking No. 7

<sup>290</sup> Transcript Volume 4, Pages 649 to 687

Code 6 as the applicable standard in Canada. Dr. Bailey is clear that a review of the scientific literature, which he has done, does not support the contention that Safety Code 6 is flawed. Dr. Shkolnikov adds that Dr. Maisch is incorrect saying that only averaging is looked at by Safety Code 6 because it explicitly evaluates 1/10<sup>th</sup> of a second increments as well<sup>291</sup>.

234. The CEC submits that the cross-examination exchanges constantly reinforce the credibility of the FortisBC expert witnesses.
235. Mr. Aaron goes on then to address conflict of interest and certain authors or participants of various studies and groups and possible bias related to the source of funding for the studies. Specifically reliance on Dr. Swerdlow and Dr. Ahlbom were discussed with respect to involvement with consulting activity and ownership of shares. Dr. Bailey in responding to his concerns on this subject refers to the problem of relying on any one study and the need to examine the weight of evidence from many studies and a number of attempts to replicate studies. Dr. Bailey refers to numerous other sources of bias and the need to be cautious about many different sources of bias<sup>292</sup>.
236. The CEC submits that bias is present throughout the realm of human endeavors and that the scientific principles of having numerous different sources confirming results works to blunt the potential for bias but cannot eliminate it. The CEC submits that there is not pure independent source of bias free information for the Commission to look for.
237. Mr. Aaron then turns back to Safety Code 6 and the Royal Society 1999 report. Specific reference is made to the fact that some diseases may not emerge for many years possibly 20, 30 or 40 years and that there has not been sufficient time for some of these long latency issues to emerge. Dr. Bailey confirms that duration is a part of risk assessment and confirms that the development of cancers cannot be studied in short term studies but requires examination over a long duration. Reference is made to a Swedish Radiation Safety Authority opinion that short term effects from RF radiation can be ruled out with a high degree of certainty but there is uncertainty about high long-term use. Dr. Bailey

---

<sup>291</sup> Transcript Volume 4, Pages 687 to 699

<sup>292</sup> Transcript Volume 4, Pages 700 to 735

confirmed that Safety Code 6 does not contain a limit on exposure duration. Dr. Bailey then points out that no scientific panel, significant health agency, standard setting regulatory group has concluded from their assessment of the evidence that there is a basis to conclude that exposure to very, very low RF radiation, such as with smart meters would result in adverse health effects including cancer. Dr. Bailey suggests that Safety Code 6 has dealt with the issue of duration by proposing that so long as one is below their standard this would be protective of public health regardless of duration of exposure. Dr. Bailey agrees that further studies of the issues involved with RF radiation will be done and are required to continue to improve knowledge and that since the 1999 Royal Society review many studies have been done and added a tremendous amount to the knowledge base used to assess the public health issues<sup>293</sup>.

238. The CEC submits that the CSTS posed views on latency of effects from exposure is supported in the evidence as unknown but that Dr. Bailey's assessment of the risks associated with AMI meters as exceptionally low is also firmly supported in the evidence.
239. Mr. Aaron then reviews statements by Dr. Blank with respect to the greater potential for adverse health effects related to smart meters relative to other exposures because of long term exposure in close proximity. Dr. Shkolnikov addresses the allegation of sustained exposure nature of smart meters by refuting the 24/7 concept of exposure by pointing out that there is only 1/5<sup>th</sup> of a second of exposure in six minutes so the exposure over a day is very low. A cell phone transmits in contact 30 times a minute to the cell tower and a cordless phone base also makes the frequent communication. TV, FM and AM radio are broadcast continuously. Natural sources of RF are also relatively continuous. With respect to proximity, the AMI meters are placed outside the home with the RF signal pointing away from the home and that while the signal emanates into all the space around it the intensity varies greatly based on the directionality of the signal<sup>294</sup>.
240. The CEC submits that the Dr. Shkolnikov assessment of the exposures is far and away more credible and persuasive than Dr. Blank's views.

---

<sup>293</sup> Transcript Volume 4, Pages 737 to 761

<sup>294</sup> Transcript Volume 4, Pages 761 to 772

241. Mr. Aaron's next review is of statements by Dr. Maret. Dr. Bailey agrees that most studies done are of short term effects and not long term effects, which is applicable to studies of RF emissions<sup>295</sup>. Mr. Warren confirms that it is his understanding that Safety Code 6 covers long term exposures of 20 years, which is inferred from the absence of a duration factor in the standard and Health Canada's mandate<sup>296</sup>. Dr. Bailey alludes to the possibility of a long term cumulative effect if one could be established scientifically and that the frequency of exposures could possibly influence cumulative effects<sup>297</sup>. Dr. Bailey confirms that the AMI meters would comply with any standard set ten times lower than Safety Code 6, such as the standards for Israel, Russia & China as proposed by Mr. Aaron<sup>298</sup>.
242. The evidence on the record put the AMI meters RF emissions extremely low and below any accepted standard
243. Mr. Aaron goes on to review statements of Dr. Maisch that there is not research data with respect to the effects of AMI meter emissions. Dr. Bailey provides the answer that there is such data, referencing laboratory studies on animals using similar RF emissions and specifically similar emissions to GSM phones, which are very close to those from the AMI meters and Dr. Shkolnikov provides a very specific comparison characteristic by characteristic<sup>299</sup>.
244. Dr. Shkolnikov demonstrated an exceptional understanding of the RF signals and the characteristics of the potential exposures and that the Commission can rely heavily on his expertise.
245. Asked about studies with respect to exposure during sleep Dr. Bailey references studies which have reviewed exposure during sleep<sup>300</sup>. Mr. Aaron then turns to a study involving

---

<sup>295</sup> Transcript Volume 5, Page 790

<sup>296</sup> Transcript Volume 5, Page 792

<sup>297</sup> Transcript Volume 5, Pages 792 to 796

<sup>298</sup> Transcript Volume 5, Page 758

<sup>299</sup> Transcript Volume 5, Pages 806 to 854

<sup>300</sup> Transcript Volume 5, Pages 857 to 858

long-term exposure to RF emissions and a finding that the rats gained weight, which Dr. Bailey says is common in these type of studies<sup>301</sup>.

246. The CEC submits that this is all further evidence that the Commission ought not to get into trying to arbitrate the scientific debate and had best look to Health Canada for its expertise in doing so.
247. In trying to determine exposure over 20 years Mr. Aaron tries to get agreement that a 5% duty cycle would be relevant and Mr. Warren disagrees stating that the average duty cycle is .06% with a maximum experienced duty cycle of .58% and Dr. Shkolnikov confirms that the correct metric is .06% resulting in about .144 months exposure over 20 years<sup>302</sup>.
248. The CEC submits that this little exposure only takes into account a few factors and while instructive as far as it goes it falls far short of the real world exposures which involve many more attenuation factors.
249. Mr. Aaron reviews statements by Dr. Sears with respect to the frequency of transmissions per day being 1268, which Dr. Shkolnikov confirms but then refutes other parameters in her report. Dr. Shkolnikov confirms that the maximum theoretical duty cycle for the AMI meters is 5% or 72 minutes per day. Mr. Aaron then tries to confirm that exposure to a cell phone for 72 minutes per day for 365 days per year for 20 years would be a greater exposure than the Interphone study exposures for the top 10% of exposures. Dr. Shkolnikov then deals with Dr. Maret's exposure assertions by referencing the background earth exposure of  $1.3 \text{ mW/m}^2$  and then disputes the comparison of peaks with averages for a reference to Sweden exposure levels<sup>303</sup>.
250. This exchange underscores the paucity of credibility in any of Dr. Maret's calculations and again urges the Commission to accept the persuasive, credible evidence supplied by Dr. Shkolnikov.

---

<sup>301</sup> Transcript Volume 5, Pages 862 to 863

<sup>302</sup> Transcript Volume 5, Pages 863 to 866

<sup>303</sup> Transcript Volume 5, Pages 878 to 880

251. Dr. Bailey confirms that the basic restrictions in Safety Code 6 are designed to limit heating of tissues, which is determined using a time average of 6 minutes. Dr. Shkolnikov elaborates that Safety Code 6 has determined that a temperature rise of 1 degree at 50 times the Safety Code 6 limit is what is likely and so the standard is only concerned with heating input over time<sup>304</sup>. Dr. Bailey confirms that Safety Code 6 for the frequency range of AMI meters does not have a specific limitation for non-thermal effects but confirms that Health Canada does an ongoing review of published studies involving professional judgment<sup>305</sup>. Dr. Bailey confirms that other than the Royal Society reports used by Health Canada the process for their determination of the Safety Code 6 is not publicly documented or available<sup>306</sup>.
252. The critiques of Health Canada, while interesting, are not sufficient evidence to have the Commission impugn the Safety Code 6 outcome and engage in setting its own standards.
253. Mr. Aaron goes on to differentiate the Safety Code 6 standard from a review of scientific literature to support a standard and then asks to confirm that there are other standards used in the world to which Dr. Bailey agrees and Dr. Shkolnikov confirms that the AMI meters would conform to virtually all of the world's standards<sup>307</sup>. Dr. Bailey confirms that the FCC and Health Canada are both in the process of updating their standards<sup>308</sup>.
254. This is important evidence to this hearing because the factual reality of this underscores the advocacy of the CSTS witnesses versus the reality of the physics.
255. The next review is of Dr. Carpenter's assertion that the Exponent report is incorrect in saying that there are no adverse health effects not mediated by tissue heating, because there are documented health effects seen and consistently reproduced in other studies, which are then referenced to the Bio-initiative Report. Dr. Shkolnikov answers that the Bio-initiative 2007 report is not a standard setting jurisdiction but that if there was a jurisdiction using their proposed standard the FortisBC AMI meters would meet that

---

<sup>304</sup> Transcript Volume 5, Pages 880 to 883

<sup>305</sup> Transcript Volume 5, Pages 883 to 889

<sup>306</sup> Transcript Volume 5, Pages 890 to 896

<sup>307</sup> Transcript Volume 5, Pages 897 to 899

<sup>308</sup> Transcript Volume 5, Page 899

standard too even if you were  $\frac{1}{2}$  meter in front of it for the whole duration of a lifetime<sup>309</sup>.

256. This continues to be telling evidence, which is not recognized by the CSTS witnesses and the fact that this is so severely lessens the credibility.
257. The statements about cause and effect versus association are explored then with specific reference to establishing that there is no adverse health effect the Exponent Report advice that the EPA uses a test of at least 2 animal studies with 2 different species showing no effect provides reasonable assurance that there is no adverse health effect and Dr. Bailey confirms that if that test were applied there would be reasonable assurance that the AMI meter exposures are not carcinogenic<sup>310</sup>. Dr. Bailey provides his succinct opinion and he goes on to confirm the opinion clearly.

1 | DR. BAILEY: A: My opinion with respect to the state of  
 2 | the science as summarized in our report was that the  
 5 | reviews and published science, and recently-published  
 4 | research with improved exposure information do not  
 5 | provide a reliable scientific basis to conclude that  
 6 | the operation of advanced meters will cause or  
 7 | contribute to adverse health effects or physical  
 8 | symptoms in the population, to which I would add,  
 9 | including cancer, to be specific to your question.

258. This opinion is a convincing expert opinion tested fully in cross-examination.
259. Mr. Aaron asserts that the Exponent Report did not consider non-thermal effects and Dr. Bailey confirms that it did not provide a summary description of them but that they were

---

<sup>309</sup> Transcript Volume 5, Pages 901 to 905

<sup>310</sup> Transcript Volume 5, Pages 908 to 914

considered, just as the scientific health agencies have and that there is no scientific support for Dr. Maisch's position<sup>311</sup>.

260. Dr. Maisch's views have limited utility for the Commission.
261. The next subject reviewed was whether or not there are particularly vulnerable groups which Maisch and Maret claims there is and the FortisBC response to information requests says there is not. Dr. Bailey confirms that he does not know of any scientific evidence that suggests children and other named groups are more vulnerable to RF emissions using a definition based on known scientifically established health hazards but Dr. Bailey qualifies his understanding of vulnerability by suggesting that an alternative definition related to vulnerability to exposure due to physical characteristics of which he is aware.<sup>312</sup>
262. The ability of the FortisBC witnesses to conceptually parse the meanings of assessments and address the details is creditworthy for the Commission.
263. Mr. Aaron then pursues a line of questioning whether or not Safety Code 6 even applies to the AMI meters and the FortisBC witnesses clarify that while a reading of the Safety Code 6 may appear to show that the AMI meters would be exempt that FortisBC nevertheless has to be compliant with Safety Code 6 and that this is the applicable standard in Canada<sup>313</sup>.
264. The CEC submits that the nuance of the applicability of Safety Codes 6 is not accurate and should not be given credence by the Commission.
265. The question of customers opting out on the basis of having some health issue such as diabetes and not wanting to gain weight based on the Sommer study and the FortisBC witness answers that the Fortis BC Application is not for an opt out provision but that

---

<sup>312</sup> Transcript Volume 5, Pages 945 to 951

<sup>313</sup> Transcript Volume 5, Pages 958 to 961

they would consider one if the Commission made that a condition of their approval of the project<sup>314</sup>.

266. The CEC submits that the CSTS witness's list of RF biological health effects seems to encompass so much of modern medical concerns that it cannot be reconciled with the scientific literature in these separate fields. The Commission should be very wary of this evidence.
267. Mr. Aaron then pursues a definition of cancers as all having one thing in common, that being cell damage and Dr. Bailey agrees with caveats according to how he had stated the answer<sup>315</sup>. The question then turns to the Exponent report assertion that studies assessing combined groupings of cancers are of limited usefulness and have not been adequately replicated, which Dr. Bailey confirms is his evidence<sup>316</sup>. Then a concern expressed in a Royal Society 1999 report with respect to effects on melatonin production is reviewed and Dr. Bailey says he does not think there is good evidence to support a non-thermal effect but that there is room for more study<sup>317</sup>. The next issue raised was a concern in the Royal Society 1999 report that there was not a plausible mechanism for RF signal emissions to be causing non-thermal effects and Dr. Blank's proposition for non-thermal effects being caused by cellular stress response is reviewed. Dr. Bailey confirms that the Exponent Report does not discuss Dr. Blank's hypothesis and he goes on to explain why because of the non-specific and common nature of many issues affecting this type of cell response and that numerous such theories, over the years, have failed to be replicated and sufficiently established scientifically to warrant further research<sup>318</sup>.
268. Mr. Aaron turns to the Maret report statement that there is no significant natural energy at RF radiation frequencies and Dr. Shkolnikov disagrees and discusses the sources of background microwave radiation noise, including a discussion of the fact that Dr. Blank does not distinguish between ELF and RF throughout his report. Dr. Shkolnikov

---

<sup>314</sup> Transcript Volume 5, Pages 961 to 966

<sup>315</sup> Transcript Volume 5, Pages 967 to 968

<sup>316</sup> Transcript Volume 5, Pages 968 to 973

<sup>317</sup> Transcript Volume 5, Pages 973 to 974

<sup>318</sup> Transcript Volume 5, Pages 974 to 983

concludes that it is relevant to compare the FortisBC AMI meter and the background radiation and that there is a degree of comparability<sup>319</sup>.

269. The CEC submits that once again Dr. Shkolnikov has provided the more credible explanations.
270. Finally Mr. Aaron turns to the EHS concerns and the scientific proof that people cannot detect RF signal emissions and Dr. Bailey confirms that people could be affected by symptoms and could believe the symptoms are related to RF exposure but in laboratory studies they have not been able to replicate the claimed ability to be aware of the RF impact<sup>320</sup>.
271. This is important evidence because it underscores the need for the Commission to separate health concerns from adverse health effects and to settle on the need for a full customer service approach to the transition to the AMI meters.
272. Mr. Atamenenko raised a concern with respect to one party who has a pacemaker and is worried that the AMI meters will affect the device upon which he depends for his life and Dr. Shkolnikov offers that all medical device manufacturers diligently review RF sources and design their devices to protect them from RF sources and that being six inches away from the antennae of a device may be recommended. Dr. Shkolnikov concludes that the AMI meter would not be within a range of concern<sup>321</sup>. The FortisBC witness provided the information response references on this issue indicating the devices are safe in respect to the AMI RF emissions<sup>322</sup>. Mr. Atamenenko then goes on to discuss a concern raised by an individual with a prior EMF experience which is believed to make her extremely sensitive to RF emissions and the FortisBC witnesses addressed the issue as not suggesting the issue is related to anxiety but confirming that the scientific evidence shows that there is no relationship between RF radiation and peoples claims with respect to EHS<sup>323</sup>.

---

<sup>319</sup> Transcript Volume 5, Pages 984 to 986

<sup>320</sup> Transcript Volume 9, Pages 986 to 989

<sup>321</sup> Transcript Volume 9, Pages 1000 to 1005

<sup>322</sup> Transcript Volume 9, Pages 1005 to 1007

<sup>323</sup> Transcript Volume 9, Pages 1008 to 1014

**I. Radio Frequency Exposure**

273. The most important test of the health issues for the FortisBC AMI project are that they meet the Safety Code 6 standards and requirements regarding exposure to RF radiation.
274. The second most important test is whether or not the Provincial Public Health Officer has any concerns with the public health issues related to Smart Meters.
275. The third most important test is whether the evidence before the Commission provides a basis to say that the exposures to RF radiation from AMI meters will be so far below safety limits so as to negate the probability of a future change in safety code standards making the approval obsolete.
276. The fourth most important test is whether the evidence before the Commission provides a basis to say that the RF exposures, which may be of concern to some, can be mitigated in ways that can legitimately satisfy the concerns.
277. The fifth most important test is whether or not the Commission has sufficient evidence and capability to in fact assess the full body of scientific literature and make a determination with respect to risk.
278. The sixth final most important test is whether or not the evidence before the Commission is that health issues will be so severe, immediate, highly probable and non-mitigatable that the Commission must take action independent of other authorities.

**J. Onus of Evidence**

279. In the CEC's submission, the utility, FortisBC, must have the onus to demonstrate tests 1, 2, 3, and 4 to the extent necessary.
280. An intervention to have the Commission set an alternate standard has the onus to demonstrate tests 5 and 6.

**K. The Measure of RF Signal Exposure**

281. The field of expertise required for understanding and measuring RF signal exposure is a specialty field in its own right. The 2009 ICNIRP Report, Section I<sup>324</sup>, contains a full discussion of the subject and represents the necessary level of understanding to be able to deal with the dosimetry in regard to non-ionizing radiation. In this section it can be seen just how complicated the subject is and how difficult it can be to fully understand the subject.
282. For the measurement of RF signals from AMI meters such as the ones proposed by FortisBC Inc. there are a number of useful sources of evidence for the Commission to consider. Particularly useful is the 2010 EPRI Technical Report, An Investigation of Radiofrequency Fields Associated with the Itron Smart Meter<sup>325</sup>, which is an extensive assessment of the RF exposures from Smart Meters.
283. Key to the discussion of measurement of the RF signal exposures is measuring the power density (PD) of exposure which is measured in  $\mu\text{W}/\text{cm}^2$  or  $\text{mW}/\text{cm}^2$  (these two measures are similar but the  $\mu\text{W}/\text{cm}^2$  is 1/1000 of the  $\text{mW}/\text{cm}^2$ ) for exposure at some distance from an RF signal source and specific absorption rate exposure, which is measured in W/kg for exposure close to a specific body location. The switch from PD measurement to SAR measurement is variable with frequency and for the AMI meter frequency occurs as near field distances of about 5 cm<sup>326</sup>.
284. The technical physics basis for calculation of RF signal exposures is measuring the power density based on the following equation made available in the Exponent Report.

The exposure calculation is based on the computation modeling recommended in Industry Canada RSS-102. The power density at a distance R from the transmitter, with input power P, antenna gain G, and duty cycle  $\delta$  is equal to:

$$2.56 \frac{PG}{4\pi R^2} \delta$$

<sup>324</sup> Exhibit C-17-19, ICNIRP 2009, Pages 1 to 70

<sup>325</sup> Exhibit C-17-8-1

<sup>326</sup> Exhibit B-15-1, BCH 2.2.12, IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields 3KHz to 300 GHz, Page 122

- 285. Exhibit B-1, Appendix C-5, Exponent Report, Appendix A, Technical Memorandum
- 286. Of the witnesses available to the Commission, Dr. Shkolnikov was without a doubt qualified as an expert with respect to RF signal exposure measurement and sustained throughout cross-examination a record of providing competent objective advice and expert opinions. In contrast none of the CSTS witnesses made available to the Commission and none of the other witnesses demonstrated any comparable competence in this area.
- 287. The information required for certification of the AMI meters with Health Canada, which is done on the basis of the US certification for the Federal Communications Commission (FCC) in the US is as follows.

**MPE Calculation**

The Power Density (mW/cm<sup>2</sup>) is calculated as follows:

$$S = \frac{P/G}{4\pi R^2}$$

Where:

S = power density (in appropriate units, e.g. mW/cm<sup>2</sup>)

P = power input to the antenna (in appropriate units, e.g. mW)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

MPE Calculator for Mobile Equipment							
Limits for General Population/Uncontrolled Exposure*							
Transmit Frequency (MHz)	Radio Power (dBm)	Power Density Limit (mW/cm <sup>2</sup> )	Radio Power (mW)	Antenna Gain (dBi)	Antenna Gain (mW eq.)	Distance (cm)	Power Density (mW/cm <sup>2</sup> )
915.0	28.38	0.61	688.65	2.2	1.696	20	0.227
2440	18.13	1.00	65.01	3.2	2.399	20	0.231

- 288. This shows that the power density limit Maximum Permissible Exposure (MPE) is 0.61 mW/cm<sup>2</sup> and that the AMI meter has a power density of 0.227 mW/cm<sup>2</sup> when measured at a distance of 20 cm from the face of the meter.
- 289. This is approximately 37% of the MPE and therefore qualifies as meeting the standard with respect to the exposure limit.
- 290. FortisBC goes on to show that this is essentially a peak measurement and is not reflective of the actual exposures people would experience. The primary issue they introduce into their evidence is the communications duty cycle or amount of power communication over a period of time. This is necessary because the meters are not on all of the time.
- 291. The FortisBC primary information with respect to RF signal exposures in as follows.

7

Table 8.4.2.a - RF Exposure at 902 MHz to 928 MHz

Condition	Exposure at 0.5 meters (mW/cm <sup>2</sup> )
Health Canada Safety Code 6 Limit <sup>19</sup>	0.6
Mean duty cycle 0.06%	0.000056
Maximum typical duty cycle 0.58%	0.00054
Maximum supported duty cycle 5%	0.0047

292. This shows that for the mean duty cycle for the AMI meter the exposure to the RF signal is 0.000056 mW/cm<sup>2</sup> and is about 1/10000 of the Health Canada Safety Code 6 standard limit for RF exposures.
293. This information is taken from the Exponent Report where it is shown this data is based upon measurements taken at .5 meter or 50 cm in front of the AMI meter<sup>327</sup>. At this distance there is very little likelihood that anyone would be continuously exposed to these levels of RF signal power density.
294. This information essentially deals with two of the relevant factors in assessing people's exposure, being the peak power output of the radio and the duty cycle or how often it is communicating.
295. The precise type and number of radio signals from the AMI meters were provided by FortisBC as 1141 command and control communications having a duration from 20 to 33 milliseconds each and 127 scheduled and on demand read communications having a duration of 53 to 103 milliseconds each<sup>328</sup>.

## Calculation of the Duty Cycle

AMI Maximum Communication Time Per Day			
Type of AMI Communication	Quantity per day	Duration milliseconds	Total Time milliseconds
Command and Control Com	1141	20 to 33	37653
Scheduled and on Demand Read	127	53 to 103	13081
Total AMI Communication/day			50734
Total Time/day			86400000
Maximum Duty Cycle %			059%

329

<sup>327</sup> Exhibit B-1, Appendix C-5, Exponent Report, Appendix A, Technical Memorandum, Page A-2

<sup>328</sup> Exhibit B-15, CEC 2.34.1

<sup>329</sup> Exhibit C-17-23

296. The CEC calculated the total communication time over a day shows a duty cycle of .059% and confirms the FortisBC evidence of a .06% mean duty cycle. Because meters may be relaying information from one meter to the next before communicating back to the FortisBC mesh network there will be some variation in the amount of RF signal across a large population of meters.
297. The 190,000 communications per day claims of some interveners<sup>330</sup>, suggest that the communication is of greater frequency has been clearly shown to be a misrepresentation because it relates to another meter type and not the FortisBC AMI meter.
298. The 24/7 argument raised by some interveners<sup>331</sup>, suggesting that the RF signals are impacting people with exposure all the time, is clearly debunked by this information. The reality is that at this level of exposure the RF energy being received by a person at 20 cm to 50 cm from the front of the meter is less than 1 minute per day if they are near the meter all day.

**L. Other Factors Affecting the RF Signal Exposure**

299. FortisBC references: (1) power; (2) distance; (3) frequency; and (4) duty cycle as the relevant factors to consider when evaluating EMF risks<sup>332</sup>. This is incomplete as there are a number of other factors which become relevant when we want to know what the likely exposure of the public will be to the AMI meter RF signal. The following is a list of additional factors to be considered beyond the power, frequency and duty cycle considered in the preceding section. Some of these are mentioned in the Exponent Report but are not brought together into an estimate of the exposure of the public in general. Each is discussed here with the relevant evidence references and likely impacts.
- a) Distance from the Source of Signal
  - b) Direction of Signal & Shielding of Meter Back Plate
  - c) Across Body Spatial Variation
  - d) Building Materials
  - e) Signal Reflections

---

<sup>330</sup> Transcript Volume 3, Pages 333 to 334

<sup>331</sup> Transcript Volume 4, Pages 764 to 765

<sup>332</sup> Exhibit B-1, Page 134

- f) Number of Meters Providing a Signal
  - g) Presence at Site of the Source of Signal
  - h) Choice of In Home Communication
  - i) Background RF signal Noise
  - j) Optional Shielding
300. Distance from the source signal is very important because the RF signal's power density drops off with the square of the distance. Virtually all people spend their time, when at home, in different rooms of their premises so they will be exposed to quite different RF signal power density from their AMI Meter.
301. The formula<sup>333</sup> provided in the Exponent Report allows an easy determination that the RF signal drops by a factor of 10 within the first meter and then by another factor of 10 within the second to third meter and then another factor of 10 by the sixth meter. So it would be reasonably expected that people will spend very little to no time within 100 centimeters of an AMI meter and much of their time more than 200 centimeters away from an AMI meter thus, the likely exposures will be between 100 and 1000 times lower than the exposure at 20 centimeters from the AMI meter. This is confirmed in the 2010 EPRI Technical Report showing the calculations with 3 orders of magnitude drop off within about 15 feet from the source RF signals<sup>334</sup>.
302. In addition to this effect of distance, the back plate of the AMI meter provides shielding from the RF signal coming from the AMI meter such that the RF signal power density is reduced by a factor of 10<sup>335</sup>. Further evidence of this effect can be found in other reports, such as the 2010 EPRI Technical Report, which measured the fields behind the AMI meter and found them to be 1/10 of the field in front of the meter<sup>336</sup>.

---

<sup>333</sup> Exhibit B-1, Appendix C-5, Exponent Report, Appendix A, Technical Memorandum, Page A-1

<sup>334</sup> Exhibit B-15-1, BCH 2.2.11, Page 14-4

<sup>335</sup> Exhibit B-1, Appendix C-5, Exponent Report, Appendix A, Technical Memorandum, Page A-2

<sup>336</sup> Exhibit B-15, CEC 2.39.1, Reference to Report Exhibit B-15-1, BCH 2.2.11, Page 17-1, Conclusion

303. Spatial variation across a body can also be a significant source of reduction of exposure because the RF signal is not uniform throughout the space in a home it will vary across a person's body. Across a 6 foot vertical space the RF intensity from an AMI meter can vary by a factor of 10 from peak to lowest value and the spatial average would be in the 23% range<sup>337</sup>.
304. Building materials can vary significantly in terms of affecting the propagation of the RF signal through the home. There are at least two instances in the evidence where information is provided with respect to the attenuation of the RF signal through building materials. A simulated stucco wall was tested to determine signal loss across the building material, which showed a significant signal attenuation amounting to approximately 40 % reduction<sup>338</sup>. Dr. Shkolnikov also provided some approximation for building material attenuation of the RF signal indicating a reduction by a factor of 6<sup>339</sup>.
305. Signal reflections can occur when RF signals bounce off surfaces and aggregate intensity in a particular space. The calculation provided in the Exponent Report indicated a factor of 2.56 as a multiplier to allow for this effect, which Dr. Shkolnikov indicated needed to be reduced to 1.15 when considering indoor exposure because a reduction in that environment of the conditions which would cause reflections<sup>340</sup>.
306. In some situations there is a potential for there to be a number of meters in the vicinity of a person's home. A neighbour's AMI meter for instance would be one potential source. A bank of meters on an apartment building would be another source. The first instance of a neighbour's AMI meter is unlikely to add any significant RF signal intensity to another person's home. The spacing between residences will typically be in the 10 foot to 15 foot range which will reduce the RF signal by a factor of 100 before it gets into the home<sup>341</sup> and it will then dissipate further with distance toward a negligible signal. Banks of multiple meters have been tested to determine the combined effect of multiple meters,

---

<sup>337</sup> Exhibit B-15-1, BCH 2.2.11, Page 11-1

<sup>338</sup> Exhibit B-15-1, BCH 2.2.11, Page 10-8, Table 10-2

<sup>339</sup> Exhibit B-52, Undertaking No 9, Page 4

<sup>340</sup> Exhibit B-52, Undertaking No 9, Page 4

<sup>341</sup> Exhibit B-1, Appendix C-5, Exponent Report, Appendix A, Technical Memorandum, Page A-3

which shows an increase in field intensity of about a factor of 2 and demonstrates that adding more meters does not add more field intensity. The level of the RF field appears to reach a definitive plateau very quickly after adding just a couple of meters<sup>342</sup>. It should also be noted that banks of meters at apartment buildings often are in electrical closets further away from and more shielded than on the outside of a residential home and many of the residents served will be very far away from the source of the RF signals and will therefore experience almost no exposure at all.

307. There is a further factor involving whether or not a person is present at home all of the time. People are home a considerable portion of a day on average but do spend some percentage of time away from home. The CEC estimates that people are at home on average up to 80% of the time based on the American Time Use Survey of the Bureau of Labor<sup>343</sup>.
308. One concern may be that other in home devices would potentially provide aggregate RF exposure and the AMI meter exposure could be additive to this and exacerbate the RF exposure issue. The exposure levels from a number of devices have been estimated based on reasonable duty cycles for the devices and the AMI meter exposures have been shown to be very small by comparison when evaluated at reasonable attenuation factors. A microwave oven leakage at 1 foot was measured at 12% of the MPE<sup>344</sup>, but the duty cycle would be quite limiting reducing this over time to 100's of times less exposure. A cordless phone was measured at .03% of the MPE at distance of 1 foot. A wireless router was measured at a distance of 1 foot and showed a field intensity of .24% of the MPE<sup>345</sup>. Cordless phones and routers are sometimes experienced at a 1 foot distance but are more likely to have substantially lower exposure levels because they will be experienced at much greater distances. These are all 100's to 1000's of times greater than the AMI power density level which would be experienced in a home. The AMI meter exposure

---

<sup>342</sup> Exhibit B-15-1, BCH 2.2.11, Page 9-6, Table 9-2

<sup>343</sup> Exhibit C17-23, CEC Witness Aid

<sup>344</sup> Exhibit B-15-1, BCH 2.2.11, Page 13-2, Figure 13-2

<sup>345</sup> Exhibit B-15-1, BCH 2.2.11, Page 13-3

will be a negligible addition and the aggregate actually experience in homes will be many orders of magnitude below the safety levels.

309. The California Council on Science and Technology report on The Health Impacts of Radio Frequency Exposure from Smart Meters also has a comparative graphic showing Smart Meters in comparison to other devices and in particular showing that cell phones have much more intense RF signal power levels<sup>346</sup>. The levels shown for Smart Meters are shown for a 50% duty cycle and are therefore extraordinarily conservative. The AMI meter duty cycle is about .06%, which is about 800 times lower than the data shown. This will move the Smart Meter comparative more properly toward the bottom range of the graphic with FM and TV broadcast signals. This lower actual duty cycle is acknowledged in their report<sup>347</sup>.
310. Another potential issue is the combined impacts of all of the components of the AMI meter including the cell communications tower. Again the distances and the duty cycles move the exposures to very modest levels in total aggregate<sup>348</sup>.
311. The background RF signal noise can be quiet significant in terms of presence but quite small in terms of overall RF exposure<sup>349</sup>. The AMI meter exposures can get lost very quickly in the background and disappear into the background creating difficulty in even measuring the effects.
312. One of the more important findings with respect to AMI meter RF signals is that it is relatively easy to shield any location from the signals with inexpensive options for an individual customer. The physics of the RF signal reveals that it is susceptible to significant attenuations with a simple wire mesh of increasingly smaller size mesh with a 38% transmission loss for common mesh<sup>350</sup>. Of course the market will supply even greater shielding materials to satisfy a public fear, even though the fear may be totally

---

<sup>346</sup> Exhibit B-15-1, BCH 2.2.9, Page 5, Figure 1

<sup>347</sup> Exhibit B-15-1, BCH 2.2.9, Page 19, Figure 5

<sup>348</sup> Exhibit B-15-1, BCH 2.2.11, Page 16-3, Table 16-1

<sup>349</sup> Exhibit B-1, Appendix C-5, Exponent Report, Appendix A, Technical Memorandum, Page A-4

<sup>350</sup> Exhibit B-15-1, BCH 2.2.11, Page 10-4

unfounded. The importance of this is that anyone who fears these RF signals is free to further reduce the prospect of exposures, should they so choose, at relatively little cost. The consequence of this result extended to the realm of the feasible options is that the Commission is not restricted to seeing the question of customer choices entirely in terms of opting out as the politics of Smart Meters has been defining it.

313. Finally the Commission has very useful data on actual measured peak values within a home, which verifies everything else the science provides as assurance with respect to the safety of the AMI meters.
  
314. This data from two different residences measures peak values inside the home including right behind the Smart Meter. The peak values shows an RF field strength of 0.01% of the MPE right behind the meter and the more common measurement throughout the house is a peak field strength of 0.0005%<sup>351</sup>. The common level of the rest of the RF measurements leads to the conclusion that these are background level of RF exposure and the AMI meter measurements have faded to vanishingly small once beyond the immediate area behind the meter. This is consistent with the attenuation of the RF signal strength with distance. Of course these peak values will be much lower once they account for the duty cycle and average exposure levels, which would require multiplication by .06% for the mean duty cycle or .58% for the maximum duty cycle (note the 95% level is .08% and only the last 1% gets close to the .58% level)<sup>352</sup>. These measurement include background RF levels and in home device levels. So they represent very close to real life examples and demonstrate the very low exposure levels. Multiplying out the measured peak values right behind the meter of 0.01% by the mean maximum duty cycle 0.58% alone provides an exposure of 0.00006%, which is just below 1/1000000 or .0001% of the MPE. These levels correspond very closely with the estimates of attenuation of the signal strength for the various attenuation factors.

---

<sup>351</sup> Exhibit B-15-1, BCH 2.2.11, Page 9-18, Table 9-6 and Page 9-25, Table 9-8

<sup>352</sup> Exhibit B-15-1, BCH 2.2.11, Page 12-9, Figure 12-7

315. The CEC put these various attenuation factors before the FortisBC witnesses in a witness aid to demonstrate that the evidence in the FortisBC Application was exceptionally conservative.<sup>353</sup> The CEC point has been that a much more accurate picture of the AMI meter RF signal exposure is that it is disappearing close to the background levels and a quantitative view of this is instructive in understanding just how slight these exposures really are. The CEC table showing various attenuations showed the attenuation reaching 1/1000000 of the Safety Code 6 standard inside a home is provided below.

Summary of the Typical Exposure From AMI Meters				
Factor in Exposure to RF	Factor Reduction	Energy in $\mu\text{W}/\text{cm}^2$	% of Safety Code 6	Fraction of Safety Code 6
Average AMI Peak RF Energy		227	37.83%	3.78/10
Duty Cycle of AMI Meters	046%	104420	0174033%	1.74/10000
Distance Away from Meters	6.7%	005961	0011602%	1.16/100000
Time at Home	83.3%	005801	0009669%	0.97/100000
Meter Back Shielding	10%	000580	0000967%	0.97/1000000
House Material Shielding	90%	000522	0000870%	0.87/1000000

354

316. This table shows that when the various attenuation factors are taken into account the exposure levels reduce to below 0.0001% or one/one millionth of the Safety Code 6 standard. It should be noted that this table could be adjusted further by the spatial averaging of exposure to further accommodate real exposure attenuation issues. Interestingly these levels correspond with the lowest background levels measured in and around a home and shown in the EPRI Report, providing consistent confirmation.

317. FortisBC in its response to information requests from the CEC acknowledged that the 1/10000 information they put in the FortisBC Application was a conservative number and that the 1/1000000 level is further support for the Provincial Health officer view that the AMI meters are not a public health risk<sup>355</sup>.

318. The FortisBC witness under cross examination on this subject had the following to say.

<sup>353</sup> Exhibit C-17-23

<sup>354</sup> Exhibit C-17-23

<sup>355</sup> Exhibit B-15, CEC 2.39.4

5                   In terms of the -- is exposure in Table 1  
6                   of the Undertaking 2, does it cover the whole gamut as  
7                   I think I was very strongly cross-examined by CEC, the  
8                   answer is no. If you're inside the house and under  
9                   most conditions the numbers we have put in this table  
10                  for the smart meter are very conservative, and even --  
11                  I would -- actually based on the calculation we used,  
12                  even outdoors at half a metre which we compute, you're  
13                  unlikely to reach those values; inside the house  
14                  you're probably going to be much lower. So from that  
15                  perspective, yes, clearly, and deferring to CEC, we  
16                  could have -- we put in our report but we didn't put  
17                  in our table, you know, the whole gamut of how low the  
18                  exposure from the smart meter could get as opposed to  
19                  the value that we have conservatively estimated from  
356 20               the device.

6                   And so what I would say is that typical  
7                   exposure from the smart meter would increase exposure  
8                   by about one ten-thousandth of the Safety Code 6 in  
9                   addition to other devices, although I defer to Mr.  
10                  Weafer it would be one millionth.

357

319. The CEC contends that there will be some range of exposure to AMI meter RF signals particularly where a person is very close to the meter but that overwhelmingly the public

---

<sup>356</sup> Transcript Volume 6, Page 1046

<sup>357</sup> Transcript Volume 6, Page 1052

exposure to RF signals from AMI meters will typically be one-one millionth of the Safety Code 6 standard or less.

320. The evidence goes on to suggest that the likely exposures to RF signals from AMI meters would comply with the 2007 Bio-initiative Report recommended standard and probably the 2012 Bio-initiative Report recommended standard, if either of them were to be a standard<sup>358</sup>.
321. In an urban setting of maximum RF exposure the combined contributions of multiple devices as posed would have an exposure effect of 13% of Safety Code 6 with a bank of 45 AMI meters on the premises contributing 1/30,000 of the combined effect<sup>359</sup>.

**M. *Credibility of Witnesses***

322. The CEC has reviewed the reports, IR responses and oral testimony, if applicable, from the witnesses put forth by FortisBC, the Citizens for Safety Technology and others. The CEC assessed the witnesses and the information presented based on their objectivity, stature, comprehensiveness/accuracy and relevance to smart meters.
323. The CEC submits the witnesses presented by FortisBC were significantly more credible and persuasive than those presented by the Citizens for Safe Technology.

**N. *Citizens for Safe Technology Witnesses***

324. The CEC submits that the witnesses presented by the Citizens for Safe Technology could more reasonably be characterized as advocates rather than objective experts. Typically the CEC found the information to be uneven in its presentation. Mixed with some credible information was information that was misrepresented, uninformed, or biased in its analysis and consequently of limited use in informing the debate. Further, the witnesses themselves were frequently of limited stature in their fields, were not convincing in their respective areas of influence and that several elements of the information presented by the CSTS witnesses was contradictory between them. The CEC submits that the CSTS witnesses should be found by the Commission to be, for the most part, not particularly credible except in very limited areas. The CEC submits that most of the CSTS witnesses

---

<sup>358</sup> Transcript Volume 7, Pages 1265 to 1266

<sup>359</sup> Exhibit B-52, Undertaking No. 9, Page 6

have unjustifiably come to the conclusion that Health Canada and other organizations are incorrect and/or remiss simply because they do not agree with the interpretation of the evidence that Health Canada assesses and weighs to set the standards for Canada.

325. The CEC submits that the Commission should assign a limited weight to these witnesses. The CEC provides the following commentary with respect to the individual witnesses:

**(1) Dr David O Carpenter**

326. Dr. Carpenter was qualified as an expert as “a public health specialist with expertise in electrophysiology, low frequency electromagnetic field bioeffects, and radio frequency and microwave radiation bio-effects”<sup>360</sup> Dr. Carpenter is a public health physician rather than a practicing physician which he states focuses on determining the causes of human disease, rather than treating individuals<sup>361</sup>. His recent research is direct study of the diseases in humans that result from exposure to environmental agents, including non-ionizing radiation.<sup>362</sup>
327. The CEC has reviewed the evidence submitted by Dr. Carpenter and finds it to be of limited assistance in informing the issue. In summary, Dr. Carpenter’s evidence is unduly weighted in favor of a particular viewpoint and not representative of the body of scientific literature. Such actions typify those of an advocate and are not in keeping with that of an objective contributor to the proceeding. The BCUC should find Dr. Carpenter’s evidence to be of limited value. Certain portions of Dr. Carpenter’s evidence are potentially misleading. Dr. Carpenter is somewhat injudicious in his commentary and is at times disrespectful to organizations which have considerable stature. Several of Dr. Carpenter’s statements are inflammatory and unreasonably dismissive of opinions that are not the same as his, regardless of the credentials of the statute of the decision-maker or the analysis conducted.
328. The CEC has reviewed FortisBC’s assessment of Dr. Carpenter in their Final Submissions and supports this analysis<sup>363</sup>. The CEC makes the following additional

---

<sup>360</sup> Transcript, Volume 11, March 15, 2013, Page 2070

<sup>361</sup> Exhibit C9.8 2C, Carpenter Statement, Page 1

<sup>362</sup> Exhibit C9.8 2C, Carpenter Statement, Page 1

<sup>363</sup> FortisBC Final Submission, Pages 169 - 180

analysis and submissions with respect to the information that Dr. Carpenter submitted as evidence.

329. Dr. Carpenter portrayed himself as being objective but did not present evidence in an objective fashion. Dr. Carpenter claims that because the study of the human health effects of electromagnetic fields has never been his area of personal research that he does not have a ‘personal ax to grind’ his credibility is enhanced<sup>364</sup>. Dr. Carpenter’s states that his role has been to ‘provide an external and independent review of the state of the science on this issue’<sup>365</sup>. The CEC did not find Dr. Carpenter’s evidence to be balanced in its overview of the information but instead found it heavily weighted towards supporting the concept of their being negative health effects associated with RF signals.
330. The CEC has reviewed the literature cited by Dr. Carpenter in his original statement<sup>366</sup> and found that the number of references were decidedly weighted in favour of one viewpoint, and that those references presenting the alternative view were typically cited with caveats while the supporting studies were not. The CEC found with respect to weight that Dr. Carpenter cited a total of 59 studies of which 43 were supportive of their being a negative effect (73%) , 14 were not supportive (24%) and 2 were inconclusive. Of the 14 that were not supportive, Dr Carpenter cited 5 with caveats. Dr. Carpenter did not provide any caveats with respect to the 43 supportive documents. As an example, with respect to the issue of cancer being associated with radio transmission towers or cell towers, Dr Carpenter cited 7 studies of which 5 (items a, b, c, d, and g) could be viewed as supporting his viewpoint and 2 (items e and f) that were not supportive<sup>367</sup> which the CEC submits were intended to convey that Dr. Carpenter could be viewed as providing balance. Of the 2 providing balance however, 1<sup>368</sup> was cited with a significant caveat while none of the 5 supporting documents were challenged on any basis. This characterization of any of the literature cannot be viewed as balanced or objective, and is

---

<sup>364</sup> Exhibit C9.8 2C Carpenter Statement, Page 2

<sup>365</sup> Exhibit C9.8 2C Carpenter Statement, Page 2 (Note: Document is not paginated)

<sup>366</sup> Exhibit C9.8 2C Carpenter Statement pages 3-13 (Document is not paginated)

<sup>367</sup> Exhibit C9.8 2C, Carpenter Statement, Page3-4 (Document is not paginated)

<sup>368</sup> Item f, Mobile phone base stations and early childhood cancer; case-control study, Exhibit C9.8 2C, Carpenter Statement, page 4

evidence of a document that is intended to advocate for a position rather than objectively inform the Commission.

331. The CEC further submits that some of the information provided as reference material without caveat by Dr. Carpenter is not necessarily well-respected and has been found to be implausible. For example, Dr. Carpenter cites reference item (g) “Mortality by neoplasia and cellular telephone base stations in the Belo Horizonte municipality, Minas Gerais state, Brazil” by Dode AC et al without caveat and characterizes it as showing “higher rates of death from cancer among individuals living close to cell towers than among those living further away. Rates were highest in residences less than 100 m, falling to near background a 1,000 m”<sup>369</sup>. This report has been subject to considerable critique and one of the other witnesses, Dr. Blank recognized that the results did not make sense<sup>370</sup>. Dr. Blank referenced the same report which was an epidemiological study done in Belo Horizonte Brazil, which found a 13 fold increase in RF energy and a 35% increase in cancer deaths. When asked under cross-examination why cancer deaths would increase in a five year period in parallel with the increasing RF energy when it can take many years and sometimes decades for cancers to develop Dr. Blank agreed that the results do not mesh or make sense. He concluded that “there is no good answer”<sup>371</sup>. The CEC notes that Dr. Carpenter’s depiction of the potential effects of base stations does not necessarily reflect international opinion. ICNIRP found with respect to exposure from base stations that “Generally, studies of symptoms and wellbeing find a higher percentage of symptoms and less well-being among person who are concerned about exposure from base stations, whereas there is little evidence for an association between measured RF levels and the studied outcomes.”<sup>372</sup>
332. The CEC has also reviewed the studies cited by Dr. Carpenter and compared the conclusions drawn by the authors of the studies with that drawn by Dr. Carpenter. On several occasions Dr. Carpenter cited information from reports but arguably misrepresented the conclusions of the authors by omitting key information or

---

<sup>369</sup> Exhibit C9.8 2C, Carpenter Statement, Page 4 (Document is not paginated)

<sup>370</sup> Transcript, Volume 9, Page 1681 to 1685

<sup>371</sup> Transcript, Volume 9, Page 1681 to 1685

<sup>372</sup> Transcript, Volume 9, Oral Hearing, Page 1725

commentary as to its significance or weaknesses. The CEC requested Dr. Carpenter to provide 4 Abstracts by way of undertaking which he has done<sup>373</sup>. The CEC notes the following contrasts between what Dr. Carpenter recorded as the conclusions and the actual conclusions from the authors of the report. Some of their conclusions appear to be misrepresented or at a minimum misunderstood. The Commission should be able to rely on Dr. Carpenter to accurately portray the conclusions and would have no reasonable ability to have reviewed the documents and drawn their own conclusions.

333. As an example, at page 3 of his filed evidence, Dr. Carpenter referenced Adult and Childhood Leukemia near a High-Power Radio Station in Rome Italy (Michelozzi), Dr Carpenter summarized this document as:

“a. Michelozzi P, Capon A, Kirchmayer U, Forastiere F, Biggeri A, Barca A, Perucci CA. 2002. Adult and childhood leukemia near a high-power radiostation in Rome, Italy. Am J Epidemiol 155: 1098-1103. The authors show that there is a significant elevation of childhood leukemia among residents living near to Vatican Radio (Standardized mortality ratio = 2.2, 95% CI =1.0-4.1), and that the risk declines with distance away from the transmitter (p = 0.03).<sup>374</sup>

334. The CEC submits that in this instance Dr. Carpenter presented the study as evidence but ignored key issues with the studies as identified by the authors and did not address the main conclusion that no causal implication could be drawn. The Abstract as written by the authors states the following<sup>375</sup>. The CEC has added the emphasis.

335. “Some recent epidemiologic studies suggest an association between lymphatic and hematopoietic cancer and residential exposure to high-frequency electromagnetic fields (100 kHz to 300 GHz) generated by radio and television transmitters. Vatican Radio is a very powerful station located in a northern suburb of Rome, Italy. In the 10-km area around the station, with 49,656 residents (in 1991), leukemia mortality among adults (aged >14 years; 40 cases) in 1987–1998 and childhood leukemia incidence (eight cases) in 1987–1999 were evaluated. The risk of childhood leukemia was higher than expected

---

<sup>373</sup> Exhibit C9-21, CSTS Undertaking

<sup>374</sup> Exhibit C9-8 2C, Carpenter Statement, Page 3 (Note: the document is not paginated)

<sup>375</sup> Exhibit C9-21, CSTS Undertaking

for the distance up to 6 km from the radio station (standardized incidence rate = 2.2, 95% confidence interval: 1.0, 4.1), and there was a significant decline in risk with increasing distance both for male mortality ( $p = 0.03$ ) and for childhood leukemia ( $p = 0.036$ ). **The study has limitations because of the small number of cases and the lack of exposure data. Although the study adds evidence of an excess of leukemia in a population living near high-power radio transmitters, no causal implication can be drawn. There is still insufficient scientific knowledge, and new epidemiologic studies are needed to clarify a possible leukemogenic effect of residential exposure to radio frequency radiation** (*Am J Epidemiol* 2002;155:1096–103). Carpenter Example at page 3 of his statement: Ecological study on residences in the vicinity of AM radio broadcasting towers and cancer deaths: preliminary observations in Korea.<sup>376</sup>

336. The CEC submits that in this instance Dr. Carpenter has taken the first sentence nearly verbatim from the Abstract Conclusions, (without quotations) but left out the second key sentence which does not support his opinions.

337. Dr Carpenter referenced this study as follows:

c. Park SK, Ha M, Im HJ. 2004. Ecological study on residences in the vicinity of AM radio broadcasting towers and cancer death: preliminary observations in Korea. *Int Arch Occup Environ Health* 77:387-394. This study found higher mortality areas for all cancers and leukemia in some age groups in the area near the AM towers.

338. The conclusion from the Abstract accurately reads as follows:

“Conclusions: We observed higher mortality rates for all cancers and leukemia in some age groups in the area near the AM radio broadcasting towers. Although these findings do not prove a causal link between cancer and RF exposure from AM radio broadcasting towers, it does suggest that further analytical studies on this topic”<sup>377</sup>

339. Dr. Carpenter’s example at page 4 of his statement was titled “Epidemiologic Evidence on Mobile Phones and Tumor Risk A Review (Ahlbom)”. In this case, Carpenter

---

<sup>376</sup> Exhibit C9-8 2C, Carpenter Statement, Page 3 (Note: the document is not paginated)

<sup>377</sup> Exhibit C9-21, CSTS Undertaking

selected information cited in the report but dismissed the Author's the main conclusion which was decidedly different from that portrayed by Dr. Carpenter:

(d) Ahlbom A, Feychting M, Green A Keifet L, Savitz DA, Swedlow AJ (ICNIRP Standing Committee on Epidemiology 2009. Epidemiologic Evidence on Mobile Phones and Tumor Risk A Review. *Epidemiology* 20: 639-652

'Comment that most studies of glioma show small increased or decreased risk among users, although a subset of studies show appreciably elevated risks. They then argue that there are methodological reasons for these positive studies.'

340. In contrast, the Abstract as written by the authors states:

"This review summarizes and interprets epidemiologic evidence bearing on a possible causal relation between radiofrequency field exposure from mobile phone use and tumor risk. In the last few years, epidemiologic evidence on mobile phone use and the risk of brain and other tumors of the head in adults has grown in volume, geographic diversity of study settings, and the amount of data on longer-term users. **However, some key methodologic problems remain, particularly with regard to selective nonresponse and inaccuracy and bias in recall of phone use.** Most studies of glioma show small increased or decreased risks among users, although a subset of studies show appreciably elevated risks. We considered methodologic features that might explain the deviant results, but found no clear explanation. **Overall the studies published to date do not demonstrate an increased risk within approximately 10 years of use for any tumor of the brain or any other head tumor. Despite the methodologic shortcomings and the limited data on long latency and long-term use, the available data do not suggest a causal association between mobile phone use and fast-growing tumors such as malignant glioma in adults (at least for tumors with short induction periods). For slow-growing tumors such as meningioma and acoustic neuroma, as well as for glioma among long-term users, the absence of association reported thus far is less conclusive because the observation period has been too short.** (Emphasis added)

341. Dr. Carpenter's example at page 12 of his Statement<sup>378</sup> is titled "Effects of Cell Phone Radiofrequency Signal Exposure on Brain Glucose Metabolism". The CEC submits that in the instance Dr. Carpenter again lifted information almost directly from the Abstract conclusion (without quotation), but omitted key information that does not support his opinion. This document was referenced in the following manner:

c. Volkow ND, Tomasi D, Wange GJ, Vaska P, Fowler JS, Teland F, et al. 2011. Effects of cell phone radiofrequency signal exposure on brain glucose metabolism. JAMA 305:808-814. In healthy participants and compared with no exposure, 50-minute cell phone exposure was associated with increased brain glucose metabolism in the region closest to the antenna. This shows direct effects of RF radiation on the brain with cell phone use.

342. The conclusions from the Abstract state in contrast:

"Conclusions- In healthy participants and compared with no exposure, 50-minute cell phone exposure was associated with increased brain glucose metabolism in the region closest to the antenna. **This finding is of unknown clinical significance**".

343. The CEC submits that Dr. Carpenter has been injudicious in his assessment of other bodies of stature and dismissive of opinions that are not the same as his, regardless of the credentials of the organization or the analysis undertaken. The CEC found Dr. Carpenter to be disrespectful of both Health Canada and the authors of the Exponent Report, claiming that Health Canada's scientists were 'verging on the unethical'<sup>379</sup> and the authors of the Exponent report were 'unjustified and questionably ethical'.<sup>380</sup>

344. The CEC submits that all of the above is more in keeping with an advocate than an objective expert on whom the BCUC could rely. The CEC recommends that the BCUC assign very limited weight, if any, to Dr. Carpenter's evidence and further assess the BioInitiative Report of which he is a key editor in the above light.

---

<sup>378</sup> Exhibit C9-8 2C, Carpenter Statement, Page 12

<sup>379</sup> Exhibit C9-8 2C, Carpenter Statement, Page 13

<sup>380</sup> Exhibit C9-8 2C, Carpenter Statement, Page 14

**(2) Dr. Donald Maisch**

345. Dr. Donald Maisch was qualified by the Commission as an expert in ‘health standards relating to exposure to electromagnetic radiation’.<sup>381</sup> Overall, the CEC recommends that the Commission accept Dr. Maisch’s evidence with respect to the jurisdiction and credentials of Health Canada and reject his evidence on most other subjects as being inadequately researched or outside his area of expertise.
346. Dr. Maisch submitted evidence in the form of a report and information responses and oral testimony related to several topics including: the state of scientific research related to health and RF exposure from smart meters; the approach followed by Health Canada in setting Safety Code 6; the validity of the Exponent Report submitted by FortisBC; the validity of Health Canada’s Safety Code 6; the validity of the Health Canada document ‘Its’ Your Health’; the range of medical perspectives on electromagnetic hypersensitivity (EHS) including his own views; the applicability of studies which are not based on the same emissions as smart meters; the appropriate organization for establishing health standards; the quality of the process of expert review at the international standards setting organization; the relevance of in vitro vs. animal studies in identifying health effects among others.
347. The CEC accepts Dr. Maisch’s qualifications as an expert in ‘health standards relating to exposure to electromagnetic radiation’ but submits they are limited to identifying the jurisdiction of health organizations setting standards electromagnetic radiation and their role in public policy. Dr. Maisch’s evidence is that Health Canada is the appropriate body for setting standards relating to health effects from RF signals and that this is the body’s standards with which FortisBC must comply. He states “...FortisBC is bound to follow national official standards, such as Safety Code 6. Ultimately it is the responsibility of Health Canada, as a public health agency, to consider adopting alternative standard recommendations, and base their own recommendations on an objective assessment of the science. That is not the responsibility of FortisBC.”<sup>382</sup>

---

<sup>381</sup> March 12, 2013, Oral Hearing Transcript, Page 1503, Lines 13-25

<sup>382</sup> ExhibitC9-8-4C, Statement of Donald Maisch, Page 12

348. While Dr. Maisch has knowledge of the jurisdiction of standard setting bodies, he should not be considered credible with respect to his opinions of the particulars of Health Canada's Safety Code 6, nor the validity of Health Canada's determinations and decision-making processes. Overall, the CEC found Dr. Maisch inadequate in his research and analysis as well as biased in his viewpoint and recommends that the Commission assign a reduced weighting to Dr. Maisch's evidence in this regard. The CEC notes that Dr. Maisch criticized Health Canada's capabilities stating "Health Canada had not considered thermal effects in setting Safety Code 6"<sup>383</sup>, only to admit in his oral testimony and information request responses that he had been relying upon a document more than 10 years out of date<sup>384</sup> for his information. Although Dr. Maisch acknowledged his mistake once queried, the CEC submits that such an error is untenable given that Dr. Maisch claims expert insight into the inner workings of the regulatory bodies and was explicitly commenting on the documents that Health Canada had examined for information.<sup>385</sup>
349. The CEC further submits that Dr. Maisch has not completed a review of, and does not have the knowledge or credentials to conduct a sufficient analysis of the health literature reviewed by Health Canada, but is instead critiquing Health Canada's analysis based on a flawed theory as to how Health Canada makes determinations. Dr. Maisch's premise to be that Health Canada set inadequate exposure limits by relying on a chain of inferior decisions, starting at the international level, which only considered thermal effects and considers this premise to be unsupportable and has backed this up with a cursory review of the literature referenced on Health Canada website.
350. The CEC does not accept Dr. Maisch's thesis "The Procrustean Approach" as being justification for negating the validity of international standards bodies' recommendations nor Health Canada's reference to international standards at the introduction of Safety

---

<sup>383</sup> Exhibit C9-8-4C, Statement of Donald Maisch, Pages 2 and 7

<sup>384</sup> Exhibit C9-14-3, CEC 1.3.2

<sup>385</sup> Exhibit C9-8-4C, Statement of Donald Maisch, Page 7

Code 6 to be sufficient for such a claim.<sup>386</sup> The CEC submits that Dr. Maisch's thesis as biased in its viewpoint. Dr. Maisch's thesis was entitled 'The Procrustean Approach: Setting Exposure Standards for Telecommunications Frequency Electromagnetic Radiation' and is sub-titled 'An examination of the manipulation of the telecommunications standards by political, military, and industrial vested interests at the expense of public health protection'. Dr. Maisch's thesis that 'all scientific evidence not in conformity with the thermal bed of knowledge is simply cut off from consideration' is clearly incorrect with respect to Health Canada. The evidence shows that Health Canada reviews a wide range of studies examining non-thermal effects.<sup>387</sup> Dr. Maisch acknowledges Health Canada's clear statement of its assessment of the literature regarding 'biological effects' and its finding that that 'these proposed outcomes do not provide a credible foundation for making science-based recommendations for limiting human exposures to low-intensity RF energy.'<sup>388</sup>

351. The CEC submits that Dr. Maisch's qualifications also do not extend to conducting even limited scientific health studies, assessing 'anecdotal reports' or providing commentary with respect to their value. Dr. Maisch is not a doctor, has no qualifications in epidemiology and has no academic training in medicine or health sciences. Many of Dr. Maisch's opinions are based simply on his own self-education. "I have taken a special interest in tinnitus and studied all that I could find on the condition, as well as discussing the condition with hearing specialists, because I have had the condition myself since the 1980s. The cause was most likely exposure to loud noise during construction work. It is a common condition in Australia and can be quite annoying for some people."<sup>389</sup>

---

<sup>386</sup> Exhibit C9-13-3, FBC 4.1, "The scientific approach used to establish the exposure limits in Safety Code 6 is comparable to that employed by other science-based international standards bodies(8-12). As such, the basis restrictions in Safety Code 6 are similar to those adopted by most other nations, since all recognized standard setting bodies use the same scientific data"

<sup>387</sup> Exhibit C9-13-3, FBC 4.11.2

<sup>388</sup> Exhibit C9-13-3, FBC 4.12.5

<sup>389</sup> Exhibit C9-14-3, CEC 1.1

352. The CEC also submits that Dr. Maisch has stretched his credibility in assessing the validity of health literature by referencing his own studies which are clearly unscientific in their design and biased in their process and interpretation.

**(3) Dr. Margaret Sears**

353. Dr. Sears was qualified by the Commission as a researcher and author of scientific literature with expertise in the scientific body of material relating to the health effects of electromagnetic fields, including radiofrequency emissions.<sup>390</sup> Dr. Sears' expertise is primarily relevant in identifying the techniques of evidence synthesis<sup>391</sup> and recommends that the Commission find significance in Dr. Sears' comment that there is insufficient time and resources to conduct a proper scientific review of the literature, and that such a review would also require a carefully scoped question for analysis which was not provided.<sup>392</sup> Otherwise, the CEC recommends that the Commission find Dr. Sears' information to be biased in its selection of information and presentation and as such, is evidence of one viewpoint and of limited weight. The CEC also recommends that Dr. Sears' analysis of the strength of the radiofrequency signal is beyond the scope of her credentials.

354. The CEC notes that Dr. Sears has presented herself as experienced and/or expert in evidence synthesis<sup>393</sup>, and as working with an internationally prominent group that conducts systematic reviews of medical literature<sup>394</sup> although she is not listed on their website and does not work there full-time.<sup>395</sup> As such, the primary value of Dr. Sears' evidence should rationally have been to offer an objective overview of the literature base and predominant medical opinion related to potential health effects of RF signals. Dr. Sears did not do so, and there is little value in credentials relating to how to make objective determinations through evidence synthesis or medical literature reviews if the expertise is not exercised in the issue at hand. The CEC accepts it as reasonable that Dr. Sears did not have the time, resources or carefully scoped question necessary to conduct a

---

<sup>390</sup> Transcript., Volume 9, Page 1805

<sup>391</sup> Exhibit C9-8, 7B, Dr. Sears Report, Page 5

<sup>392</sup> Exhibit C9-12, CEC 1.5.4.1 and CEC 1.12.1

<sup>393</sup> Exhibit C9-8, 7B, Dr. Sears Report, Page 1

<sup>394</sup> Exhibit C9-8, 7B, Dr. Sears Report, Page 5

<sup>395</sup> Transcript, Volume 9, Page 1852

‘systematic review’ or ‘weight of evidence’ analysis<sup>396</sup> but submits that the Commission should reasonably expect balance in the reporting of information from an expert of these credentials. Dr. Sears did not provide a balanced report but submitted a report to portray one viewpoint which is not in keeping with the guidelines she would adhere to if she was conducting a professional analysis. The CEC considers that although Dr. Sears stated that she intended to provide the best assistance to the Commission, she has been less than successful. The CEC notes that Dr. Sears has been previously disqualified as an expert witness in 2009 R v. Canada SKQB 509 with the following comments regarding her submission:

“As one of the respondents observed, Dr. Sears’ affidavit, although it reflects a noble effort at objectivity, nevertheless frequently reflects opinions, if not of Dr. Sears herself, those of others who have authored these studies....”<sup>397</sup>

355. The CEC considers that Dr. Sears implied through the tone, discussion and detail of her report that she was providing a more objective analysis to the Commission and Interveners than she did. Dr. Sears discussed her credentials and the use of strict protocols and critical assessment in evidence synthesis<sup>398</sup> at the outset of her discussion on health effects. She provided a seven page discussion as to ‘methodological issues in the synthesis of scientific/medical evidence regarding effects of radiofrequency radiation including epidemiological study design’ and incorporated detailed discussions on how a variety of different types of bias may be inserted into various studies and reports.<sup>399</sup> Dr. Sears also referenced 69 studies by way of examples. Despite this tone Dr. Sears did acknowledge that she was not providing an objective review and was intending to make points to support her opinion. She states “I was not asked for a weight of evidence analysis over such a broad range of research questions, and provided neither the time or resources to conduct one. Such an activity would be vast in scope requiring a research team over many months...a review ‘considering signals that should not be ignored, and may even inform further research’ is more appropriate. This was my goal’.” She also

<sup>396</sup> Exhibit C9-12, CEC 1.5.4.1, CEC 1.7.2, CEC 1.12.1, and CEC 1.13.3.1

<sup>397</sup> Exhibit C9-12, FBC 1.7.3

<sup>398</sup> Exhibit C9-8, 7B, Dr. Sears’ Report, Page 5

<sup>399</sup> Exhibit C9-8, 7B, Dr. Sears’ Report, Pages 5-7. Dr. Sears discusses issues with comparator groups, lack of historical data, vested interest accurate measures of dose response among others.

stated "... I chose the best quality studies I could find.....that most directly...demonstrated the point being made." The CEC submits that the Commission should rely on Dr. Sears' evidence that it would take a research team many months to properly assess the health effects evidence. The CEC recommends that the Commission use this to determine that it is not in possession, on the record of this hearing, of sufficient information to independently set alternative standards to Health Canada.

356. In reviewing the information provided by Dr. Sears the CEC found significant bias in the examples cited, substantial gaps in the evidence discussed and inaccurate portrayals of medical opinion. The evidence presented was clearly one-sided and intended to advocate rather than inform.
357. The CEC's analysis found that in Section 1 of Dr. Sears' report "Methodological issues in the synthesis of scientific/medical evidence regarding effects of radiofrequency radiation" she cited a total of 19 studies<sup>400</sup> to illustrate her points. Of these, the CEC assessed 16 to be supportive of the position that there may be negative health effects from RF signals, and none of these were critiqued for bias or had caveats. In contrast, Dr. Sears referenced 3 reports which did not suggest a health effect, and all were portrayed with caveats as to their value or as examples of bias.
358. In Section 2 'Biological effects of radiofrequency radiation' Dr. Sears acknowledged that she provided information 'to illustrate biological effects of radiofrequency radiation; in particular effects potentially contributing to symptoms of electromagnetic hypersensitivity'.<sup>401</sup> Dr. Sears' report provides one perspective with no context as to its relevance to the overall base of information and as such has limited value in determining any weight of evidence. Dr. Sears references 39 studies that support the concept of biological effects without any discussion as to their potential limitations or bias and cites only 3 reports with contrary findings, two of which have caveats. The CEC does not consider this to be a balanced view of the subject and submits that this is in no way reflective of the medical literature.

---

<sup>400</sup> Exhibit C9-8, 7B, Dr. Sears Report, Pages 5-11

<sup>401</sup> Exhibit C9-8, 7B, Dr. Sears Report, Pages 12-17

359. The CEC also notes that Dr. Sears presents controversial evidence regarding Electromagnetic Hypersensitivity syndrome without qualification, which the CEC considers to be significant and misrepresentative of medical opinion and scientific literature. In particular, Dr. Sears states that Electromagnetic Hypersensitivity is a ‘scientific fact’<sup>402</sup> but provides no evidence to support this, but instead rationalizes the lack of data and diminishes studies that show conflicting evidence. Dr Sears states ‘provocation studies of electromagnetic hypersensitivity have particular difficulties and limitations...they recommended objective measures’<sup>403</sup>, and “epidemiological studies are unlikely to find a correlation between ongoing radiofrequency exposure because people with sensitivities avoid exposure” and “with no objective tests ...researchers depend upon self”<sup>404</sup> and cites other rationales such as the health effects not persisting long enough to be replicable in studies.<sup>405</sup>
360. The CEC does not consider EHS as a ‘scientific fact’ and notes that well respected health institutions do not recognize EHS as a medical condition. FortisBC has confirmed the following has been said by the World Health Organization:

“EHS [Electromagnetic hypersensitivity] is characterized by a variety of non-specific symptoms that differ from individual to individual. The symptoms are certainly real and can vary widely in their severity. Whatever its cause, EHS can be a disabling problem for the affected individual. EHS has no clear diagnostic criteria and there is no scientific basis to link EHS symptoms to EMF exposure. Further, EHS is not a medical diagnosis, nor is it clear that it represents a single medical problem.”

406

361. When queried in an Information Request regarding medical opinion, Dr Sears stated that she “has not surveyed health organizations on this topic.”<sup>407</sup> Dr. Sears stated in her report that ‘recognition of electromagnetic hypersensitivity as an important issue is reflected in many committed, hard working groups of individuals whose experiences have convinced

---

<sup>402</sup> Exhibit C9-12, CSTS, Dr. Sears Response, CEC 1.10.1

<sup>403</sup> Exhibit C9-8, 7B, Dr. Sears Report, Page 5

<sup>404</sup> Exhibit C9-8, 7B, Dr. Sears Report, Page 6

<sup>405</sup> Exhibit C9-8, 7B, Dr. Sears Report, Page 7

<sup>406</sup> Exhibit B-15-1, BCH 2.6.1

<sup>407</sup> Exhibit C9-12, CSTS, Dr. Sears Response, CEC 1.16.1

them that this is an important issue, including interveners in this proceeding”. The CEC submits that many “hardworking individuals” do not constitute valid medical opinion.

362. Dr. Sears also makes no reference to the nocebo effect with respect to EHS, which is a key issue in the debate and is characterized by Dr. Maisch as a “well-recognized human condition” and it is inevitable that worry over possible health effects from an environmental exposure to an agent (such as smart meter RF emissions) will cause a stress response and illness in some people – the nocebo effect.<sup>408</sup> Dr. Sears explicitly characterized concepts such as EHS as a “scientific fact” when it is not accepted by the medical community. She ignored key information regarding its very existence which is indicative of Dr. Sears’ lack of objectivity and misrepresentation of the facts.
363. Overall, the CEC recommends that the Commission attribute little weight in Dr. Sears’ analysis except with respect to the lack of time and resources available to conduct proper analyses.

**(4) Dr. Martin Blank**

364. Dr. Blank’s evidence has some interesting problems. Dr. Blank is not at all precise with respect to whether he is talking about ELF or RF when he is talking about health effects and he mixes them as if they are the same throughout his paper. He acknowledges that ELF is in the 0 to 300 Hz range, a very different frequency range from the AMI meter 900 MHz range<sup>409</sup>. Many of his references are to ELF, which the scientific community and standard setting groups acknowledge is a different concern as evidenced by the frequency range applicable for Safety Code 6. Dr. Blank clearly has worked in the in vitro study field and has with other established certain types of DNA and cell response to EMF and RF in particular. The questions remain what to make of these findings do they translate into public health concerns? Dr. Blank thinks so and offers the Myung epidemiology selective meta-study and the Dode cell tower study from Brazil. Dr. Blank is clearly outside of his expertise area in advancing these studies. The Dode study has been the subject of critique and in his testimony Dr. Blank is unable to explain the illogical consequences of the study, yet he has recommended it to the Commission as

---

<sup>408</sup> Exhibit C9-8, 4C, Statement of Donald Maisch, Page 9

<sup>409</sup> Exhibit C9-14-4, CEC 1.2

proof of health effects. The Myung Study has selectively separated studies based on bias criteria and found that a number of studies show considerable likelihood of there being cancer causing effects from RF, while the others studies do not. Virtually all of the studies showing some effect come from one research group, the Hardell Group, and are based on questionnaires, which can be subject to significant bias. In cross examination he has no explanation for the overstatement he makes about the study versus the caution contained in the study abstract. Dr. Blank lacks credibility outside of his field of expertise and shows a tendency to adopt hyperbole such as “the chorus of all these groups constitutes a circular firing squad, when it comes to the science content”<sup>410</sup>. Dr. Blank has been an advocate for the Bio-Initiative Report and continues to show marked bias toward supporting one set of view without balance or even acknowledging the other views. He supports Cindy Sage as a co-editor of the Bio-initiative report and author of multiple chapters, despite her lack of credentials for scientific study, without even knowing her credentials or acknowledging that she has been severely critiqued for her failures in assessing RF exposure<sup>411</sup>, which to the contrary he suggests are among her best capabilities. Dr. Blank has ultimately concluded that he does not have enough evidence to even establish a proposed scientific basis for a non-thermal biological health effect standard let alone get it accepted<sup>412</sup>.

**2.2. Please discuss the difficulties involved in reaching the point of sufficient scientific study to establish cause and effect with reasonable certainty.**

DNA damage from exposure to RF has already been established. If sufficient funds were provided for the relevant research, it would be possible, with relatively little difficulty, to establish the full range of interactions between RF exposure and DNA damage and thereby lay the basis for creating biologically based safety standards.

365. Dr. Blank confirms that other things than RF emissions can cause stress proteins to react and that it is related to an increase in temperature in the cell, where the temperature increase reaches about 4 degrees Celsius. Dr. Blank then confirms that an electromagnetic signal will stimulate cells at 100,000 (however he does not remember what the level of the number was) time lower thresholds than thermal stimuli. Dr. Blank

---

<sup>410</sup> Exhibit C9-14-4, CEC 1.22.4

<sup>411</sup> Exhibit C17-8, Appendix D

<sup>412</sup> Exhibit C9-14-4, CEC 1.2.2

then relates the stress response to DNA damage in a cell as one indicator of molecular damage and that the stress proteins help to put a cell back into shape. Dr. Blank says that the DNA strand breaks occur with ELF but may also occur with RF and he confirms that most of the studies have been done at higher levels of exposure but have also been found for exposures that are common for people. Dr. Blank then suggests that Health Canada is relying on a thermal standard so they are missing out on a lot or virtually all of the damage caused by the weak EMR signals. He then provides the threshold of 0.2 micro-Tesla for a response to EMR in the ELF 60 Hz range. However, he has not done this work with RF signals<sup>413</sup>.

366. Dr. Blank's focus on his studies at the ELF level and his absence of work with RF in the range of the AMI meters severely limits the usefulness of his testimony.
367. Dr. Blank references in his report an epidemiological study done in Belo Horizonte Brazil, which found a 13 fold increase in RF energy and a 35% increase in cancer deaths. When asked why cancer deaths would increase in a five year period in parallel with the increasing RF energy when it can take many years and sometimes decades for cancers to develop Dr. Blank then agrees that the results do not mesh or make sense and he concludes that "there is no good answer"<sup>414</sup>.
368. The CEC submits that this is evidence that Dr. Blank readily advances advocacy material, which on light questioning he cannot support. Dr. Blank's evidence should be significantly downgraded in weighting because of his lack of ability to adequately defend it.
369. Dr. Blank confirms that receiving funding from EPRI has not compromised the direction or objectivity of his work and he confirms that it is his view that other scientists are likely the same and not influenced by their funding or employers but he acknowledges that there are some who would not follow the highest standards<sup>415</sup>.

---

<sup>413</sup> Transcript Volume 9, Pages 1665 to 1681

<sup>414</sup> Transcript Volume 9, Pages 1681 to 1685

<sup>415</sup> Transcript Volume 9, Pages 1686 to 1690

14 DR. BLANK: A: I would say that most scientists tend to  
15 do the best they can, given the pressures in our  
16 society. I would think that there are some who will  
17 not follow the highest standards, but that's true of  
18 all professions.

370. Dr. Blank is quick to attack other for bias but unable to recognize his own, whether it is working with certain employers or advocating for the Bio-Initiative Report positions. The CEC does not have an issue with Dr. Blank being an advocate and appreciates the importance of skepticism and alternative view. However, in his testimony as in his evidence, the Commission should not view Dr. Blank's evidence as a neutral, balanced expert opinion.
371. Dr. Blank is posed the question as to whether or not a biological effect at a cellular level is different from an established adverse health impact at the whole body level and he questions the use of the word established preferring accepted by scientists knowledgeable in the field. He specifically rejects the groups of people who publish the established health agency and standard setting reports such as ICNIRP as having the "Wizard of Oz mentality." He characterizes the differences of opinion between himself and others involved in the Bio-initiative Report as being the people doing the measurement and publishing the studies versus the people appointed to these committees he describes as a "buddy system", but then he goes on to say that he does not know how they are chosen<sup>416</sup>.
372. Dr. Blank's hyperbole and quick critique of others, does not make Dr. Blank a witness with evidence that the Commission should feel comfortable accepting.
373. Dr. Blank is referred to the Myung study and asked why the quote in his report does not agree with the Journal of Clinical Oncology and he responds that he does not know. The finding in the abstract refer to finding evidence of a link between RF exposure and cancer particularly after 10 years and they found a large discrepancy between RF exposure and

---

<sup>416</sup> Transcript Volume 9, Pages 1694 to 1698

cancer between research groups, which is confounded with the methodological quality of the research and they suggest further cohort studies are necessary. He agrees that most of the positive findings come from the Hardell research group, which he says is no surprise<sup>417</sup>.

374. The CEC submits that Dr. Blank's mischaracterization of this study is a caution sign for the Commission to be careful in weighing his evidence. The quality of his evidence is not at a level that the Commission needs to go where Dr. Blank would have the Commission go.
375. Dr. Blank's recommendation of achieving RF emissions as low as reasonably possible is reviewed and he is asked to comment on the fact that the AMI meters would meet Health Canada Safety Code 6 standards but also those of Russia and China and even the 2007 Bio-initiative Report. At this point Dr. Blank goes on to critique Health Canada saying that "to say their opinion is worth anything is an overstatement of their contribution to the health of Canada"<sup>418</sup>.
376. The CEC submits that Dr. Blank's hyperbole and failure to acknowledge the low levels of AMI meter exposure are again a warning sign for the Commission to give the evidence little weight.
377. Dr. Blank agrees that Health Canada's Safety Code 6 limits human exposure to the radio frequency electromagnetic energy in the frequency range of 3kHz to 300 GHz in Canada and that the Consumer and Clinical Radiation Protection Bureau of Health Canada issues Safety Code 6, which specifies requirements for the safe use of radio frequency emitting devices and that Dr. Blank's report does not say anything about whether the FortisBC AMI meters will comply with the requirements of Safety Code 6. Dr. Blank agrees that he has not tested a FortisBC AMI meter and he agrees that Health Canada's mandate is to "help Canadians maintain and improve their health"<sup>419</sup>.

---

<sup>417</sup> Transcript Volume 9, Pages 1698 to 1701

<sup>418</sup> Transcript Volume 9, Pages 1702 to 1707

<sup>419</sup> Transcript Volume 9, Pages 1708 to 1709

378. The CEC submits that Dr. Blank has not found a basis for suggesting that the FortisBC AMI meters will not comply with the Safety Code 6 standards but he clearly does not respect the Safety Code 6 standards themselves. This opposition to Safety Code 6 is insufficient for the Commission to ignore and replace these standards with one of its own based on Dr. Blank's evidence.
379. Dr. Blank is taken through an accounting of the work he has done and whether or not it was available in the public domain for review by the health agencies and standard setting groups, ICNIRP, SCENIHR, for their 2009 reports and whether or not all of his research will be available to Health Canada when it next reviews the Safety Code 6 standard. Dr. Blank disputes whether or not Health Canada has taken his evidence into account but he agrees that not all studies and reports should be reviewed but rejects the standard of established science unless it is the opinions of scientists in the field. Dr. Blank refers to Health Canada scientists as "political scientists"<sup>420</sup>.
380. The CEC submits that Dr. Blank's work and research has been available to the many health agencies, which have reviewed the scientific literature. Dr. Blank's 'political' theories are outside his field of expertise. The Commission should not accompany Dr. Blank down this path.
381. Dr. Blank goes on to critique the Nobel Prize award committee as part of reviewing his CV. Dr. Blank's specific areas of expertise are reviewed and then a follow up question was asked with respect to the expertise of the authors of the ICNIRP 2009 Report and then specifically the Chapter on Dosimetry and Dr. Blank offers that he does not know. Then when asked about Chapter 2 dealing with RF biological effects he says he does not know if the scientists are qualified in his view and he doesn't know how they are appointed but believes it is a buddy system. All he knows is that he tried to get some information into ICNIRP through Mike Repacholi and finally did but it was not used<sup>421</sup>.

---

<sup>420</sup> Transcript Volume 9, Pages 1711 to 1716

<sup>421</sup> Transcript Volume 9, Pages 1717 to 1722

382. The CEC submits that Dr. Blank is very critical of others and often without knowing who they are, what their credentials are and without knowing much of anything about what they have done.
383. Dr. Blank confirms that his area of expertise is not epidemiology studies and is not in the field of research study of cancer. In reference to his report discussing a study in Brazil he is asked if he has any idea how much RF would come from AMI meters and how much from other sources and he says he does not know and asked if he has studied anything with respect to sources of RF and RF from AMI meters he says he has not. Asked to comment on an ICNIRP report summary that the symptoms and well-being reported are higher for those concerned about RF exposure than for those who are not. Dr. Blank appears to be unaware of the ICNIRP conclusions regarding environmental exposure from transmitters and has no comment. Dr. Blank's lack of expertise is put to him with regard to his references to the Dode study as a reference of little value to the Commission because he does not have the expertise to back up his review and opinion and he qualifies that it has the value of being a reference to another study<sup>422</sup>.
384. Dr. Blank has not demonstrated the kind of expertise the Commission would need to displace the Safety Code 6 standards in Canada.
385. Dr. Blank is then questioned about the Bio-initiative report in which he is an author and part of the founding group who brought the report together. He is then referred to the Public Utility Commission of Texas report on Smart Meters and the reference to the Bio-Initiative report as having received some notoriety despite having been viewed negatively by the research community and he disagrees. He is taken through a list of criticisms and he offers that he is aware of the criticisms. His opinion is that "notoriety is in the eye of the beholder" and "if the beholder isn't worth scrutiny then he doesn't know if much attention should be paid to it". He then goes on to suggest that clinical physicians should not be relied on for scientific judgment. He is then questioned as to whether or not he is aware that Dr. Carpenter was disqualified as an expert in Quebec and whether or not he knows what Cindy Sage's credentials are. He was unaware of Dr. Carpenter's

---

<sup>422</sup> Transcript Volume 9, Pages 1723 to 1726

disqualification and did not actually know what Cindy Sage's credentials are despite the fact that they are co-editors of the Bio-initiative Report. He then goes on to say the measure of a person is really the accomplishment and he then goes on to extol a Sage and Associates report on Smart Meters and her report on Autism and RF. He then goes on to say that she has got some support for the Bio-Initiative report<sup>423</sup>.

386. Dr. Blank again does not know about the criticisms that have been made of the Bio-Initiative Report and its co-editors and reveals a key motive of finding funding for the initiative. The CEC submits that the Commission should not dismiss the assessments of others as Dr. Blank has done throughout his testimony.
387. Dr. Blank is questioned about setting standards and that they should be based on scientific evidence of cause and effect and he agrees. He is of the view that sufficient funds have not been provided to do the relevant research to establish scientific based standards and is of the view that the funds will not be provided<sup>424</sup>.
388. The CEC submits that this statement alone is sufficient for the Commission to acknowledge that Dr. Blank and the objectives he pursues are not ready yet for controlling the standard setting and the Commission should decline the invitation to go there with them, as they lack the credibility to adequately substantiate an alternative.
389. Dr. Blank has testified before the BC Utilities Commission before but had forgotten but when reminded that it was in regard to the Okanagan Transmission line he remembered it was in Penticton and that he had testified about EMF and that it was from the same base of material and quoting from the Bio-Initiative Report. The Commission at that time examined EMF by comparing it to the WHO standards at that time and the project was approved but Dr. Blank did not remember<sup>425</sup>.
390. The CEC submits that the Commission should take due note of Dr. Blank's failure to persuade other Commission Panels and that the Commission has sufficient evidence in

---

<sup>423</sup> Transcript Volume 9, Pages 1729 to 1737

<sup>424</sup> Transcript Volume 9, Pages 1737 to 1738

<sup>425</sup> Transcript Volume 9, Pages 1739 to 1741

**(5) Dr. Jamieson**

395. Dr. Jamieson is questioned about a couple of studies upon which he bases his paper, a Bavarian study and a Spanish study, both of which involved distributing questionnaires among a population in a limited geographical living around a communications base station<sup>428</sup>. The questionnaire based studies have the potential for numerous biases and Dr. Jamieson has documented some of those in an undertaking<sup>429</sup>. It was further confirmed with respect to survey response from the Spanish study that the returned questionnaires also decreased with distance from the base station<sup>430</sup>.
396. The CEC submits that this demonstrates that Dr. Jamieson's evidence is thin on science and more focused on conjecture and purpose but provides no sound scientific basis for the Commission to use to support the Commission contest Health Canada.
397. Dr. Jamieson is asked whether or not he has any basis to disagree with Dr. Shkolnikov's assertion that the AMI meters would meet standards in China and Russia as well as be below the Bio-initiative 2007 recommended standard and he confirms that he does not<sup>431</sup>.
398. The CEC submits that this is solid evidence for the CSTS witness that the AMI meters are not the appropriate focus for the RF concerns.
399. Dr. Jamieson when challenged with respect to his reliance on anecdotal evidence avoids answering the question and simply suggests that better studies could be done<sup>432</sup>. The anecdotal survey results have been taken from an anti-smart meter advocacy website and proposed to the Commission as validation of health issues. Dr. Jamieson says that there has been no proper scientific research done on the potential biological effects of smart meters and there does not appear to be any being done now<sup>433</sup>. This he says despite also confirming that he has no information to dispute Dr. Shkolnikov's assertion that the smart meter RF emissions are much the same as cell phone emissions<sup>434</sup> and have been studied extensively. The report is further challenged based on the fact that 143 people plus a few

---

<sup>428</sup> Transcript Volume 10, Pages 1919 to 1935

<sup>429</sup> Exhibit C9-20, Undertaking to BCPSO

<sup>430</sup> Transcript Volume 10, Pages 1942 to 1944

<sup>431</sup> Transcript Volume 10, Pages 1948 to 1950

<sup>432</sup> Transcript Volume 10, Pages 1952 to 1959

<sup>433</sup> Transcript Volume 10, Pages 1962 to 1963

<sup>434</sup> Transcript Volume 10, Page 1950

answered that they had a smart meter installed yet 318 people reported having health symptoms related to smart meters<sup>435</sup> and Dr. Jamieson's only response is to suggest that maybe a neighbor had a smart meter. When asked if he wanted to withdraw basing his assertions of health impacts on flawed anecdotal surveys he instead cites another anecdotal survey from Maine and another anti-smart meter website and finally he agrees that the study is not a scientific study<sup>436</sup>.

400. The CEC submits that the Commission cannot rely on Dr. Jamieson with regard to his sources and methods of preparing and presenting the issues other than for what he proffers them to be as an area for more study. The CEC submits that the Commission should not put itself into the position of being an arbiter of what further studies may be required.
401. Dr. Jamieson offers that he is aware that Safety Code 6, limits of human exposure to radio frequency electromagnetic energy in the range of 3KHz to 300 GHz was prepared by the Clinical Radiation Protection Bureau of Health Canada and he answers yes. He is asked if he is aware that Safety Code 6 sets out the requirements for safe use of or exposure to radio frequency emitting devices in Canada and he answers only for thermal effects but agrees that it is the standard in Canada at this time. He confirms that his report does not say that the AMI meters will not comply with Safety Code 6. He is asked to confirm that he is aware that Health Canada's mandate is to help Canadians maintain and improve their health<sup>437</sup>.
402. The CEC submits that Dr. Jamieson, as with other CSTS witnesses, does not have any case to refute the FortisBC claim that their AMI project will comply with Safety Code 6 and that this is the appropriate standard applicable in Canada.

---

<sup>435</sup> Transcript Volume 10, Pages 1963 to 1966

<sup>436</sup> Transcript Volume 10, Pages 1972 to 1973

<sup>437</sup> Transcript Volume 10, Pages 1977 to 1980

403. Dr. Jamieson confirms that the symptoms he is referencing in the Spanish and Bavarian studies are not areas in which he has personally conducted any research and that they are either caused by or associated with numerous other sources other than RF exposure<sup>438</sup>.
404. Dr. Jamieson, in his report and evidence, covers a vast array of subjects to make RF emissions appear to be responsible for all manner of health problems but has no expertise or depth to back up what he says. The CEC submits that the Commission should give no weight to Dr. Jamieson's evidence in all of these wide ranging areas.
405. Dr. Jamieson confirms that a number of the CEC information request questions were not answered and that he has not subsequently answered them but says he has some answers now and answers 7.1 with the fact that he had a hypothesis and he checked it out with a medical professional and it has not been written with assistance of someone else.<sup>439</sup>
406. The CEC submits that it is likely that Dr. Jamieson does not have the capability to answer questions to any depth on these subjects and certainly not from a base of personal research in the field. The CEC submits that the fact that Dr. Jamieson in response to this question came up with a hypothesis himself speaks volumes about his willingness to venture into any area without trepidation. The Commission should be asking why he does not have a base in the scientific literature to turn to and provide explanations. The Commission cannot afford to rely on this low level of knowledge as expert testimony.
407. Dr. Jamieson agrees that there are materials available which can provide shielding against RF emission energy, but he suggests not out doors. Dr. Jamieson is familiar with the back plate on the AMI meter and its shielding effect and he goes on to elaborate about the ability of the Zigbee radio to communicate into a building<sup>440</sup>.
408. Dr. Jamieson may have some expertise with respect to his architectural background but his actual experience with health issues is not of a level that the Commission should give any significant weighting to his submissions.

---

<sup>438</sup> Transcript Volume 10, Pages 1981 to 1982

<sup>439</sup> Transcript Volume 10, Pages 1982 to 1989

<sup>440</sup> Transcript Volume 10, Pages 2002 to 2004

409. Dr. Jamieson is asked by the Commission panel about the RF emissions from power supplies. He confirms that they exist with wireless meters and with wired meter and when asked what those levels may be and Dr. Jamieson does not know but is sure they are well below the Safety Code 6 levels<sup>441</sup>.
410. Dr. Jamieson is clearly someone who is credentialed but is not someone on whose expertise the Commission can rely.

**O. Privacy**

411. The CEC has reviewed the FortisBC Application with respect to Privacy and accepts the FortisBC position with respect to these issues. The CEC submits that there is a substantial framework of authoritative oversight available to protect the privacy of persons dealing with their utility and that the Commission can rely on the company's evidence to be satisfied that the public interest in privacy will be adequately tended with respect to the FortisBC Application implementation and operation.

**P. Security**

412. The CEC has reviewed the FortisBC Application with respect to the security of the AMI Project systems and accepts the FortisBC evidence as sufficient to enable the Commission to conclude that the security of the AMI Project will be sufficient to meet the test of being in the public interest.

**Q. Fires**

413. The CEC has reviewed the evidence with respect to smart meters causing fires and has found there to be no credible basis to suggest a hazard with the FortisBC AMI meters. The CEC concurs with FortisBC that 'if anything, the implementation of AMI meters will actually decrease the number of fires associated with electricity.'<sup>442</sup> The CEC notes that electrical hazards may be associated with a damaged base plate which could either be pre-existing or occur at the time of meter exchange.<sup>443</sup> The CEC considers it an advantage that every base plate will be inspected for damage during the course of the

---

<sup>441</sup> Transcript Volume 10, Pages 2013 to 2017

<sup>442</sup> FortisBC Final Submission, Page 212

<sup>443</sup> Exhibit B-6, BCUC 1.47.3

AMI implementation and suggests this could potentially avert a fire that could have arisen from pre-existing damage. The CEC also considers it an advantage that meter base exchanges are being done in a large scale under the FortisBC Application. The CEC notes that meter exchanges must occur from time to time in any event, and submits that FortisBC is particularly alerted to and prepared for the possibility of damage to occur during such a substantial installation, and is incented to ensure a clean transition. FortisBC intends to mitigate the risks by adopting best practices and has conservatively allotted for 1000 base plate replacements<sup>444</sup> If necessary, FortisBC will replace a faulty base plate by a qualified electrician at no cost to the customer.<sup>445</sup>

414. The CEC notes that a report prepared by the Fire Chief of the City of Surrey and an Associate Professor in Crime Research concluded that electrical fires may decline with the installation of smart meters<sup>446</sup>. The CEC notes there has been a 35.7% decrease in fires since BC Hydro introduced Smart Meters<sup>447</sup> The CEC considers this as being a possible indication of a significant benefit that might be attributed to smart meters.
415. The CEC therefore recommends that the Commission determine that the evidence shows there is no increased fire hazard associated with the AMI meters or meter exchange process.

**R. High Bills and Meter Accuracy**

416. The CEC notes that Smart Meters have been challenged as being inaccurate and resulting in higher than expected bills for customers. The CEC has not found there to have been sufficient evidence presented that reasonably documents this concern. The CEC considers that the new meters are more likely to be accurate than the older electro-mechanical meters which become less accurate over time<sup>448</sup> and that FortisBC's intention to tighten bill tolerances<sup>449</sup> will result in fewer billing errors. The CEC has therefore concluded

---

<sup>444</sup> Exhibit B-6, BCUC 1.47.3. Of 54,640 meter installations, removals or replacements over a 5 year period, only 13 incidents of meter base damage were identified. This would equate to fewer than 30 incidents over 110,000 exchanges anticipated under the AMI program.

<sup>445</sup> Exhibit B-6, BCUC 1.47.3

<sup>446</sup> Exhibit B-11, Joe Tatangelo, 1.59

<sup>447</sup> FortisBC Final Submission, Page 213

<sup>448</sup> Exhibit B-15, CEC 2.9.1

<sup>449</sup> FortisBC Final Submissions, Page 217

based on the evidence presented by FortisBC, and that AMI meters can be expected to improve accuracy and result in increased customer satisfaction.

**S. Remote Disconnect**

417. The CEC considers the predominant concern regarding remote disconnection to be the elimination of (possible) customer interaction at the time of disconnection. The CEC believes this is of primary concern in the situation of non-payment, which accounts for approximately 40% of all disconnections<sup>450</sup>, and may be particularly problematic for those who are unable to pay or those dependent on electricity for health reasons. The CEC submits that the remote disconnection capability will not unduly reduce customer contact in these instances. The CEC believes that the process outlined by FortisBC provides sufficient protection for customers in that site visits will be required for 100% of disconnections for non-payment<sup>451</sup>, two notices are sent and at least two points of contact are made, with review by two Customer Service Representatives to verify the process and ensure that no issues such as health warnings were identified with the account.<sup>452</sup>

**T. Public Opposition**

418. The CEC agrees with FortisBC that the existence of public opposition, in and of itself, is not a significant consideration in determining whether to approve an application.<sup>453</sup> The CEC submits that all public opinion, whether positive or negative, is reasonably considered as the context within which the Commission operates and serves as the vehicle to bring forth the necessary information for analysis. The CEC submits that the airing of public opinion is an important means of bringing forward relevant information with which to inform debate, and is a key aspect of the Commission process in decision-making for the province. In this regard, public opposition is relevant, but has no probative value of its own.
419. The CEC firmly supports the opportunity for differing opinions to be examined by the Commission. The CEC submits, however, that the public relies upon the Commission to

---

<sup>450</sup> Exhibit B-11, BCPSO 1.47.1

<sup>451</sup> Exhibit B-1, Page 91

<sup>452</sup> Exhibit B-15, BCPSO 2.10.1

<sup>453</sup> FortisBC Final Submission, Page 220

make informed, reasoned decisions to define and promote the ‘public interest’ as found by the Commission and based on its careful evaluation of the integrity of the information before them. The CEC agrees with FortisBC that the overriding requirement of the Commission is to determine what is in the ‘public interest’, which may not necessarily align with public opinion.<sup>454</sup>

420. The CEC submits that the selection from the Decision in the Matter of West Kootenay Power Ltd. – Utilicorp (the West Kootenay Decision) cited by FortisBC to be particularly germane.
421. “The Utilities Commission Act, which determines the basis on which the Commission carries out its regulatory responsibilities, clearly specifies the Commission’s overriding duty to protect the public interest and is silent on the matter of public opinion. It is apparent that the two cannot be the same unless public opinion has been based on public understanding of the same information required for a reasoned determination of what is in the public’s best interests overall”.<sup>455</sup>
422. Accordingly, the CEC recommends that the Commission find the existence of any public opinion to be relevant as a means by which information is aired, but not to be made equivalent in determining what constitutes the ‘public interest’.

### **PART XIII - OPT OUT PROVISIONS**

423. FortisBC has filled its FortisBC Application on the basis that an Opt Out provision is not required because:
- a) Opt Out will not necessarily resolve the concerns of customers who have expressed opposition;
  - b) Opt Out will erode the benefits of the FortisBC Application;
  - c) There is no compelling scientific evidence to justify an Opt Out provision; and

---

<sup>454</sup> FortisBC Final Submission, Page 220

<sup>455</sup> FortisBC Final Submission, Page 220

- d) Opt Out is not consistent with government policy. FortisBC witnesses expanded on this with a view that there is not cost, health, rates, security or other reason to adopt an Opt Out provision.<sup>456</sup>
424. FortisBC has provided an outline of what would be required in an Opt Out provision if the Commission determined that one was required. The provision should include:
- a) installation of a standard advance meter with the radio communication turned off;
  - b) meter readings and operational data would be down loaded from the meter manually on a bi-monthly basis;
  - c) account holders with radio off meters would bear the full incremental cost of the manual meter reading; and
  - d) once the account holder terminates the service the meter radio will be turned on. FortisBC projects the costs as \$100 for initial incremental costs and \$22 for bi-monthly meter reads<sup>457</sup>.
425. In the FortisBC Application FortisBC says it plans to work with its customers to explain the benefits of the FortisBC Application and to address the majority of customer concerns about the meters at the time of installation. In the event of continued refusal FortisBC intends to continue a productive dialogue with customers to address their concerns and explain the option to relocate their meter to the edge of their property. FortisBC has said it would then use estimate billing for six months and with a continuing refusal for another three months would suspend service until a standard meter could be installed<sup>458</sup>.
426. In discussing the Opt Out options FortisBC notes that several other jurisdictions have offered an Opt Out provision enabling manual meter reading rather than communication through a wireless network<sup>459</sup>.

---

<sup>456</sup> FortisBC Inc. Final Submission, Page 221

<sup>457</sup> FortisBC Inc. Final Submission, Page 222

<sup>458</sup> Exhibit B-1, Page 142

<sup>459</sup> Exhibit B-1, Page 143

427. FortisBC lists no jurisdiction in Canada or the US with an Opt Out provision having no fee and lists six states with Opt Out provision<sup>460</sup> and research on the fees charged is also provided to the extent available<sup>461</sup>.
428. FortisBC has explained why they consider that government policy is to provide these meters to all customers based on the legislation applicable to BC Hydro<sup>462</sup>. FortisBC has confirmed that provisions of the Clean Energy Act do apply to them, specifically sections 17(1) and 17 (6) and that the Clean Energy Act does not deal with Opt Out provisions<sup>463</sup>.
429. FortisBC makes it clear that the existing tariff is insufficient for an Opt Out provision and would need amendment to incorporate the terms of the Opt Out provision<sup>464</sup>. Also FortisBC makes it clear that the existing tariff would enable the suspension of service in the event that a customer continued to refuse to have a standard meter for their service<sup>465</sup> & 466.
430. FortisBC confirmed that the costs in 2016 around the time of implementation completion for manual meter reads would be about \$192.69 per year<sup>467</sup>. FortisBC has confirmed that the cost in 2016 for a meter change out would be about \$198.36 and the cost of a digital meter would be \$30.11 in 2012 dollars<sup>468</sup>. FortisBC has confirmed a Commission calculation that the cost of an installed AMI meter would be about \$174.58 based on 2013 to 2015 nominal dollars<sup>469</sup>. Consequently, FortisBC confirms that it is more cost effective to install an AMI meter than to install a digital meter then to later change it out to an AMI meter<sup>470</sup>. FortisBC confirms that once an AMI meter is installed it can have the radio turned off remotely but cannot have the radio turned on remotely, which would require a site visit at a cost of about \$22<sup>471</sup>. To keep other customers whole relative to an

---

<sup>460</sup> Exhibit B-6, BCUC 1.117.1

<sup>461</sup> Exhibit B-11, CEC 1.96.1, CEC 1.96.2

<sup>462</sup> Exhibit B-6, BCUC 1.117.2

<sup>463</sup> Exhibit B-14, BCUC 2.84.2

<sup>464</sup> Exhibit B-6, BCUC 1.117.3

<sup>465</sup> Exhibit B-6, BCUC 1.117.4

<sup>466</sup> Exhibit B-14, BCUC 2.84.3

<sup>467</sup> Exhibit B-14, BCUC 2.5.1

<sup>468</sup> Exhibit B-14, BCUC 2.5.3

<sup>469</sup> Exhibit B-14, BCUC 2.5.4

<sup>470</sup> Exhibit B-14, BCUC 2.5.5

<sup>471</sup> Exhibit B-14, BCUC 2.5.6

Opt Out the one time fees would have to be \$110.00 and the manual meter reading fees would have to be \$132.00 per year based on a .5% Opt Out rate<sup>472</sup>.

431. The impact on project benefits has been outlined by FortisBC for different meter options within an Opt Out provision and a sensitivity has been calculated that the project becomes cost ineffective with an Opt Out rate of 2.8% for leaving existing meters in place or 11.9% if the AMI meter is installed with the radio off<sup>473 & 474</sup>. FortisBC explains that it does not believe that an Opt Out provision is in the public interest<sup>475</sup>.
432. FortisBC has described the process for determining theft as requiring some considerable investigation after balance analysis shows likely missing energy and from this it can be interpreted that the costs are increased when there is an Opt Out in the balance analysis data<sup>476</sup>. FortisBC confirms that theft detection requires installation of the AMI meter capability<sup>477</sup>. Fortis explains the costs included in its estimate of costs for Opt Out and provides information confirming that the costs are not linear with the degree of Opt Out<sup>478</sup>. FortisBC agrees that a full AMI implementation would result in the optimal realization of the theft benefits<sup>479</sup>.
433. FortisBC explains the potential options for an Opt Out in detail<sup>480</sup>. FortisBC explains that an Opt Out with multiple forms would be more expensive than a single version of AMI installation with the radio turned off<sup>481</sup>.
434. FortisBC provides an explanation as to why an Opt Out provision should not be an endless customer choice option, why it favours choice for a number of customer services but offers the view that protecting other customers when the choice is not in the public interest would require payment for the cost of the Opt Out and the loss of benefits<sup>482</sup>.

---

<sup>472</sup> Exhibit B-11, CEC 1.50.6, CEC 1.50.6.1

<sup>473</sup> Exhibit B-14, BCUC 2.84.4

<sup>474</sup> Exhibit B-11, CEC 1.50.5

<sup>475</sup> Exhibit B-14, BCUC 2.84.6

<sup>476</sup> Exhibit B-11, CEC 1.22.1

<sup>477</sup> Exhibit B-11, CEC 1.22.3

<sup>478</sup> Exhibit B-11, CEC 1.41.1, CEC 1.41.2, CEC 1.41.3

<sup>479</sup> Exhibit B-15, CEC 2.15.1, CEC 2.15.2, 2.15.3, 2.15.4

<sup>480</sup> Exhibit B-11, BCSEA 1.102.1

<sup>481</sup> Exhibit B-11, CEC 1.50.2

<sup>482</sup> Exhibit B-11, CEC 1.50.3, CEC 1.50.4, BCSEA 1.102.2, BCSEA 1.103.1 and 1.103.2

However, FortisBC has made an assumption that a formal Opt Out program would enable customers to have the choice at a new premises of having the radio turned off, essentially offering endless Opt Out<sup>483</sup>. The CEC submits that this should not be done and that there is not sufficient evidence on the record to justify establishing an endless Opt Out.

435. FortisBC confirms that Opt Out from an AMI meter would not enable anyone to eliminate RF signal emissions from their homes and further confirms that Opt Out from an AMI meter would not appreciably reduce the RF signal exposure in any one's home<sup>484</sup>.
436. The CEC submits that concerns expressed by interveners that an Opt Out provision may be needed for health, security, privacy, meter accuracy, fire risk, and any other reason brought forward by opponents of the AMI meters are largely overstated. In particular the CEC submits that the Health Canada and Provincial Health Officer's views with respect to AMI meters is the most sound evidence before the Commission in regard to the first of these, health, as it seems to have garnered most of the public opposition attention. Consequently, any public interest concern for an Opt Out provision is strictly a customer service concern and is not properly related to any of the alleged risks proffered by the opponents of the AMI meters.
437. The CEC submits that it is quite important for the Commission to make a clear determination that the evidence does not support any credible conclusion with respect to the proposed health issues that could lead the Commission to any position other than to agree with the competent authority in Canada and the Province with respect to the health issues related to AMI meters. The CEC recommends that the Commission make such a clear statement, particularly as it relates to any proposed Opt Out provision.
438. The CEC submits that the Commission should give some consideration to the customer service concerns related to the transition to the AMI meters. The evidence is that FortisBC has considered the customer service issues related to AMI implementation carefully and has proposed to engage in extensive customer service work to manage the

---

<sup>483</sup> Exhibit B-11, CEC 1.50.3.1

<sup>484</sup> Exhibit B-11, CEC 1.50.7.3, CEC 1.50.7.4

transition to AMI meters. FortisBC is proposing to work for a number of months with customers to provide information and explain the relevant facts with respect to the AMI meters to its customers so that it can allay the fears generated by some degree of misinformation in the community the evidence for which is documented throughout the record of this proceeding.

439. The CEC recommends that the Commission endorse FortisBC's proposals to provide significant customer service during the installation period and afterward to enable as much calm and rational discussion and engagement with customers as FortisBC deems useful and cost effective to enable implementation of the AMI meters.
440. The CEC submits that a very important key issue for the Commission is to determine how best in the public interest to support a transition to AMI meters. The public interest will be best served if the Commission commits to a staged program of justified financial charges for the Opt Out implementation transition that would have the full AMI implementation within Opt Out operating toward a self-closing option at some point in the future except and in the interim moving toward full recovery of lost benefits and costs. An Opt Out provision may be valuable in the short term to facilitate good customer service with respect to the implementation transition. The Commission has on numerous occasions in the past used transition staged implementations to smooth out customer concerns and impacts and should do so in this case.
441. The CEC submits that such an Opt Out provision should first and foremost not be an endless Opt Out, should not have a fixed date for achieving 100% implementation and should be driven by the costs of Opting Out, including direct costs, overhead costs and opportunity costs, which should increase over time. Once an initial customer with an Opt Out provision has moved and the premises has been converted to a fully functional communicating AMI meter the available customer options should revert to relocation of the meter on the property at the customer's expense or cessation of service if that is the customer's preference. This grandfathering type of provision has been used by the Commission before, with respect to closing out rate classes for instance. This condition should be subject to any future updating of evidence, which may be brought to the Commission and would provide a compelling basis for increasing or enhancing any Opt

Out provision for reasons other than customer service. Finally the CEC agrees with the FortisBC sense of customer service that it will always take an individual customers circumstances into due consideration in balance with all of its public interest obligations and may vary policy to accommodate its view of the customer service needs and public interest balance as necessary.

442. The CEC submits that the FortisBC proposal for the costs to be associated with an Opt Out provisions is a reasonable starting point and should include restriction to an AMI meter with the radio turned off. The costs to the customer proposed by Fortis BC should be suitably loaded with indirect and overhead costs in order that they are the full costs. The Commission should set out fees for the Opt Out based on the FortisBC proposed \$22 bi-monthly charge which should be updated automatically and annually based on annual compliance filings from FortisBC with respect to documenting the appropriate full costs of the Opt Out. The Commission should make it clear to the public that over time it expects the Opt Out provision to become more expensive as the full costs are identified and included in the charge. FortisBC has not included in its costs the cost to turn the radio back on once a customer changes premise and that this should be part of the fees to be charged.
443. The CEC further submits that the Commission should incorporate allowance for a charge related to the lost opportunity benefits for other customers. The most significant evidence relates to the loss of all the net benefits at 11.9% Opt Out. This would involve \$17 million spread over 12% of 116484 customers in 2013 and would be about a \$20 charge per bi-monthly period for customer opting out based on the FortisBC conservative business case assumptions.
444. The evidence on the record in this proceeding is that the net benefits of the FortisBC Application are very likely substantially greater than the FortisBC conservative assumptions. This would place the opportunity loss per customer opting out at significantly higher levels when factoring in the future benefits and non-quantified benefits as they come closer to realization. The alternate bi-monthly period to the initial \$22 charge should include a \$2 charge for lost benefits to recover the lost opportunity for other customers being disadvantaged. This lost benefits component should be a charge

added to the initial Opt Out cost charges after FortisBC has exhausted all reasonable customer service communications and discussion with the customer. The level of the rate for the lost opportunity cost should also be an automatic adjustment based on annual FortisBC compliance filings documenting the state of its planning for and implementation of achievement of the AMI meter supported functionality as FortisBC makes its filings and the Commission approves the reports the tariff provisions for the Opt Out charges would be updated.

445. The Commission should provide a clear price signal that the charge should be expected to increase over time as the AMI meter related functionality of the electric system and the associated benefits become realistic future prospects in the FortisBC plans and are reported to the Commission as being realistically and quantifiably in the FortisBC long term planning. It would be wholly inappropriate to adopt an endless Opt Out provision which would enable an opting out customer to impose a loss on other customers of the very significant magnitude established in the evidence in this proceeding as being realistic future achievable benefits.
446. One of the most important principles the Commission implements in rate setting is to ensure that it sends the most appropriate price signal to the customer for the service. The record establishes clear evidence that the appropriate price signal for the charge is something quite significantly larger than FortisBC has proposed. Even FortisBC has said in its evidence it is appropriate to incorporate the opportunity cost of lost benefits. The timing for doing this is after the reasonable customer service options have been exhausted. The pricing principles can quite legitimately charge historical cost causation and potential future cost causation (as is done with conservation rates). The Commission should make it clear that these are the appropriate pricing principles and enable FortisBC to establish the details in its compliance filing with the Commission over time.
447. The Commission has made this proceeding significantly about the health issue evidence but the CEC submits that the AMI benefit and benefit loss evidence is very compelling. The CEC submits that this evidence deserves the Commissions attention to weighing the public interest benefit heavily against the reality that Opting Out of AMI meters will likely not reduce any individuals RF signal exposure sufficiently to be make an

appreciable difference, particularly given that the evidence supports a conclusion that the average RF exposure is likely to be 1/1000000<sup>th</sup> of the Safety Code standards.

448. The Commission can best serve the public interest by providing FortisBC the time and tools to provide quality customer service in the transition to AMI implementation.

#### **PART XIV - ADEQUACY OF PUBLIC CONSULTATION AND REVIEW**

449. The CEC considers that the public consultation with respect to the FortisBC Application has been more than adequate given the size and scope of the project under review. The CEC acknowledges the contentious nature of the ‘smart meters’ but submits that the opportunity for public comment on the issue of electromagnetic frequency radiation was fully available to all with concerns. Given the high profile of the Commission in setting public policy and the public’s perception of its decisions<sup>485</sup> the hearing has resulted in public consultation and provided the information necessary to inform and solicit public opinion and to provide the Commission with information upon which to make their determinations.
450. The CEC notes that FortisBC is intending to replace a total of approximately 115,000 meters with ‘smart meters’ which constitutes approximately 6% of those already in place in BC. However, the public consultation process ultimately extended to 3 community input sessions, three rounds of information requests and 10 oral hearing days with witnesses appearing by video from around the world. The CEC submits that the public consultation has been extraordinarily generous.

#### **PART XV - CONCLUSIONS AND RECOMMENDATIONS**

451. The CEC submits that there are 4 very important conclusions for the Commission to reach from this proceeding and the CEC would like to provide recommendations as to what those are and has matched them to the case it finds is well established on the record in this proceeding.

---

<sup>485</sup> The CEC considers that the BCUC has a significant role in the public perception of risk.

**A. *The Net Benefits of the AMI Project***

452. The Commission finds, based on the evidence established in this proceeding, the FortisBC AMI Project proposed net benefits are reasonable and are very likely understated as FortisBC have used very conservative assumptions in establishing the proposed benefits for the AMI Project. The Commission finds that the benefits associated with the technological changes being implemented with the AMI Project have an enduring life beyond the 20 year initial meter installation. The Commission finds that the evidence establishes that this benefit is likely on the order of the same magnitude as the initial 20 year net benefits and can be recognized as an enduring technological change benefit or terminal value of the AMI Project. The Commission finds that the future sustaining capital associated with ongoing meter replacement will ensure the capture of these benefits and notes that the evidence supports an increasing value over time.

**B. *Future Benefits of the AMI Project***

453. The Commission finds, based on the evidence on the record in this proceeding, the FortisBC AMI Project will form a platform for the incorporation of considerable additional functionality to improve the performance of the electrical system. The Commission declines the notion of adding these net benefits to the AMI Project benefits at this time but acknowledges that they are real opportunities and should be the focus of considerable effort from FortisBC over the coming years to ensure that these benefits are captured. In order to ensure that these potential benefits are realized the Commission requests that FortisBC include in its periodic reporting to the Commission on the AMI Project a listing of the future benefit opportunities, which will use the platform of the AMI meters and smart grid, and their state of planning and development for implementation as well as their anticipated future benefit potential as and when the company has acquired sufficient information to make initial quantifications of potential benefits as a reasoning to pursue further development of the opportunities. The Commission requests that to the extent non-quantified benefits become quantifiable that FortisBC add those to this periodic reporting.

**C. *Health Impacts of AMI Meters – Safety Code 6***

454. The Commission finds, based on the evidence in this proceeding, that the Health Canada Safety Code 6 standard and provisions are the applicable standard for the AMI meters being proposed by the applicant and that compliance with these provisions and those of Measurement Canada and Industry Canada is sufficient to protect the public interest. The Commission finds that there is insufficient credible evidence on the record in this proceeding for it to establish that the Commission has either the jurisdiction or the necessary foundations to supplant these authorities. The Commission relies on these authorities and their ongoing review processes over time to ensure the protection of the health of the people of Canada and the Commission declines the suggestion that it should try to step into their role and provide alternative regulation of non-ionizing radiation for utilities in BC. The Commission acknowledges that there are over 25,000 studies of biological effects related to RF emissions but after extensive review of the intervenor submissions finds that it would be imprudent for the Commission to try to duplicate the tasks of Health Canada and various international standard and guideline setting institutions. The Commission finds that it would not have the resources or the ability to undertake such a role and instead relies on Health Canada and other properly constituted authorities and officials to adequately protect the health of FortisBC customers. The Commission finds that the evidence in this proceeding has established that the likely average exposure of people to RF radiation emissions from AMI meters will be on the order of 1/1000000<sup>th</sup> of the Safety Code 6 standard for protection of public health. The Commission finds that the attenuation factors from the peak radio transmission of the AMI meter communications including the duty cycle, distance from the meter, meter back plate shielding, building material attenuation and spatial averaging all contribute to making the actual exposure to RF energy very small and clearly support the conclusions of health authorities that exposure to RF emissions from smart meters are not a public health issue or concern. The Commission has considered the evidence on EHS and while acknowledging that the individuals who have presented themselves as having this condition have genuine concerns the Commission finds that it does not have a basis to establish that this can be causally related to RF emission levels from AMI meters. Nevertheless the Commission is sympathetic and will provide FortisBC the latitude in

dealing with its customers to exercise its customer service in such a way as to balance customer service objective and the public interest. The Commission finds that it is in the public interest to have a full and complete implementation of the AMI project over time following reasonable transition customer service principles.

**D. Opt Out Provisions**

455. The Commission finds that it is appropriate to provide an Opt Out provision for customers who refuse to have an AMI meter with communications radio on installed as a transition step for customer service reasons alone. The Opt Out provision shall include only installation of the AMI meter with the radio turned off. Customer refusing the installation of the standard meter in this configuration will have the option of having their metering moved to another location on their property or as established with FortisBC as viable at the customer expense or the provisions of the tariff enabling cessation of service will apply. The Opt Out provision is provided to enable FortisBC to conduct appropriate customer service engagement to explain and inform customers of the reality of the vanishingly small RF profile of the AMI meters and the evidence available to assure customers that particular concerns about these emission are not well founded in current science. Should customers not accept the customer service attention and advice from FortisBC the Opt Out provisions will be provided to them in their current premises. Once they sell or terminate lease or rent arrangements the premises will have the meter revert to radio on status for the indefinite future. Customers Opting Out will have their meters read manually by FortisBC and the customers will pay for the costs of providing the manual meter reading and an amortization of the costs of enabling the meter to revert to radio on once they move from their premises. FortisBC will be engaged in continuing customer service discussions with Opt Out customers and when all reasonable options for a customer service approach have been exhausted FortisBC will be authorized to implement an additional charge for the reasonable lost opportunity cost imposed on other customers. The charges related to the Opt Out provisions will be established in the company's tariffs and the amounts for the charges will be updated periodically based on periodic reports filed by FortisBC with the Commission from time to time outlining the costs of Opt Out provisions and the lost opportunity costs being imposed on other customers. These Opt Out provisions will continue as a transition measure to enable

FortisBC to exercise customer service principles in the transition to adoption of the AMI meter technology which the Commission finds to be in the public interest.

ALL OF WHICH IS RESPECTFULLY SUBMITTED.

*David Craig*

David Craig, Consultant for the Commercial Energy Consumers Association of British Columbia

A handwritten signature in black ink, appearing to read 'C. Weafer', is written over a horizontal line.

Christopher P. Weafer, Counsel for the Commercial Energy Consumers Association of British Columbia