Wayne Mackenzie  
Application Officer  
Alberta Utilities Commission  
Utilities Division, Calgary Office  
Fifth Avenue Place  
400, 425 – 1st Street SW  
Calgary, Alberta  T2P 3L8  

Dear Wayne:  

Re:  **AESO 2012 Construction Contribution Policy Application**  
Commission-Initiated Electric Transmission Contribution Policy Proceeding  
**Application No. 1607193 and Proceeding ID No. 1162**  

1. Please find enclosed the 2012 Construction Contribution Policy Application of the Alberta Electric System Operator (AESO). This application is submitted in accordance with the scope and schedule established by the Commission in the Electric Transmission Contribution Policy Proceeding initiated in accordance with determinations in Decision 2010-606 on the AESO's 2010 ISO Tariff Application.

2. The application develops and describes an approach to establishing the contribution policy for transmission connection projects used to provide system access service to load market participants. More specifically, the application requests approval of:
   - contribution policy principles,
   - a methodology to determine a point of delivery cost function,
   - a methodology to determine maximum investment levels, and
   - proposed investment levels.

3. This application includes a request that the proposed investment levels be effective retroactive to July 1, 2012. The AESO considers that retroactive implementation of the proposed investment levels would avoid the potential for project schedule delays and inefficiencies that could otherwise result, as discussed in section 11.1 of the application.

4. The AESO conducted extensive stakeholder consultation during development of this application. Consultation included distribution of a discussion paper, formation of and meetings with a small working group with broad industry representation, and two general stakeholder consultation meetings. The AESO considers the consultation, especially discussions with the small working group, to be effective and to have improved the thoroughness and overall quality of the application.

5. The application summarizes a significant amount of analysis, most of which is represented in three workbooks provided as appendices to the application. The AESO understands the Commission sometimes conducts a technical meeting to provide an opportunity for participants to more fully understand the technical and other information included in the application. The AESO is prepared to host
such a technical meeting if the Commission or stakeholders consider such a meeting would be worthwhile.

Based on the detailed scope of work provided in the Commission and on the extensive consultation conducted during development of this application, the AESO suggests the application be reviewed through a written proceeding.

Please direct all correspondence relating to this application to:

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Phone</th>
<th>Fax</th>
<th>Email</th>
</tr>
</thead>
<tbody>
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If you need any additional information, please contact me at 403-539-2465 in Calgary or by email to john.martin@aeso.ca.

Yours truly,

[original signed by]

John Martin
Director, Tariff Applications

cc: Heidi Kirrmaier, Vice-President, Regulatory, AESO
Lee Ann Kerr, Manager, Tariff Applications, AESO
Melissa Mitchell, Regulatory Support Services Administrator, AESO
Alberta Electric System Operator
2012 Construction Contribution Policy
Application

Date: June 20, 2012
Prepared by: Alberta Electric System Operator
Prepared for: Alberta Utilities Commission
              Electric Transmission Contribution Policy Proceeding
              Application No. 1607193, Proceeding ID No. 1162
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provided separately

provided separately

provided separately

provided separately
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1 Application

On July 12, 2011, the Alberta Utilities Commission (Commission) issued a letter setting out the final scope of work and filing schedule for the Electric Transmission Contribution Policy Proceeding it had established in accordance with determinations in Decision 2010-606 on the 2010 ISO tariff application of the Alberta Electric System Operator (AESO).

This application is submitted in accordance with the scope and schedule established by the Commission, and pursuant to sections 30 and 119 of the Electric Utilities Act (Act) under which the AESO prepares, submits, and receives approval from the Commission for a tariff which sets out the terms and conditions that apply to each class of system access service provided by the AESO.

The application develops and describes an approach to establishing the contribution policy for transmission connection projects used to provide system access service to load market participants. More specifically, the application requests approval of:

- contribution policy principles,
- a methodology to determine a point of delivery cost function,
- a methodology to determine maximum investment levels, and
- proposed investment levels to be effective retroactive to July 1, 2012.

1.1 Background

On December 22, 2010, the Commission issued Decision 2010-606 with respect to the AESO’s 2010 ISO tariff application (Application No. 1605961 and Proceeding ID No. 530). In its decision, the Commission determined that:

… the Commission will establish a module, under a separate proceeding, to deal with aspects of the AESO’s customer contribution policy. The Commission will set out the full terms of reference for this proceeding in correspondence to be issued following this Decision. [Decision 2010-606, section 9.3.1, page 58, paragraph 301]

On April 13, 2011, the Commission issued objectives and provided terms of reference for an electric transmission contribution policy proceeding and directed the AESO to submit a detailed scope of work and a schedule for filing an application. The Commission also established Proceeding ID No. 1162 to address the contribution policy proceeding.

After receiving comments from stakeholders and reply from the AESO, the Commission provided a final scope of work and application filing schedule on July 12, 2011.

This application is accordingly submitted by the AESO to comprehensively address all matters considered in-scope in the Commission’s July 12 letter. Matters considered in-scope included the following.

(1) Review the rationale, history and factors that influenced the development and implementation of transmission contribution policies, including:

- Review legislative requirements and policies in Alberta that impact transmission contributions.
- Review principles and directions established in prior decisions, including Decision 2010-606, that impact transmission contributions.
- Review other generally accepted regulatory principles and guidelines that are relevant to transmission contributions.
- Review principles and methodologies used for other utilities or in other jurisdictions relevant to transmission contributions, and in particular those used to establish maximum investment levels.

9  (2) Document changes in the frequency and amount of contributions over time.

10 (3) Examine whether a contribution should be required between two regulated utilities which already have underlying obligations to provide service; examine the potential impact on becoming a direct connect customer if distribution facilities owners do not have to make contributions in the future; and, investigate the means of mitigating any impacts.

11 (4) Identify those factors which most frequently result in contributions being paid for a point of delivery connection project, together with
- Examine the capital costs of transmission connection projects, including related investment and contribution amounts and factors that contribute to the variability of such costs between connection projects.
- Examine factors that may result in different considerations applying to expansion projects compared to greenfield connection projects.

12 (5) Investigate the impacts of contribution policies, maximum investment levels, and contribution levels on market participants, including
- Contribution balances for transmission facility owners and any other potential impacts (excluding Rider I and management fee impacts, which are included as out-of-scope items 1 and 2 below).
- Impact of changes to contribution policies on rates charged for system access service.
- Effects and impacts on intergenerational equity and potential means of mitigating such impacts.

13 (6) Develop one or more recommendations for determining the appropriate level of contributions that should result from application of a transmission contribution policy.

The in-scope matters are addressed in the remaining sections of this application, although not necessarily in the order listed above. This application also includes several appendices that provide the data and calculations used in the analysis of the AESO's construction contribution policy.

1.2 Stakeholder Consultation

The schedule provided by the Commission included provision for stakeholder consultation during development of this application.

The AESO’s consultation included three main components:
- distribution of a discussion paper reviewing contribution policy background with a request for stakeholder comments (August to September 2011);
- formation of a small working group to examine contribution policy matters in more detail and to provide input and advice to the AESO during the review of its contribution policy (October 2011 to June 2012); and
- general stakeholder meetings to update the broader stakeholder community and to receive feedback on the conclusions reached by the AESO (March and May 2012, each attended by 20-30 stakeholders).
The AESO issued an invitation for stakeholders to participate on the working group in September 2011. In response to the invitation, a working group was formed with members from the following organizations representing a broad spectrum of industry and consumers:

- AltaLink Management Ltd.: transmission facility owner;
- ATCO Electric: transmission facility owner and distribution system owner;
- Enbridge: industrial consumer;
- ENMAX Power: transmission facility owner and distribution system owner;
- FortisAlberta: distribution system owner;
- Industrial Power Consumers Association of Alberta (IPCAA): transmission-connected and distribution-connecting industrial consumers; and

The working group held eight meetings from October 2011 through June 2012.

All documents used in the consultation, including notes on working group meetings, were posted on the AESO website and are accessible at www.aeso.ca by following the path Tariff ► Current Consultations ► Contribution Policy.

### 1.3 Effective Date

In this application, the AESO requests approval of methodologies for developing a point of delivery cost function and for establishing investment levels. The AESO also requests approval of specific investment levels to replace those in subsection 8(4)(b) section 8 of currently-approved ISO tariff. The AESO requests that the new investment levels be approved to be effective retroactive to July 1, 2012.

The proposed investment levels represent a material increase compared to currently-approved investment levels, due to the various factors considered in this application. The AESO considers the proposed increase in investment levels to be large enough that some market participants may attempt to delay projects until new levels become effective. Such delays could create inefficiencies and schedule changes that impact many market participants, including transmission facility owners. The AESO submits that retroactive implementation of the proposed investment levels would avoid the potential for such delays and inefficiencies.

The balance of approvals in this application are requested to become effective after the Commission issues its decision on a date to be established by the Commission, as is the usual practice for tariff-related decisions.

### 1.4 Relief Requested

Based on the detailed scope of work provided in the Commission’s letter of July 12, 2011, and on the extensive consultation conducted during development of this application, the AESO suggests the application be reviewed through a written proceeding.

Based on the entirety of this application and in respect of:

- the AESO’s tariff and terms and conditions approved by the Commission pursuant to sections 30 and 119 of the Electric Utilities Act, and
- the Commission’s letter of July 12, 2011, and instructions therein,

the AESO requests the following:

(a) approval of the contribution policy principles described in section 3 of this application as appropriate principles upon which to base the AESO’s contribution policy;
(b) approval of the methodology used to develop the point of delivery cost function in section 7 of this application, and approval of the cost function so derived;

(c) approval of the methodology used to develop maximum investment levels in section 8 of this application, and approval of the levels so derived as provided in section 9;

(d) approval of section 8 of the ISO tariff incorporating the proposed maximum investment levels, as provided in Appendix D of this application, to be effective retroactive to July 1, 2012;

(e) confirmation that this application adequately responds to and satisfies the scope of work identified in the Commission’s letter of July 12, 2011; and

(f) such other relief as the Commission deems appropriate.

All of which is respectfully submitted this 20th day of June, 2012.

Alberta Electric System Operator

Per: 

Heidi Kirrmaier
Vice-President Regulatory
2 History of AESO Contribution Policies

The AESO’s contribution policy has undergone several changes since the electric industry was initially restructured in 1996. An underlying consideration for a contribution policy is that a contribution is suitable in circumstances where service to a connecting market participant might impose costs on existing market participants for which they should not be responsible. At the same time, “deep” system costs are properly the responsibility of all market participants and should be recovered from all market participants through rates.

Investment level determines what construction contribution is required to be paid by a load market participant, with the contribution covering the construction costs in excess of the maximum investment level. The investment is recovered from all load market participants through the point of delivery charge in Rate DTS. The AESO’s current method of determining a maximum investment level has evolved over time, from a policy which explicitly accounted for revenue from a market participant’s service to a policy which is fully based on connection project costs.

The following sections summarize the contribution policies in effect during various periods of the AESO’s history.

2.1 Pre-1996

Prior to 1996, when utilities in Alberta were vertically integrated within separate service areas, there was no distinction between a contribution for a transmission connection and one for a distribution connection. The AESO is unable to provide specific information regarding transmission connection project costs prior to 1996 or to determine the amount of transmission contributions made prior to 1996.

2.2 1996-2000

From 1996 to 2000, eligible Rate DTS market participants were entitled to a “capital credit” applied to their connection project costs. This capital credit was calculated based on a minimum contract term.

<table>
<thead>
<tr>
<th>Capital Credit per kW of Contract Capacity</th>
<th>Minimum Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>$115</td>
<td>5 years</td>
</tr>
<tr>
<td>$200</td>
<td>10 years</td>
</tr>
<tr>
<td>$265</td>
<td>15 years</td>
</tr>
<tr>
<td>$310</td>
<td>20 years</td>
</tr>
</tbody>
</table>

The Capital Credit available will not exceed the participant-related cost for any individual point of delivery.

During this period, contract capacity was a heavily weighted variable in the calculation of available investment, and an investment term (5 to 20 years) was also a component.

2.3 2001-2005

During the period 2001 through 2005, the AESO’s contribution policy was based on four major principles:

- harmonization with the contribution policies of distribution system owners inasmuch as the AESO’s contribution policy would be revenue-based and 80% of transmission projects would not require a contribution, such that neither distribution nor transmission contribution policy would provide an incentive for a market participant to prefer connection to one system over the other;
- imposition of an economic siting discipline on market participants;
33 The investment level during 2001-2005 was based on what was termed a "roll-in ceiling", which included a base commitment term amount of $6,000,000 for a 20-year commitment term plus three times the levelized annual projected revenue from the new or expanded service. The contract capacity did not weigh as heavily in determining investment and was only considered in the calculation of the projected annual revenue.

34 The terms "maximum investment" and "roll-in-ceiling" are synonymous; both terms represent the same concept, recognizing that it is the transmission facility owner who would make the "investment" in facilities.

2.4 2006-2008

In Decision 2005-096, the Alberta Energy and Utilities Board determined that cost, not revenue, would be an appropriate starting point for the establishment of an investment policy. At that time, the Board considered the principle of sending appropriate economic siting signals to be of primary importance. In this regard, an average cost function based on a data set of interconnection project costs was introduced.

35 Decision 2005-096 included the following explanation:

The Board notes that it is in the interest of existing AESO customers that the interconnection of new customers be encouraged so long as the interconnection costs to be funded by existing customers are less than the incremental transmission tariff revenues expected to be generated. Accordingly, the Board considers that it is appropriate that the maximum investment function to be applied in the longer term should include some additional “tolerance” above the amount that would be provided under an investment function strictly designed to reflect average costs. [Decision 2005-096, section 6.1.4, page 57]

36 The maximum investment in connection facilities for this period was $125,000 per year plus $5,000 per MW per year. The AESO was directed in Decision 2005-096 to conduct further study to devise a more comprehensive investment function proposal as part of its next general tariff application.

2.5 2008-Present

37 As part of its 2007 general tariff application, and following extensive consultation with stakeholders, the AESO developed an investment cost function which was based on data gathered for a Customer Contribution Study. The data and recommendations were submitted as part of the tariff application and were further refined through the tariff review proceeding. The Commission ultimately approved an average cost function with several components. A multiplier applied to this cost function formed the approved multi-tier investment level.

38 The AESO used the same cost function both to determine the maximum investment levels for its contribution policy and to design the point of delivery charge component of Rate DTS, resulting in alignment between investment structure and rate structure.

2.6 Summary of Historical Policies

39 The AESO’s past and current construction contribution policies are summarized in Table 2-2, including example calculations of investment based on a single load service at a substation and a 20-year contract term.
Table 2-2  Summary of Transmission Contribution Policies, 1996-Present

<table>
<thead>
<tr>
<th>Years</th>
<th>Tariff</th>
<th>Maximum Investment</th>
<th>Example Investment</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1996-2000</td>
<td>1996 Tariff</td>
<td>$115,000/MW for a 5-year term</td>
<td>7.5 MW $2,325,000</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>Effective: Jan 1, 1996</td>
<td>$200,000/MW for a 10-year term</td>
<td>17 MW $5,270,000</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>Approved: Order U97157</td>
<td>$265,000/MW for a 15-year term</td>
<td>40 MW $12,400,000</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$310,000/MW for a 20-year term</td>
<td>Average $6,665,000</td>
<td>—</td>
</tr>
<tr>
<td>2001-2003</td>
<td>2001 Tariff</td>
<td>$2,000,000 for every five year commitment</td>
<td>7.5 MW $6,873,165</td>
<td>196%</td>
</tr>
<tr>
<td></td>
<td>Effective: Jan 1, 2001</td>
<td>term past five years, plus</td>
<td>17 MW $7,979,174</td>
<td>51%</td>
</tr>
<tr>
<td></td>
<td>Approved: Decision 2000-57</td>
<td>three times levelized annual revenue</td>
<td>40 MW $10,656,879</td>
<td>-14%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Average $8,503,073</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2003-2005</td>
<td>2003 Tariff</td>
<td>$400,000/year after first five years, plus</td>
<td>7.5 MW $6,873,165</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Effective: Dec 1, 2003</td>
<td>three times levelized annual revenue</td>
<td>17 MW $7,979,174</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Approved: Decision 2003-077</td>
<td></td>
<td>40 MW $10,656,879</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Average $8,503,073</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2006-2008</td>
<td>2006 Tariff</td>
<td>$125,000/year, plus</td>
<td>7.5 MW $3,250,000</td>
<td>-53%</td>
</tr>
<tr>
<td></td>
<td>Effective: Jan 1, 2006</td>
<td>$5,000/MW/year</td>
<td>17 MW $4,200,000</td>
<td>-47%</td>
</tr>
<tr>
<td></td>
<td>Approved: Order U2005-464</td>
<td></td>
<td>40 MW $6,500,000</td>
<td>-39%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Average $4,650,000</td>
<td></td>
<td>-46%</td>
</tr>
<tr>
<td>2008-2009</td>
<td>2007 Tariff</td>
<td>$51,400/year × SF, plus</td>
<td>7.5 MW $5,363,000</td>
<td>65%</td>
</tr>
<tr>
<td></td>
<td>Effective: Aug 1, 2008</td>
<td>$28,900/MW/year for first (7.5 × SF) MW</td>
<td>17 MW $7,263,000</td>
<td>73%</td>
</tr>
<tr>
<td></td>
<td>Approved: Order U2008-217 and Decision 2009-105</td>
<td>$10,000/MW/year for next (9.5 × SF) MW</td>
<td>40 MW $9,977,000</td>
<td>53%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$5,900/MW/year for next (23 × SF) MW</td>
<td>Average $7,534,333</td>
<td>62%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$3,100/MW/year for all remaining MW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010-2011</td>
<td>2010 Tariff</td>
<td>$51,050/year × SF, plus</td>
<td>7.5 MW $6,218,500</td>
<td>16%</td>
</tr>
<tr>
<td></td>
<td>Effective: Jan 1, 2010</td>
<td>$34,650/MW/year for first (7.5 × SF) MW</td>
<td>17 MW $8,650,500</td>
<td>19%</td>
</tr>
<tr>
<td></td>
<td>Approved: Decision 2010-606</td>
<td>$12,800/MW/year for next (9.5 × SF) MW</td>
<td>40 MW $12,215,500</td>
<td>22%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$7,750/MW/year for next (23 × SF) MW</td>
<td>Average $9,028,167</td>
<td>20%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$4,200/MW/year for all remaining MW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td>2011 Tariff</td>
<td>$50,050/year × SF, plus</td>
<td>7.5 MW $6,101,000</td>
<td>-2%</td>
</tr>
<tr>
<td></td>
<td>Effective: Jul 1, 2011</td>
<td>$34,000/MW/year for first (7.5 × SF) MW</td>
<td>17 MW $8,485,500</td>
<td>-2%</td>
</tr>
<tr>
<td></td>
<td>Approved: Decision 2011-275</td>
<td>$12,550/MW/year for next (9.5 × SF) MW</td>
<td>40 MW $11,981,500</td>
<td>-2%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$7,600/MW/year for next (23 × SF) MW</td>
<td>Average $8,856,000</td>
<td>-2%</td>
</tr>
<tr>
<td>Cumulative, 1996 to 2011</td>
<td></td>
<td></td>
<td></td>
<td>33%</td>
</tr>
</tbody>
</table>

2.7 Changes in the frequency and amount of contributions over time

Table 2-3 below identifies calculated contribution amounts for load connection projects taking service under Rate DTS. The year category represents the tariff year and thus contribution policy applied to the project. The table compiles data for 69 greenfield connection projects and 128 upgrade projects. The dollar amounts are in millions of dollars.
### Table 2-3 Summary of Investment and Contribution Under Different AESO Tariffs

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of Projects</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greenfield Projects</td>
<td>4</td>
<td>5</td>
<td>20</td>
<td>4</td>
<td>21</td>
<td>3</td>
<td>12</td>
<td>69</td>
</tr>
<tr>
<td>Upgrade Projects</td>
<td>2</td>
<td>10</td>
<td>28</td>
<td>31</td>
<td>22</td>
<td>16</td>
<td>19</td>
<td>128</td>
</tr>
<tr>
<td>Total Projects</td>
<td>6</td>
<td>15</td>
<td>48</td>
<td>35</td>
<td>43</td>
<td>19</td>
<td>31</td>
<td>197</td>
</tr>
<tr>
<td><strong>Greenfield Project Costs, $ 000 000</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greenfield Costs</td>
<td>$16.82</td>
<td>$22.33</td>
<td>$154.80</td>
<td>$40.94</td>
<td>$278.57</td>
<td>$50.37</td>
<td>$250.70</td>
<td>$814.53</td>
</tr>
<tr>
<td>Contributions Greenfield</td>
<td>$0.70</td>
<td>$1.19</td>
<td>$22.95</td>
<td>$24.24</td>
<td>$130.66</td>
<td>$20.04</td>
<td>$149.54</td>
<td>$349.31</td>
</tr>
<tr>
<td>Contributions Greenfield %</td>
<td>4.1%</td>
<td>5.3%</td>
<td>14.8%</td>
<td>59.2%</td>
<td>46.9%</td>
<td>39.8%</td>
<td>59.6%</td>
<td>42.9%</td>
</tr>
<tr>
<td><strong>Upgrade Project Costs, $ 000 000</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upgrade Costs</td>
<td>$0.85</td>
<td>$19.97</td>
<td>$40.96</td>
<td>$56.22</td>
<td>$69.38</td>
<td>$75.67</td>
<td>$80.44</td>
<td>$343.48</td>
</tr>
<tr>
<td>Investment Upgrade</td>
<td>$0.85</td>
<td>$19.97</td>
<td>$25.47</td>
<td>$24.31</td>
<td>$34.78</td>
<td>$20.64</td>
<td>$18.63</td>
<td>$144.64</td>
</tr>
<tr>
<td>Contributions Upgrade</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$15.49</td>
<td>$37.17</td>
<td>$36.76</td>
<td>$55.03</td>
<td>$61.80</td>
<td>$206.25</td>
</tr>
<tr>
<td>Contributions Upgrade %</td>
<td>0.0%</td>
<td>0.0%</td>
<td>37.8%</td>
<td>66.1%</td>
<td>53.0%</td>
<td>72.7%</td>
<td>76.8%</td>
<td>60.0%</td>
</tr>
<tr>
<td><strong>All Project Costs, $ 000 000</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Costs</td>
<td>$17.68</td>
<td>$42.30</td>
<td>$195.76</td>
<td>$97.15</td>
<td>$347.95</td>
<td>$126.04</td>
<td>$331.14</td>
<td>$1,158.00</td>
</tr>
<tr>
<td>Total Investment</td>
<td>$16.98</td>
<td>$41.11</td>
<td>$157.32</td>
<td>$43.80</td>
<td>$183.81</td>
<td>$50.97</td>
<td>$119.80</td>
<td>$613.77</td>
</tr>
<tr>
<td>Total Contributions</td>
<td>$0.70</td>
<td>$1.19</td>
<td>$38.45</td>
<td>$61.41</td>
<td>$167.42</td>
<td>$75.07</td>
<td>$211.34</td>
<td>$555.56</td>
</tr>
<tr>
<td>Total Contributions %</td>
<td>3.9%</td>
<td>2.8%</td>
<td>19.6%</td>
<td>63.2%</td>
<td>48.1%</td>
<td>59.6%</td>
<td>63.8%</td>
<td>48.0%</td>
</tr>
</tbody>
</table>

Note: For tariff years 2006 and 2007, the % investment and % contribution calculations include a 12% operations and maintenance charge, which was added to the total project costs. This results in values that are greater than 100% in those years.
3 Contribution Policy Principles

In accordance with the scope established for the contribution policy proceeding, the AESO reviewed the principles that would apply to a transmission contribution policy.

The AESO initially reviewed the contribution policy principles included in its 2010 ISO tariff application, which had been compiled and summarized from prior decisions on AESO tariff applications to the Commission and the Alberta Energy and Utilities Board. In Decision 2010-606 on the 2010 ISO tariff application, the Commission commented:

*The Commission has reviewed the contribution policy principles proposed by the AESO and considers that they reflect cost causation and are consistent with the principles established in previous proceedings.*

*The Commission considers that the overall intent of the contribution policy and maximum investment levels is to achieve a reasonable balance of what an individual customer pays upfront through a customer contribution relative to what all customers in a particular rate class pay through ongoing rates.*

The AESO also considered the contribution policy principles discussed in:
- the *Common Approach to Maximum Investment Levels* filed by FortisAlberta as part of its 2010-2011 distribution tariff application (Section 9, Appendix O);
- the *Maximum Investment Level Study* filed by ATCO Electric as part of its 2011-2012 general tariff application (Section 10, Attachment 1); and
- recommendations resulting from AltaLink’s industry consultation process during 2008 on the AESO’s construction contribution policy.

Based on the information reviewed, the AESO established that an optimal contribution policy should address eight principles, with three principles considered primary and the remaining three considered secondary. The principles were discussed with the contribution policy working group, and the AESO considers that the working groups supported the principles as presented below. Accordingly, the AESO submits that an optimal contribution policy:

1. provides effective price signals;
2. maintains intergenerational equity;
3. is based on cost causation;
4. is based on local costs;
5. is robust and sustainable;
6. treats all load market participants equitably;
7. compensates utilities equitably; and
8. is simple, consistent, and transparent.

A contribution policy that satisfies these eight principles should generally prove satisfactory when applied to almost all connection projects, although specific circumstances will likely exist where the policy may not provide appropriate outcomes. In particular, it is doubtful that any contribution policy will fully satisfy all eight principles in all circumstances. As noted in Decision 2010-606 quoted above, a contribution policy generally represents a reasonable balance of objectives.

In recognition that a contribution policy may not be able to satisfy all principles simultaneously in all circumstances, the AESO considers it essential that it satisfy the three primary principles in as many circumstances as possible. In addition, it should satisfy the secondary principles as frequently as possible, but not at the expense of the primary principles.
The following sections describe each of the principles in more detail and provide additional background discussion.

### 3.1 Primary Principles

The three primary principles are discussed first.

1. **Provides effective price signals** — The contribution policy must send price signals that influence market participants to select the best long-term economic and technical alternatives for connection projects while considering good electric industry practice. The price signals should ensure that market participants consider the costs of connections when requesting system access service. An effective price signal will result in a market participant requesting:
   - only those transmission facilities needed to meet the individual service requirements of the market participant, and
   - transmission facilities that optimize overall costs, including the impact of siting the market participant's own plant and equipment as well as other factors.

   The contribution policy should not provide excessive investment or other incentives that would encourage market participants to request facilities beyond those needed to meet their individual service requirements.

An effective price signal is one that supports optimal connection project configuration and design. At the same time, the price signal should not be larger than necessary to encourage such optimization and, in particular, should not be so excessive that it discourages the use of system access service by a market participant.

The price signal provided for a connection project includes both the construction contribution paid by a market participant at the time of connection and the point of delivery charge paid by a market participant in monthly charges for system access service. A market participant who does not pay a construction contribution will still pay connection-related costs through the point of delivery charge. A market participant would be expected to respond to both aspects of the price signal for a connection project, when making decisions that affect connection project configuration and design.

It is difficult to assess the effectiveness of a contribution policy price signal, especially given the limited number of connection projects that occur annually and the variability of those project's circumstances. In general, requiring an incremental contribution for a connection project in direct proportion to its incremental cost would be expected to send a direct and clear price signal. However, lack of a construction contribution for a specific project may not indicate lack of a price signal: a price signal may have been given and responded to such that the resulting configuration was below the maximum investment level.

Conversely, payment of a construction contribution for a specific project does not guarantee the effectiveness of a price signal. A market participant may have modified their service request to reduce costs and, in doing so, may have resulted in a sub-optimal configuration that does not represent the best long-term economic and technical alternative. In general, a price signal should not be excessive such that a market participant unnecessarily sacrifices operability and reliability in pursuit of a lower construction contribution.

For example, consider two projects from the project database provided as Appendix A of this application, as summarized in Table 3-1 below.
Table 3-1  Comparison of Investment for Two Projects

<table>
<thead>
<tr>
<th>Project</th>
<th>Capacity (MW)</th>
<th>Project Cost ($000 000)</th>
<th>Investment ($000 000)</th>
<th>Contribution ($000 000)</th>
<th>“Unused” ($000 000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>863</td>
<td>25</td>
<td>$7.6</td>
<td>$7.6</td>
<td></td>
<td>$0.1</td>
</tr>
<tr>
<td>864</td>
<td>25</td>
<td>$9.2</td>
<td>$7.7</td>
<td>$1.5</td>
<td>-</td>
</tr>
</tbody>
</table>

56 For project 863, listed first in Table 3-1, no construction contribution was paid, and the investment calculation in the tariff would have actually provided an additional $0.1 million of investment had it not been limited by the actual project costs. The term “unused investment” is used to refer to the $0.1 million provided by the investment calculation which was not available because the project costs were low enough that it was not required.

57 For project 864, listed second in Table 3-1, a construction contribution of $1.5 million was paid.

58 The fact that investment was “unused” for one project and a contribution was paid for another project does not mean that an effective price signal was not provided for the first project and was provided for the second. The first project may reflect a response to the price signal provided through monthly tariff charges or may reflect that a contribution would be required if any additional facilities would have cost more than the $0.1 million of “unused investment” potentially available.

59 The second project may not reflect any response to a price signal if project costs were higher due to a greater length of transmission line required for the project or if the market participant’s decisions were based on operation and reliability concerns rather than cost matters.

60 In summary, it is important that a contribution policy be designed to provide as effective a price signal as possible, but it may be difficult to assess the effectiveness of a contribution policy in practice.

61 (2) Maintains intergenerational equity — The contribution policy must balance what a new market participant pays as a contribution compared to what all market participants pay through related rate components. In general and consistent with historical practice, new market participants should receive a fair and sufficient level of investment such that most do not pay a contribution or, alternatively, that most contributions represent a small proportion of connection project costs. As well, a new service should not unduly burden existing services and should not place undue upward pressure on rates.

62 Maintaining intergenerational equity provides fairness and equality between past, present, and future “generations” of market participant who connect to the transmission system and receive system assess service. On the one hand, current market participants should pay a construction contribution under conditions which would have required a construction contribution for past connection project, and generally in proportions with the contribution that would have been paid for those past projects. On the other hand, current market participants should not receive excessive investment such that upward pressure is placed on rates that all market participants will pay in the future (nor should they receive such little investment that rates would tend to decrease in the future).

63 A challenge in assessing intergenerational equity for connections to the transmission system is that connection project costs and investment coverage of those costs has varied considerably in the past. For example, under the tariff in effect in 2000, about 97% of project costs were covered by investment with the remaining 3% paid through construction contribution. Under the tariff in effect in 2006, about 48% of project costs were covered by investment with the remaining 52% paid through contribution. At the same time, average connection project costs approximately doubled from 2000 to 2006.
Figure 3-2 below summarizes average project cost and investment for the contribution policies in place for the projects included in Appendix A of this application. The AESO understands that the contribution policies in place prior to 2000 provided similar levels of coverage as those under the 2000, 2001, and 2003 tariffs, at least for the period starting in 1996 when a separate transmission administrator was first established. Prior to 1996, when system connections were provided by vertically-integrated utilities, the AESO also understands that construction contributions for transmission connections were similarly rare, as transmission facility owners had recorded limited construction contributions at that time.

**Figure 3-2 Average Greenfield Project Cost, Investment, and Investment Coverage**

The challenge when assessing the intergenerational equity offered by a proposed contribution policy is whether it should be assessed against the contribution policy in place under the 2000 tariff, under the 2006 tariff, or under some other tariff. In general, the AESO considers that intergenerational equity should be assessed against those policies in place prior to 2006. This is based on the AESO’s understanding that the current contribution policy proceeding has resulted, at least in part, from concerns about the equity of the AESO’s existing contribution policy. That existing contribution policy began in the AESO’s 2006 tariff, with subsequent tariffs representing refinements to the original 2006 contribution policy. It accordingly seems inappropriate to assess intergeneration equity against policies which have required a separate proceeding to review them.

At the same time, the reduction in investment under the 2006 tariff was a reaction, at least in part, to concerns about excessive investment available under prior tariffs. From that perspective, some weight must still be accorded to recent tariffs.

(3) **Is based on cost causation** — Investment levels should be determined on the same cost causation basis as are the related rate components, to the extent practical and considering the expected life of a service. Since investment is recovered through rates, basing both on cost causation will ensure investment is appropriately recovered through rates over a broad range of market participant connections.
A cost causation basis for a contribution policy ensures that construction contributions relate to the cost of a connection project. A cost causation basis will recognize economies of scale and will also ensure that decisions which cause higher connection project costs are appropriately reflected through the contribution policy.

In the AESO’s tariffs since 2006, both investment levels and the point of delivery charges in Rate DTS have been based on the same cost function, as illustrated for the current tariff by their identical shapes in Figure 3-3. Since investment in a connection project is recovered over time through the point of delivery charge, aligning the two is appropriate and reasonable. Such alignment also means that a market participant who receives a higher level of investment will pay a higher monthly charge for the service received.

Figure 3-3  Maximum Investment and Point of Delivery Charge Under 2011 ISO Tariff

A cost causation basis for a contribution policy should also ensure that a market participant is responsible only for connection project costs that are attributable to the market participant’s request for system access service. Costs should not be attributed to the market participant’s connection if they are more properly attributed to other market participants’ when shared facilities provide multiple services or when connection facilities are in excess of those required to serve the market participant due to economic or system planning reasons. The AESO’s tariff includes several provisions to address such circumstances to support the cost causation basis for its contribution policy.

These three primary principles — that a contribution policy should provide effective price signals, maintain intergenerational equity, and be based on cost causation — have some interrelated aspects. For example, basing a contribution policy on cost causation should improve the effectiveness of the price signal it provides. Similarly, if contribution policies, over time, have provided effective price signals and have been based on cost causation, then they have potentially maintained intergenerational equity.

The AESO considers that it is essential that an optimal contribution policy address all three of these primary principles to the greatest extent possible.
3.2 Secondary Principles

In addition to the primary principles already discussed, there are five secondary principles that a contribution policy should also satisfy. However, these secondary principles should not be satisfied at the expense of the primary principles.

4) **Is based on local costs** — The contribution policy should directly relate to the current local connection costs of system access service and should exclude system costs. The connection costs should reflect good electric industry practice for transmission facilities to meet the individual service requirements of the market participant.

The contribution policy should ensure that costs related to the “deeper” transmission system are not attributed to the participant-related costs of a connection project. Such system-related costs are more properly shared amongst all system access services through the local system and bulk system charges of Rate DTS.

The costs attributed to a connection project should also be consistent with current standards, guidelines, and judgment for good electric industry practice. The connection project configuration and design should be neither substandard (which could result from an excessively restrictive contribution policy) nor overbuilt (which could result from an excessively generous contribution policy).

5) **Is robust and sustainable** — The contribution policy must accommodate changes to the service characteristics, functionality, and standards that apply to system access service, as those characteristics, functionality, and standards change over time.

A contribution policy must be robust enough to adapt to the significant variation in connection projects that occurs through the normal process of meeting a market participant’s requirements while connecting to a pre-existing transmission system in an area, and to changes to both the market participant’s requirements and to the transmission system over time. A contribution policy must also equitably address the provision of additional system access services through an existing connection project. Finally, a contribution must also be sustainable through these changes and by adapting to changes specifications and standards as they evolve and are revised from time to time.

6) **Treats all load market participants equitably** — The contribution policy should apply equally to owners of distribution systems, owners of industrial systems, and direct-connected market participants who receive section 101 releases. In as much as all load market participants pay the same investment-related rate components, all should be subject to the same contribution policy.

The AESO considers that a transmission contribution policy must apply to and treat all load market participants equitably. All load market participants pay the same Rate DTS for system access service and should accordingly be eligible for the same level of investment, since the point of delivery charge in Rate DTS recovers investments made in connection projects. This principle is discussed in more detail in section 5 of this application.

7) **Compensates utilities equitably** — The contribution policy should provide a reasonable opportunity for transmission facility owners to invest in and be compensated for the facilities they own, operate, and maintain to provide system access service.

Equitable compensation for transmission facility owners who own, operate, and maintain facilities for which contributions have been paid was discussed extensively during the 2011 generic cost of capital proceeding. The AESO understands the concern arose, in part, because of the high proportions of contributions paid for connection projects under recent AESO tariffs, as illustrated earlier in Figure 3-2. The AESO considers that a contribution policy should include investment levels sufficient to minimize such concern.
(8) **Is simple, consistent, and transparent** — The contribution policy must be simple to administer and update. It must also be able to be applied consistently and transparently.

A contribution policy should be relatively easy to understand and apply. If not, it risks that the price signal it provides will not be received or responded to. A contribution policy should also be stable and consistent so that market participants may make decisions respecting system access service with an expectation of reliable and coherent contribution determinations. Finally, a contribution policy should be simple to administer and maintain to avoid administrative inefficiencies for the AESO, transmission facility owners, and market participants.

These five secondary principles — that a contribution policy be based on local costs, be robust and sustainable, treat all load market participants equitably, compensate utilities equitably, and be simple, consistent, and transparent — represent highly desirable, but not necessarily essential, aspects of an optimal contribution policy.

The eight contribution policy principles (three primary and five secondary) provide the framework for the development and evaluation of the proposed transmission contribution policy in the remaining sections of this application.
4 Possible Investment Mechanisms

The most significant outcome of a contribution policy review is a mechanism to provide investment in a connection project together with the specific level of investment provided by the selected mechanism.

4.1 Possible Mechanisms

The AESO identified several different approaches that could be used to determine investment for connection projects. The working group adopted the term “mechanism” to refer to those approaches. Each of these mechanisms provides a different way of determining the balance between investment (which is recovered over time through the average point of delivery charge to all market participants) and construction contribution (which is a project-specific cost paid by a connecting market participant). These mechanisms are summarized below.

Investment coverage — This contribution policy mechanism has been supported historically in Alberta and has traditionally been referred to as the “80/20 rule”. Some Alberta distribution utilities continue to use this mechanism to set distribution investment levels today. Investment coverage refers to setting an investment level such that investment would fully cover connection costs for a certain percentage of new service connections. (In the case of the “80/20 rule”, investment would cover costs for 80% of service connections, while contribution would be required for the remaining 20%.) A variation of this mechanism would set an investment level such that investment would cover a certain percentage of aggregate connection costs for all new service connections. Although frequently referred to as the “80/20 rule” mechanism, the mechanism could use any specified percentage for the number of connections covered or the portion of connection costs covered.

Average cost multiplier — This mechanism applies a numeric multiplier to the average cost of connection projects to determine the maximum investment level. A multiplier of 1.0 would result in maximum investment equal to the average cost of a connection project, and a multiplier of 1.5 would result in maximum investment of 50% more than the average cost of a connection project. The multiplier mechanism has been used to establish investment levels in the AESO’s tariff since its 2007 tariff application.

Revenue test — This mechanism involves a calculation of the incremental revenue a market participant would contribute to connection project costs. The market participant would then pay a contribution if the forecasted incremental revenue over a prescribed period of time did not cover the cost of the connection project. Revenue test mechanisms are frequently simplified to a calculation of total revenue over a relatively short period (three to five years) rather than a more extensive calculation of incremental revenue over a longer period.

Maximum line length — Under this mechanism, a market participant would be responsible for costs of transmission line required for a connection project over a prescribed line length. For example, investment levels could be set to cover the cost of a substation and two kilometers of line; the cost of any additional line required would be paid through contribution.

Percentage cost coverage — This mechanism would provide investment as a prescribed percentage of the cost of each connection project. Every market participant would receive investment (a certain percentage of project costs) and every participant would be required to pay a contribution (the remaining percentage of project costs).

Zero contribution — Under a zero contribution (or 100% investment) mechanism, market participants would not be required to pay a contribution for any load connection project that was consistent with good electric industry practice.
Zero investment — Finally, a zero investment (or 100% contribution) mechanism would require all market participants to pay all of the local connection costs associated with their connection projects.

Other approaches that could be used to determine investment for connection projects appear to be variations of these eight mechanisms. The AESO notes that some of these eight mechanisms themselves may be considered variations of a more general approach. For example, an average cost multiplier mechanism may be used to achieve an investment coverage level. Zero contribution and zero investment mechanisms may be considered variations of the percentage cost coverage mechanism, with the percentage set at 100% and 0%, respectively.

However, the AESO considers that these eight mechanisms provide a broad spectrum of different approaches that may be used to establish investment levels.

### 4.2 Assessment of Mechanisms Against Principles

In order to establish an appropriate mechanism to form the basis of its contribution policy, the AESO evaluated the ability of each mechanism to satisfy the contribution policy principles discussed in section 3 of this application. Together with the working group members, the AESO assessed how well each mechanism met the eight principles.

In Table 4-1 below, rows contain the seven mechanisms and columns contain the eight principles. Symbols in the cells indicate how well a particular mechanism supports a particular principle.

- A check mark (in a green-shaded cell) indicates that the mechanism fully, or almost fully, supports the principle.
- A cross mark (in a red-shaded cell) indicates that a mechanism does not support the principle or supports it very weakly.
- A black dot (in a yellow-shaded cell) indicates that a mechanism partially supports the principle or supports it moderately.

Some cells contain both a cross mark and a check mark, which indicates that when applied to an individual connection project a mechanism may fully support a principle or may not support a principle at all. For example, an investment coverage mechanism provides a price signal when a contribution must be paid for a connection project, but provides no price signal when the full cost of the connection project is covered by investment.

This AESO notes that the assessments indicated in Table 4-1 are qualitative rather than quantitative in nature. Although weighting and numeric analysis were considered for the assessment, the AESO considers it is not practical to attempt to more precisely assess the seven mechanisms. The qualitative assessment’s main purpose is to provide useful comparative information about each of the mechanisms.

Based on this assessment of mechanisms against the contribution policy principles, the AESO concludes that the first two mechanisms — investment coverage and average cost multiplier — provide the strongest support for the greatest number of principles. As well, those two approaches do not fail to support any of the principles to some extent or, at a minimum, in some circumstances. In particular, only those two mechanisms support (in at least some circumstances) all three of the primary principles.

Of the two mechanisms which most fully satisfy the contribution policy principles, the average cost multiplier mechanism provides somewhat stronger support than the investment coverage mechanism. The AESO therefore focuses on the average cost multiplier mechanism in the remaining sections of this application. However, as will be seen in the final sections, the investment coverage mechanism provides useful insight into selection of a specific multiplier.
Table 4-1  Contribution Policy Mechanisms and Principles

<table>
<thead>
<tr>
<th>Contribution Policy Mechanism</th>
<th>Provides effective price signals</th>
<th>Maintains inter-generational equity</th>
<th>Is based on cost causation</th>
<th>Is based on local costs</th>
<th>Is robust and sustainable</th>
<th>Treats all load market participants equitably</th>
<th>Compensates utilities equitably</th>
<th>Is simple, consistent, and transparent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investment coverage</td>
<td>✗ ✔</td>
<td>✔</td>
<td>✔</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Average cost multiplier</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>●</td>
</tr>
<tr>
<td>Revenue test</td>
<td>✔</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✔</td>
<td>✔</td>
<td>●</td>
<td>✗</td>
</tr>
<tr>
<td>Maximum line length</td>
<td>✔</td>
<td>✗</td>
<td>✗</td>
<td>✔</td>
<td>✗</td>
<td>✔</td>
<td>●</td>
<td>✗</td>
</tr>
<tr>
<td>Percentage cost coverage</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✔</td>
<td>●</td>
<td>✔</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Zero contribution</td>
<td>✗</td>
<td>●</td>
<td>✗</td>
<td>●</td>
<td>●</td>
<td>✔</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Zero investment</td>
<td>✔</td>
<td>✗</td>
<td>✔</td>
<td>●</td>
<td>●</td>
<td>✔</td>
<td>●</td>
<td>✗</td>
</tr>
</tbody>
</table>
5 Contributions Between Regulated Utilities

In accordance with the scope established for the contribution policy proceeding, the AESO investigated and considered contributions between regulated utilities. More specifically, the AESO considered whether distribution system owners should be required to pay construction contributions to transmission facility owners for connection projects to provide system access service.

The AESO first observes that distribution system owners currently pay construction contributions in accordance with the AESO’s existing contribution policy, as do owners of industrial systems and direct-connected market participants who receive section 101 releases from the distribution system owners. The AESO considers that this requirement for contributions by distribution system owners to transmission facility owners should be maintained in the AESO’s contribution policy, for the following reasons.

(a) The requirement for construction contributions by distribution system owners to transmission facility owners aligns with the unbundled industry structure established by the Electric Utilities Act.

(b) The practice of construction contributions supports a primary principle of a contribution policy: that it provide an effective price signal. Conversely, not requiring contributions from distribution system owners would remove a price signal. As the market participant who receives system access service is a distribution system owner for most connections to the transmission system, the price signal is most often given to the distribution system owner (except for connections for owners of industrial systems and direct-connected market participants who receive section 101 releases).

(c) Under a well-designed contribution policy, construction contributions reflect principles of cost causation and are based on local costs incurred for the connection.

(d) On principle, requiring contributions from distribution system owners results in all load market participants being treated equitably. It does not require significant changes to other aspects of the AESO’s tariff, such as a separate cost allocation or rate class for distribution system owners.

(e) No longer requiring distribution system owners to pay contributions might result in concerns about differences between the transmission components of distribution tariffs compared to the AESO tariff applied to a direct-connected market participant. This could reduce harmonization and introduce seams issues between large industrial customers served under a distribution tariff compared to ones who receive section 101 releases for direct-connected service from the AESO.

(f) Continuing the practice of distribution system owners paying construction contributions does not raise issues around maintaining intergenerational equity with existing services where a construction contribution may previously have been paid.

(g) Discontinuing the practice of distribution system owners paying construction contributions could potentially require an assessment of each transmission facility owner’s standards and costs associated with connection projects to ensure that distribution customers are not subsidizing each other with respect to transmission facility costs within a distribution service area.

While consideration of the “management fee” proposed by some transmission facility owners is outside the scope of this contribution policy proceeding, the AESO notes that concerns were raised about the potential of “double-dipping” when a transmission facility owner earned a management fee on contributed assets while an affiliated distribution system owner earned a return on the contribution it had paid. Commission Decision 2011-474 denied the management fee proposals and effectively removed the concern of “double-dipping” when a distribution system owner pays a construction contribution to an affiliated transmission facility owner.
The AESO considers the above reasons provide strong support to continue the practice of distribution system owners paying construction contributions to transmission facility owner, there may be two benefits to discontinuing the practice. First, no longer requiring contributions would remove some financial complexity for integrated utilities with both transmission and distribution functions. Second, no longer requiring contributions would remove concerns that transmission facility owners would not be compensated equitably for the contributed assets which they own, operate, and maintain. This second concern would be alleviated by a well-designed contribution policy, but the potential magnitude of the concern is discussed in the next section.

### 5.1 Contribution Balances Held by Transmission Facility Owners

Recent tariff applications and filings have included a total balance of just over $500 million of unamortized construction contributions held by transmission facility owner as summarized in Table 5-1 below.

#### Table 5-1 Contribution Balances Held by Transmission Facility Owners

<table>
<thead>
<tr>
<th>Transmission Facility Owner</th>
<th>Contributions ($ 000 000)</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>AltaLink</td>
<td>$227.9</td>
<td>AltaLink 2011-2012 TFO Tariff Compliance Filing — 2012 Forecast Net Mid-Year Contributions</td>
</tr>
<tr>
<td>ATCO Electric Transmission</td>
<td>186.6</td>
<td>ATCO Electric 2011-2012 GTA Compliance Filing — Forecast 2012 Net Mid-Year Contributions</td>
</tr>
<tr>
<td>ENMAX Transmission</td>
<td>24.4</td>
<td>ENMAX Transmission 2010 Annual Operations Financial and Operating Reporting — Actual 2010 Mid-Year Balance</td>
</tr>
<tr>
<td>EPCOR Transmission</td>
<td>60.9</td>
<td>EPCOR 2012 Tariffs Application — Forecast 2012 Net Mid-Year Balance</td>
</tr>
<tr>
<td>Lethbridge Transmission</td>
<td>1.6</td>
<td>Lethbridge 2009-2011 TFO Tariff Refiling — Forecast 2011 Net Mid-Year Balance</td>
</tr>
<tr>
<td>TransAlta Transmission</td>
<td>0.1</td>
<td>TransAlta 2009-2010 TFO Tariff Refiling — Forecast 2010 Mid-Year Balance</td>
</tr>
<tr>
<td><strong>Total Contributions</strong></td>
<td><strong>$501.5</strong></td>
<td></td>
</tr>
</tbody>
</table>

The AESO had prepared a similar table in response to information request AUC.AESO-011 (b) during its 2010 ISO tariff application proceeding, which summarized $261.2 million of total contributions based primarily on forecasts for 2010. The AESO observes that total contributions held by transmission facility owners are forecast to have increased by $240.3 million, or 92%, in the two years since the earlier table was prepared. The AESO considers the magnitude of this increase supports the concern that the AESO’s contribution policy may not be equitably compensating transmission facility owners for contributed assets which they own, operate, and maintain.

The AESO expects this concern would increase if distribution system owners were no longer required to pay construction contributions to transmission facility owners.

Although Table 5-1 includes contributions for generator connection projects as well as for load connection projects, the magnitude of the total contributions held by transmission facility owners illustrates the importance of a well-designed contribution policy. As noted in the principles discussed in section 3 of this application, a contribution policy should provide a reasonable opportunity for transmission facility owners
to invest in and be compensated for the facilities they own, operate, and maintain. Too high a level of contributions can impair that opportunity.

5.2 Assessment Against Principles

The AESO has found it informative to consider the concept of contributions between utilities in the context of the assessment of mechanisms against contribution policy principles previously provided in section 4.2 of this application.

A distribution system owner paying contributions to a transmission facility owner would be represented by the investment coverage or average cost multiplier mechanism, assuming one of these recommended approaches forms the basis of the contribution policy.

Alternatively, a distribution system owner that is not required to pay contributions would be represented by the zero contribution mechanism.

These three mechanisms are compared in Table 5-2 below.

Table 5-2 Contribution Policy Mechanisms and Principles for Contributions Between Utilities

<table>
<thead>
<tr>
<th>Contributions From Distribution System Owners to Transmission Facility Owners</th>
<th>Provides effective price signals</th>
<th>Maintains intergenerational equity</th>
<th>Is based on cost causation</th>
<th>Is based on local costs</th>
<th>Is robust and sustainable</th>
<th>Treats all load market participants equitably</th>
<th>Compensates utilities equitably</th>
<th>Is simple, consistent, and transparent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investment coverage</td>
<td>❌</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Average cost multiplier</td>
<td>❌</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>No Contributions Between Utilities</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
<td>❌</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
<td>✔️</td>
</tr>
</tbody>
</table>

The AESO notes that a concept of no contributions between utilities (as represented by the zero contribution mechanism) fails to support three contribution policy principles, including two primary principles of providing effective price signals and being based on cost causation. Even the third primary principle of maintaining intergenerational equity is only moderately supported.

In contrast, contributions between utilities (as represented by the first two mechanisms in Table 5-2) supports half or more of all the principles, including strong support for two primary principles and partial support for the third.

Based on this assessment, the AESO concludes that distribution system owners should continue to be required to pay construction contributions to transmission facility owners, based on a contribution policy designed in accordance with the principles set out in this application.
5.3 Impacts on Other Market Participants

Large services may receive electrical service either through a distribution system owner or, if connected to the transmission system at a single point of delivery, through direct arrangement with the AESO when released to do so by the distribution system owner under subsection 101(2) of the *Electric Utilities Act*. A “direct-connected” market participant would be treated inequitably if required to pay a construction contribution for a connection project, where a similar distribution-connected service was not required to pay a contribution.

Under such an arrangement, direct-connected market participants could reasonably request the development of cost allocations and rate classes to separate distribution system points of delivery from direct-connect points of delivery. Without such separation, both parties would pay the same rate for system access service which would likely result in direct-connected market participants (who would also be required to pay contributions when their connection costs exceeded the AESO’s maximum investment levels) effectively subsidizing distribution system market participants (who would always receive investment for their full connection costs).

In addition to potential inequitable treatment for direct-connected market participants, not requiring contributions from distribution system owners will likely raise concerns from customers of specific distribution systems who feel they are subsidizing customers of other distribution systems that may have higher transmission connection costs. Such higher costs could arise due to standards established by the respective distribution system owners or transmission facility owners, or due to particular service area characteristics. Currently, with contributions being paid by distribution system owners, any differential costs that exceed the AESO’s maximum investment level are contained and recovered from customers within that distribution system’s service area as a result of those contributions.

If distribution system owners were exempt from paying contributions, all distribution system customers would pay for those differential costs through AESO rates — unless separate cost allocations and rates were determined for each distribution system. This could result in two effects. First, there would likely be pressure to develop separate AESO rates for each distribution system. Second, the issue could lead to pressure to standardize the standards, practices, and costs with respect to connection configurations and designs across all transmission facility owners. In turn, these effects would likely raise concerns of maintaining intergenerational equity, with issues related to the treatment of existing points of delivery which may or may not have previously paid a contribution, and whether those points of delivery should also have a separate AESO rate.

Potentially the largest impact on direct-connected market participants, which could have ramifications for all other customers, is that deviating from equitable treatment of all load market participants will result in additional unforeseen issues around harmonization of the AESO tariff and distribution system owner tariffs. The AESO also notes that, although distribution system owners and direct-connected market participants may not respond to price signals in exactly the same way, the *Electric Utilities Act* requires distribution system owners to arrange for system access service on behalf of large transmission-connected industrial consumers as well as on behalf of distribution-connected industrial consumers.

The AESO considers that developing separate rate classes for direct-connected market participants and for distribution system owners would lead to many issues around the differences between the transmission components of distribution tariff and the AESO tariff applied to a direct-connected market participant. These issues would result in a reduction in the harmonization of tariffs applicable to for large industrial customers served by a distribution company compared to those who are direct-connected and served by the AESO through a section 101 release. Such reduction in harmonization could result in unforeseen issues around the granting of releases under section 101(2) of the *Electric Utilities Act*. In particular, it could potentially impede the orderly, economic, and efficient development of the Alberta...
interconnected electric system by providing greater financial incentives for consumers to seek service either through a distribution system owner or through direct-connected service from the AESO.

132 The AESO concludes that changing from the existing practice of requiring distribution system owners to pay contribution, to one of not requiring contributions from distribution system owners, would introduce inequitable treatment of load market participants which would then require significant mitigation of the resulting issues and impacts.

133 The AESO further notes that not requiring contributions between utilities was suggested as an approach to address the issue of the frequency and magnitude of construction contributions being too high due to inadequate investment levels. The AESO submits that a more appropriate solution would be to increase investment levels as proposed in this application to satisfy the contribution policy principles identified earlier.
6 Connection Project Data

Consistent with the principle of basing a contribution policy on cost causation, the AESO has utilized actual connection project data in the analysis performed for this application. The database of connection projects, including much of the analysis conducted during the course of developing the recommendations in this application, is provided as Appendix A.

6.1 Description of Greenfield and Upgrade Project Data

Connection projects that result from requests for system access service are referred to as either “greenfield” projects or “upgrade” projects. Greenfield projects are those that require the construction of a new substation to provide system access service, whereas upgrade projects are those that require the construction of additional facilities at an existing substation.

6.1.1 Greenfield Project Data

Data from the original “Customer Contribution Study” (submitted as Appendix F of the AESO’s 2007 general tariff application) formed the basis for the connection project cost database. The database was further expanded and updated in the “2010 POD Cost Function Update” (submitted as Appendix F of the AESO’s 2010 ISO tariff application). The 2007 study database included 48 greenfield load-only projects comprised of 30 AESO-era greenfield projects and 18 pre-AESO greenfield projects. The 30 AESO-era projects had in-service dates falling within the period 1998-2006, while the 18 pre-AESO projects had in-service dates falling within the period 1987-1999.

The expanded and updated 2010 study database included 64 greenfield load-only connection projects comprised of 46 AESO-era greenfield projects and the same 18 pre-AESO greenfield projects. Project cost information was updated to be current as of 2009.

For this application, the AESO compiled final project costs and updated cost estimates for connection projects included in the 2010 POD Cost Function Update. The AESO also collected connection project cost information for 23 additional greenfield load-only projects, where estimates were available at the PPS ("Proposal to Provide Service" or +20%/-10%) level, and where a facilities application had been filed with the Commission. In total, the AESO collected project cost data for 69 greenfield projects (in addition to the 18 pre-AESO greenfield projects).

The AESO also added several data fields to all connection projects to aid in further analysis. These added data fields included:

- connection type (AESO direct-connected, distribution-served transmission-connected, or distribution-served distribution-connected),
- location (geographic co-ordinates),
- substation number,
- substation voltage level,
- number of transformers,
- project type (greenfield or upgrade),
- transmission line length,
- substation costs,
- transmission line costs, and
- distributed and indirect costs.

The AESO notes that only participant-related costs (as defined in the AESO’s tariff) are included in the database. That is, system-related costs are not included.
The AESO has also introduced as part of this application’s analysis the concept of “maximum DTS”. As many connection projects have contract levels that vary over time (usually referred to as “staged” contract levels), the DTS contract level associated with a project should reflect its final or maximum capability. The maximum DTS level represents the largest capacity that a connection project has been configured and designed to serve, and is only associated with greenfield projects. Under this concept, the largest DTS capacity increase that does not require construction at a substation would be considered the maximum DTS capacity. This maximum DTS capacity is used in deriving the raw cost function.

Connection projects for industrial systems and for dual-use substations (where both load and generation are connected) continue to be excluded from the analysis, as the generation capacity for such projects frequently has a significant impact on the total project cost.

6.1.2 Upgrade Project Data

As part of this application, the AESO completed additional analysis to consider upgrade projects as well as greenfield projects. Several of the additional fields discussed above are not applicable to upgrade projects. For example, transmission line length and transmission line costs are not usually associated with an upgrade project.

The maximum DTS contract capacity for an upgrade project is the capacity after the upgrade construction. In the workbook provided as Appendix A of this application, the AESO also included an “Average DTS” field to represent the average of pre-upgrade and post-upgrade DTS capacities.

The AESO collected project data for 128 upgrade projects.

6.1.3 Pre-AESO Greenfield Project Data

As part of the AESO’s 2007 general tariff application proceeding, data for 18 older projects with small and large DTS levels were added to the database to improve the coverage of DTS capacities that were not well-represented in the more-recent greenfield project data in that application. For those 18 older “pre-AESO” projects (which were developed prior to the formation of the AESO), only DTS capacity, in-service year, and total project costs were available. (This limited data came from analysis completed for the Transmission Cost Causation Study provided as part of the AESO’s 2007 general tariff application.) Decision 2007-106 noted:

However, the Board finds these additional data points are the best available POD cost data for projects in these contract capacity ranges. Moreover, since the Board is strongly persuaded that the relationship between POD costs and contract capacity will exhibit economies of scale, the Board considers that a much more significant distortion of the POD cost function would occur if these data points were to be excluded than any potential for distortion that may be caused by incompatibilities with the greenfield data.

[Decision 2007-106, section 5.7.5, page 46]

As part of the detailed analysis completed for this application, the AESO updated the current DTS contract levels for the pre-AESO projects. DTS levels were only adjusted when there was no evidence of an upgrade project associated with the change in DTS capacity.

6.1.4 Summary of Project Data

Table 6-1 below summarizes the differences between the data that formed the basis for the POD cost function analysis in the AESO’s 2010 ISO tariff application and the data that is used as the basis for the POD cost function in this application.
### Figure 6-1  Comparison of Data Used for 2010 and 2012 Cost Function Analysis

<table>
<thead>
<tr>
<th></th>
<th>2010 Analysis</th>
<th>2012 Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Updated data period</td>
<td>1999-2009</td>
<td>1999-2013</td>
</tr>
<tr>
<td>Greenfield projects</td>
<td>64 greenfield projects (48 AESO and 18 pre-AESO)</td>
<td>87 greenfield projects (69 AESO and 18 pre-AESO)</td>
</tr>
<tr>
<td>Cost data source</td>
<td>final costs and PPS estimates</td>
<td>final costs and PPS estimates where facilities application has been filed</td>
</tr>
<tr>
<td>Total greenfield project costs, uninflated</td>
<td>$467.7 million</td>
<td>$870.2 million</td>
</tr>
<tr>
<td>Total greenfield project costs, inflated</td>
<td>$553.5 million</td>
<td>$1,017.6 million</td>
</tr>
<tr>
<td>Upgrade projects</td>
<td>not included</td>
<td>128 upgrade projects</td>
</tr>
<tr>
<td>Total upgrade project costs, uninflated</td>
<td>-</td>
<td>$343.5 million</td>
</tr>
<tr>
<td>Total upgrade project costs, inflated</td>
<td>-</td>
<td>$387.7 million</td>
</tr>
</tbody>
</table>

### 6.2  Factors Resulting in Contributions Being Paid

As with previous project cost analyses, significant variability in project costs exists among the projects in the current database. Variability of connection project costs results from many factors, including radial line requirements, transmission voltage level, substation configuration, varying geography and construction conditions, and overall project complexity.

In addition to these general factors that give rise to connection project cost variability, the AESO examined factors that affected those projects that exhibited the largest differences from average costs.

#### 6.2.1 Outlier Factors for Greenfield Projects

For greenfield projects, the AESO investigated projects where the escalated project cost was more than 170% of the average cost function estimate. The AESO first determined the average cost function for the 87 greenfield connection projects (69 AESO projects plus 18 pre-AESO projects). The AESO then divided the actual (escalated) cost of the project by the cost estimated from the average cost function for the project size (in MW). Finally, the AESO created a frequency histogram to visually represent the data. The histogram is provided in Figure 6-2 below.

The following observations can be made on Figure 6-2:
- 33 projects fall within a range of 70-130% of average project costs,
- 25 projects have costs less than 70% of average, and
- 29 projects have costs more than 130% of average cost.

Of those projects with higher-than-average costs, 15 projects have costs that are more than 170% of average project costs. The AESO identified these projects as “outliers” and investigated why those projects’ costs were so much higher than average.
The AESO notes that there is no rigid definition of what constitutes an outlier, as explained in the reference text *Outliers in Statistical Data*:

There is no rigid mathematical definition of what constitutes an outlier; determining whether or not an observation is an outlier is ultimately a subjective exercise. Outliers can occur by chance in any distribution, but they are often indicative either of measurement error or that the population has a heavy-tailed distribution. A heavy-tailed distribution is a distribution whose tail is not exponentially bound, that is, they have heavier tails than the exponential distribution. In many applications it is the right tail of the distribution that is of interest. In the case of measurement error an analyst could discard them or use statistics that are robust to outliers, while in the case of heavy-tailed distribution they indicate that the distribution has high kurtosis (a measure of the “peakedness” of the distribution) and that one should be very cautious in using tools or intuitions that assume a normal distribution. A frequent cause of outliers is a mixture of two distributions, which may be two distinct sub-populations, or may indicate ‘correct trial’ versus ‘measurement error’.

Unless it can be ascertained that the deviation is not significant, it is ill-advised to ignore the presence of outliers. [Barnett, V. and Lewis, T., 1994, *Outliers in Statistical Data*, John Wiley & Sons, 3rd edition]

The investigation of these projects revealed that a number of factors can contribute to higher-than-average costs. In general, each of the outlier projects involved at least one of the following factors which had the effect of adding significant costs to the connection project:

- Geographic location can add significant costs to a connection project, especially if a project requires long distances of transmission line.
- Building in advance of bulk system expansion can add significantly to project costs, although some of the facilities built may later be converted to system facilities (with an associated contribution refund).

Both geographic location and building in advance of bulk system expansion were the most frequently observed factors contributing to the high cost of outlier projects. The following factors were less frequently observed, but still can add significant costs to a connection project:
Delays in regulatory approvals or due to other unforeseen circumstances can increase costs by, for example, changing the season of construction or causing demobilization and re-mobilization of construction.

Recently-implemented requirements for participant involvement and additional consultation have added to project costs and timelines.

Requirements to unexpectedly outsource construction to maintain schedules under abnormal or exceptional circumstances can add to connection project costs, especially during constrained labour market conditions.

High distributed and indirect costs have contributed to higher costs for more-recent projects.

Changes in functionality or reliability standards over time can impact connection project costs.

In general, the AESO found that each of the outliers exhibited several of the factors mentioned above.

### 6.2.2 Outlier Factors for Upgrade Projects

While the factors discussed above contribute to high costs for greenfield projects, different factors contribute to high costs for upgrade projects and result in upgrade outliers. For example, while geographic location may contribute to higher costs for a greenfield project due to requirements for long transmission lines, transmission line is not usually a component of an upgrade project. In addition, upgrade projects generally do not have additional land acquisition costs or other costs associated with the construction of a substation in a greenfield location.

However, upgrade projects do exhibit considerable variability of costs. In general, there are two types of upgrade projects.

A capacity increase request that goes beyond the maximum capacity of the existing transformer(s) at a substation will require either the addition of another transformer or the replacement of an existing transformer with a larger one. Adding capacity by adding or replacing a transformer represents the first type of upgrade project, and generally incurs significant costs for the upgrade. (The AESO notes that transformer replacement generally results in lower project costs, as the removal of a transformer results in a credit to the project at replacement cost new value.)

The second type of upgrade project involves adding one or more breakers to an existing substation to allow access to additional existing transformer capacity at the substation. This type of upgrade project does not require an increase in transformer capacity, and costs are usually significantly lower than for upgrades involving transformer addition or replacement.

To identify outliers for upgrade projects, the AESO calculated the dollars per megawatt of additional capacity provided by the upgrade project. For example, an upgrade project cost of $1.0 million with an associated contract capacity increase of 10 MW would result in an average cost of $100,000 per MW. Thirteen upgrade projects exhibited average costs greater than $1 million per MW, and the AESO considered those projects to be upgrade project outliers.

Every upgrade project outlier involved the addition of a transformer. As well, each of the upgrade project outliers involved a contract capacity increase of 5 MW or less. This produced high per MW costs for the upgrades, which also provided little investment and resulted in relatively large construction contributions. Upgrade project outliers also all occurred at substations older than 20 years, with substation ages ranging from 23 years to 47 years. This suggests that it may be more expensive to accommodate additional or replacement transformers at older substations.

The examination of both greenfield and upgrade project outliers did not reveal any project costs which should be excluded from the project database, nor from development of an average cost function. Although the factors about can result in high connection project costs and high construction contributions, the resultant costs are fully attributable to individual connection projects. It is doubtful that any
contribution policy, and certainly not one structured with a maximum investment level, will significantly reduce contributions for projects where costs are so much higher than average.
7 Determination of Cost Function

Having updated and expanded the project database of greenfield and upgrade projects, the AESO developed a point of delivery cost function to represent the average cost of connection projects. The cost function provided in this application includes two enhancements compared to the cost function included in the AESO’s 2010 ISO tariff application:

- a revised and simplified inflation factor, and
- incorporation of upgrade projects into the cost function.

7.1 Inflation Index

The AESO made several small modifications to the inflation index used to escalate original project costs to more current cost levels.

The first modification recognized that the majority of material and construction costs for a connection project are typically incurred by a transmission facility owner 6 to 18 months prior to the in-service date of the project. Original costs for a connection project are therefore typically recorded by a transmission facility owner one year before a project’s in-service date. The AESO has accordingly escalated all project costs starting from the year before the project’s in-service date in the analysis used for this application. (The year before the in-service date is indicated as “ISD-1” in the project database.)

The second modification revises the composite inflation index used by the AESO for the cost function analysis provided as part of its 2010 ISO tariff application. For that cost function, the AESO used a four-component index based on Statistics Canada indices for substation equipment, transmission line, industrial services, and industrial structures. Statistics Canada has since discontinued the Alberta-specific industrial services index, which prompted the AESO to consider alternative inflation indices.

In particular, the AESO reviewed inflation indices used by transmission facility owners in Alberta. Two indices (those used by ATCO Electric and ENMAX) are also based on Statistics Canada indices and have been accepted by the Commission in tariff applications of those utilities.

The ATCO Electric and ENMAX inflation indices both use the same two Statistics Canada indices:

- the Electric Utility Construction Price Index (EUCPI), a Canada-wide index that included distribution and transmission sub-indices, and
- Alberta Average Weekly Earnings (AWE), a province-specific labour index.

Each utility combines those two indices in proportions appropriate to their organization. The AESO considered the ATCO Electric and ENMAX indices to be reasonable alternatives and compared them historically to the AESO’s composite index, as illustrated in Figure 7-1.

The AESO index factor tends to be somewhat more volatile than the both the ATCO Electric and ENMAX indices, displaying higher peaks and lower valleys. The ENMAX index is the least volatile of the three indices compared in Figure 7-1.

For its analysis in this application, the AESO is proposing an inflation index similar to ENMAX’s. The AESO has developed an index using the EUCPI Transmission and Alberta AWE Statistics Canada indices, weighted in proportion to the equipment and labour costs for connection projects in the project database. The AESO proposes a weighting of 53.2% EUCPI Transmission and 46.8% Alberta AWE.

The AESO considers the proposed index to be less volatile and simpler than its previous composite index. The Statistics Canada indices it is based on are publicly available and long-standing, and are not expected to be discontinued in the foreseeable future.
7.2 Greenfield Cost Function

In Decision 2005-096 on its 2005-2006 general tariff application, the AESO was directed to use a cost-based approach to set the maximum investment levels to be used in its contribution policy. As well, the AESO was directed to undertake further research and develop a more comprehensive investment function proposal.

Accordingly, the AESO developed and proposed a point-of-delivery cost function as part of its 2007 general tariff application. The maximum investment levels proposed for its contribution policy reflected the costs of point of delivery facilities as represented by the cost function. The AESO also proposed that the cost function be used to classify point of delivery costs for rate design purposes.

The AESO updated the cost function in its 2010 ISO tariff application and continued to use it to establish maximum investment levels and to classify point of delivery costs for Rate DTS.

For this application the AESO has conducted further development of the point of delivery cost function. In particular, the AESO has captured both greenfield and upgrade projects in an enhanced cost function which builds on the greenfield cost function as developed in prior applications.

As in those prior applications, the AESO determined an average cost function based on greenfield connection projects in its project database. New projects have been added to the database which now includes 69 AESO-era greenfield projects as well as the 18 pre-AESO greenfield projects included in the previous databases. The AESO considers it important to maintain the previous projects in the database to provide as much stability and continuity to the cost function as possible. The AESO also incorporated the revised inflation index to escalate the project cost data, as discussed above.

The AESO confirmed that, as for prior cost functions, a power curve cost function continues to best represent the project data. The power curve cost function exhibits a coefficient of determination of 0.3684, indicating moderate positive correlation between total project costs and DTS contract capacity and
generally comparable to the coefficients exhibited by previous cost functions. The cost function remains similar to the cost functions approved in Decision 2010-606 on the AESO’s 2010 ISO tariff application and in Decision 2007-106 on the AESO’s 2007 general tariff application.

Although the variability of project costs within the database remains significant, the data nevertheless exhibits a clear trend of cost increasing as contract capacity increases for connection projects. Combined with the moderate coefficient of determination, the AESO concludes this power curve is a reasonable average cost function for transmission connection projects. The cost function is represented graphically in Figure 7-2 below:

Figure 7-2  Cost Function Developed From Greenfield Projects

![Figure 7-2 Cost Function Developed From Greenfield Projects](image)

Note: Five data points are outside the bounds of this chart. For all data points, please see Appendix B.

### 7.3 Incorporation of Upgrade Projects

As discussed earlier in this application, requests for system access service that require construction are accommodated either through:

- construction of a new substation, referred to as a “greenfield” project, or
- addition of facilities at an existing substation, referred to as an “upgrade” project.

Previous developments of cost functions and investment levels in the AESO’s 2007 and 2010 tariff applications were based only on greenfield projects, as the methodology used did not readily accommodate upgrade projects. The previously-developed investment levels had been assessed against upgrade project costs and found to provide a reasonable level of investment, but upgrade projects themselves were not included in the development of the cost functions or investment levels.

During the analysis performed for this application, the AESO re-examined the inclusion of upgrade projects in the development of the cost function and investment levels. The methodology used was modified to include upgrade projects, as explained in the following paragraphs. The AESO considers that incorporating costs of both greenfield and upgrade projects results in a cost function that better reflects cost causation for all connection projects.
The cost function developed for greenfield projects provides a relationship between capacity (in MW) and project cost (in dollars), and results in investment levels based on the capacity of a greenfield project. The challenge in incorporating upgrade projects is that they involve two capacities: the initial capacity that exists before the project and the incremental capacity added during the project. The investment level varies with both the initial capacity (which can be considered the starting point on the cost curve) and the incremental capacity (which can be considered the distance moved along the cost curve). The two capacities interact such that two upgrade projects with the same incremental capacity will receive different levels of investment if they have different initial capacities, since the initial capacity determines the starting level at which incremental investment is provided. For example, under the current investment levels that became effective in July 2011, incremental capacity of 10 MW for an upgrade project would receive:

- up to $2.2 million of investment if the initial capacity was 10 MW (that is, if the project was for an upgrade from 10 MW to 20 MW of capacity), and
- up to $0.8 million of investment if the initial capacity was 40 MW (that is, if the project was for an upgrade from 40 MW to 50 MW of capacity).

Incorporating upgrade projects into the cost function development would reflect the cost of accommodating capacity at an existing substation. However, only the upgrade cost should influence the cost function for an upgrade project. The original cost of the existing substation should already be included in the cost function as a greenfield project, or should be excluded because it is outside the data set being considered (and is frequently old enough that its detailed cost is not known).

To ensure the cost function reflects only the upgrade cost for an upgrade project, the cost of the substation already in place to accommodate the initial capacity (which is considered to have been built as a greenfield project) was calculated using the cost function developed for greenfield projects. The cost of the upgrade project was then added to the calculated greenfield cost to determine a “total” cost for the substation, which would then be capable of serving the total capacity (initial capacity plus incremental capacity) at the substation. An upgrade data point therefore reflects the total costs and total capacity at the substation, which would be comparable to the cost and capacity at a greenfield substation, but the total cost would vary from the cost function only to the extent the upgrade cost varied from the cost function.

After determining data points for all the upgrade projects, a new power curve regression was analyzed for the composite data set including all greenfield and upgrade projects. The resulting power curve was slightly different from the original greenfield-only power curve. Since the cost to accommodate the initial capacity at an upgrade project was based on the original power curve, the new power curve changed the data points for upgrade projects slightly. Therefore the data points for upgrade projects were recalculated based on this first iteration of the power curve, and the new upgrade data points were then used with the greenfield data points to develop another iteration of the power curve. This iterative process — develop upgrade data points using the existing power curve for initial capacity costs, combine them with greenfield data points, and determine a new power curve — was repeated 15 times to allow the power curve determinants to converge on stable values. The AESO considers the iterative process to be appropriate both to develop a stable power curve that is as representative as possible of the combined greenfield and upgrade project data, and to acknowledge that some substations are upgraded multiple times through their lives. (Multiple upgrades are likely to occur when one considers that 128 upgrade projects occurred during the same period as only 69 greenfield projects.)

The process is illustrated conceptually in Figure 7-3 below. Although this simple illustration shows an upgrade data point that is above the original greenfield power curve (that is, is more costly than an “average” greenfield project), the AESO notes that upgrade data points occur both above and below the original power curve. The 15 iterations used for the power curve development are included in the workbook provided as Appendix B of this application.
In general, the AESO expected that the inclusion of upgrade projects in the analysis would result in an increase in the cost function for projects with larger capacities. Upgrade projects by their nature tend to be larger, since incremental capacity is being added at an existing substation that already has greenfield capacity. The total cost of providing capacity at a substation through initial greenfield construction and later upgrade construction would also typically be higher than the cost of providing the same capacity through one-time greenfield construction. As expected, the cost function increased when upgrade projects were incorporated into its determination, as illustrated in Figure 7-4 below.

The AESO considers the impact of incorporating upgrade projects into the greenfield cost function to be reasonable. The increase will provide moderately more investment for upgrade projects, but should not provide greater investment that might dampen the price signal that prompts market participants to consider future capacity requirements when requesting system access service. In general, building sufficient capacity initially for future requirements is more efficient than incremental construction, and investment is provided for future capacity increases at the time of greenfield project construction in accordance with subsection 8(6) of section 8 of the ISO tariff. At the same time, market participants should not be unduly harmed if unexpected load growth or capacity increases are required beyond periods which can be reasonably forecast. The AESO considers that including upgrade projects in the development of the cost function and investment levels appropriately balances these concerns.

The final cost function proposed by the AESO is therefore based on a combined data set of 215 connection projects. Some characteristics of those projects are summarized in Table 7-5 below.
The final cost function based on power curve regression on those 215 data points (where upgrade data points are included as discussed above) is:

\[
\text{Average Cost} = 1,976,700 \times \text{MW}^{0.5810}
\]

This cost function is illustrated in Figure 7-6 below.
7.4 Development of Proposed Cost Function

The development of the cost function in this application differs from the development in previous applications in several aspects. To illustrate the relative impact of those aspects, Figure 7-7 below shows the cost function at each stage of development in this application: updating greenfield project data, using the revised inflation index, and incorporating upgrade projects.

The “Existing” line in Figure 7-7 is the cost function used in the AESO’s current tariff. Compared to that existing cost function, the most significant change in the cost function results when greenfield project data is updated and new greenfield projects are added to the database. Both the impact of using the revised inflation index and that of incorporating upgrade projects are significantly smaller than the impact of updating the greenfield project data.
Figure 7-7  Comparison of Cost Functions Through Incremental Development

Construction Cost, $\times 10^6$

Maximum DTS Contract Capacity, MW

- Upgrade Projects
- Revised Inflation
- Updated Projects
- Existing

Confidentiality: Public
Filed June 20, 2012
8 Determination of Investment Level

The previous sections of this application have developed an average cost function representative of transmission connection projects. The final component of a contribution policy establishes the maximum investment levels available to a connection project.

8.1 Project Investment Coverage

The AESO continues to support the use of a multiplier in order to establish maximum investment levels. Similar to the methodology approved in recent AESO tariff application, a multiplier is applied to the average cost function such that a target percentage of projects or of project costs would be covered by investment.

The AESO considers that a forward-looking contribution policy provides the most appropriate foundation for establishing investment levels. This differs from the development of the point of delivery cost function, which should be based on analysis of all available connection project cost information to establish the average cost function used for both contribution policy and rate design purposes. Instead, recent project costs provide more relevant information on present and future cost trends when establishing investment levels to be applied to current and future connection projects.

Based on this consideration, the AESO proposes to use only recent projects to establish a multiplier for setting maximum investment levels. The investment levels proposed in this application are based on 68 projects with in-service dates of 2010 or later. The 68 projects include 26 greenfield projects and 42 upgrade projects.

The AESO examined various aspects of the investment coverage that resulted from several different multipliers. This analysis was supported through use of a “multiplier calculator”. The calculator allows a multiplier value to be entered and then displays the coverage available under the resulting investment levels for the 68 recent projects, together with summary data. The multiplier calculator proved a useful tool for discussion within the working group of the impact of different multipliers, and is included in the workbook in Appendix B of the application.

Figure 8-1 below is a graphical representation of the 68 recent projects included in the analysis. The orange bars represent the 42 upgrade projects and the grey bars represent the 26 greenfield projects. The horizontal axis values represent the maximum DTS contract capacity for the connection projects (which for upgrade projects was the final DTS contract capacity after the upgrade construction). The vertical axis represents the escalated project costs.

The projects are sorted by the maximum investment that was ultimately available for the project, which is calculated based on the DTS contract capacity with an assumed 20-year investment term for all projects. The bars on the left therefore represent projects with low levels of investment (based on the requested DTS contract capacity), and investment levels increase for each project as you move to the right of the graph. As an example, the first orange bar in the graph represents an upgrade project with a maximum (final) DTS contract capacity of 117 MWs. In this case the project did not increase the DTS contract capacity and no investment was available for the project, such that the project appears first on the left. The cost of the upgrade project was $5.5 million.
Figure 8-2 next illustrates the investment and contribution levels for the 68 recent projects if maximum investment levels were set equal to the cost function discussed previously in this application. Under this scenario, a project with average costs would be covered by investment — the investment level would be represented as the cost function with a multiplier of 1.00.

In Figure 8-2, the dark-shaded portions of the bars represent costs that are covered by investment. The lighter-shaded portions of the bars represent the construction contribution that would be required for the project. The red markers represent the maximum investment that was calculated for the project but was not available because project costs were less than the maximum. The uncolored spaces under the red markers represent “unused investment” — investment that the project would otherwise be eligible if its costs were not already fully covered by investment.

Large amounts of unused investment can have unintended consequences. When a connecting market participant is afforded a large investment to cover costs that are below average, that market participant might be incented to request facilities over and above what is required to satisfy the service request. Over time, this would tend to increase average project costs, which would place undue upward pressure on rates. Thus, the AESO considers that an appropriate investment level should limit unused investment, while still providing reasonable investment coverage for greenfield and upgrade projects.
Using a multiplier of 1.00 results in:

- 28% of recent greenfield and upgrade projects being fully covered by investment with no contribution required and
- 58% of total costs covered by investment.

Figure 8-3 below next shows the investment level and resulting coverage using a multiplier of 1.15 — that is, the investment level is set as the cost function multiplied by 1.15. Using a multiplier of 1.15 results in:

- 40% of recent greenfield and upgrade projects being fully covered by investment and
- 64% of total costs covered by investment.

In Figure 8-3, it is becoming apparent that the multiplier would have to be very high to cover some “outlier” projects.
Finally, Figure 8-4 below shows the investment level and resulting coverage using a multiplier of 1.53.

A multiplier of 1.53 results in:
- 50% of recent greenfield and upgrade projects being fully covered by investment and
- 76% of total costs covered by investment.

At this level of multiplier, significant levels of unused investment exist for several projects with 50% of projects having unused investment. The aggregate amount of unused investment attributed to those projects represents 20% of the total of all project costs.
8.2 Reasonability Assessment

In order to develop an optimal investment level, the AESO considered recently approved investment levels, specifically from its 2007 and 2010 tariff application and associated Commission decisions.

The investment levels in the AESO’s 2007 tariff were determined by multiplying the point of delivery cost function based on standard facilities costs by a multiplier of 1.15. Applying a multiplier of 1.15 to the 2007 cost function resulted in:

- 27 projects being fully covered by investment,
- 6 projects receiving over 90% investment coverage, and
- 5 projects receiving 80% to 90% investment coverage.

Therefore, 38 of the 58 projects in the 2007 database, or 79.2% of the projects, receive at least 80% investment coverage and the majority of these projects were fully covered by investment. This investment level resulted in 56% of projects being fully covered by investment, with an aggregate total of 88% of project costs being covered by investment.

The 2007 investment levels are represented graphically in Figure 8-5 below. This graph provides project costs, investment, and contribution levels for the 48 greenfield projects that formed the dataset for the 2007 study. Contract capacities are listed in order of increasing value along the horizontal axis.
217 Decision 2007-106 commented:

*The Board considers that using a 1.15 multiplier is more than adequate in providing a sufficient investment level of investment based on the 48 point sample dataset. This multiplier works just as well if a 30 point “greenfield” subset of the 48 point dataset is considered ....*

*As the AESO obtains new TFO project cost information in the future, the 48 point dataset may be expanded and cost functions further analyzed. [Decision 2007-106, section 8.1.2.2, page 97]*

218 In its 2010 tariff application, the AESO proposed to continue with a contribution policy reflecting multi-tier maximum investment levels, adjusted from 2007 levels based on further project cost analysis (submitted in a POD Cost Function Update). As part of the update, connection project costs for 64 projects were initially analyzed based on standard facilities costs and a multiplier of 1.15. The multiplier was adjusted to 1.06 when the concept of standard facilities was removed from the AESO’s tariff, such that the aggregate amount of investment provided for connection projects was similar to the amount that resulted from standard facilities and a multiplier of 1.15.

219 With the application of a multiplier of 1.06 to total project costs:

- 32 projects (or 50%) were fully covered by investment,
- 5 projects (or 8%) received over 90% investment coverage, and
- 9 projects (or 14%) received 80% to 90% investment coverage.

220 A total of 46 data points (or 72%) received at least 80% investment coverage. The multiplier of 1.06 resulted in total investment for all 64 projects in the database of $439 million (out of total project costs of $553.5 million) or 79% of total project costs.
Decision 2010-606 noted:

The Commission considers that calculation of the maximum investment levels using a multiplier of 1.06 provides for a distribution of investment coverage for connection projects that is similar to that approved in the AESO 2007 GTA. The Commission finds that maintaining similar coverage to historical levels is reasonable .... [Decision 2010-606, section 10.4.2.1, page 82, paragraph 448]

These recent decisions provide useful context for the AESO to compare investment levels over time and to assess any pattern exhibited by those levels.

Figure 8-6 below represents the investment coverage for the 68 recent projects under the AESO’s current 2011 investment levels. Under the current contribution policy, investment fully covers 15% of recent greenfield and upgrade projects and 43% of total project costs.

Figure 8-6  Investment and Contribution Amounts Under Current 2011 Investment Levels

The AESO notes that current investment levels fail to cover project costs that are close to the average cost function (based on project contract capacity in MW). This can be readily confirmed by comparing Figure 8-6 to Figure 8-2 (for a multiplier of 1.00) earlier in this application.

Although this section has illustrated investment coverage with different multipliers, the AESO notes that using a multiplier is a “means to an end” rather than an end in itself. The AESO considers that a multiplier used to set investment levels is not a permanently-fixed number, and will require adjustment each time
the average cost function is updated and perhaps more frequently as costs of recent projects change from year to year. The AESO suggests that the objective of applying a multiplier to the average cost function is to determine an appropriate level of investment coverage. The multiplier would accordingly be adjusted periodically, including each time project costs are updated or new projects are added to the database.

226 The AESO acknowledges that in previous decisions, the AESO has been directed to not rely on a specific target percentage for the number of projects fully covered by investment as the basis for determining maximum investment levels. More specifically, Decision 2007-106 on the AESO’s 2007 general tariff application included the following comments:

*However, the direction to devise a multiplier such that 80% of projects of the project fall under the resulting maximum investment function represented no more than a direction to conduct a one-time study. The mention of 80% in the direction should not have been interpreted as a general endorsement of an 80/20 rule as a guiding principle, nor did it require that the 80% threshold be used by the Board in determining an appropriate multiplier for the maximum investment function for the 2007 tariff.* [Decision 2007-106, section 8.1.2.1, page 93]

227 However, as discussed in section 3 of this application, the determination of an optimal contribution policy is a balancing act which should consider a number of variables, including aspects of investment coverage. The contribution policy should also limit unused investment to avoid potentially encouraging market participants to request facilities beyond those needed to accommodate their requests for system access service.

228 As part of this application, the AESO proposes to establish appropriate investment levels. The AESO suggests that a target percentage of aggregate project costs covered by investment is a useful starting point from which to determine an appropriate multiplier. The AESO is therefore proposing an approach which combines the first two mechanisms presented in section 4 of this application: a multiplier applied to the average cost function to establish investment levels that achieve a target percentage of aggregate project costs covered by investment.

229 The proposed approach is similar in some respects to the 80/20 rule mentioned above, but focuses on aggregate costs covered by investment rather than number of projects covered. The AESO notes that an investment coverage approach (based on number of projects covered) has been supported historically in Alberta and some distribution system owners currently use this approach.

230 However, the AESO considers that focusing on number of projects covered would be problematic for its contribution policy, given the limited number of connection projects in a typical year and the large variability of project costs as discussed in section 6.2 of this application. The AESO instead proposes that an investment level be established using a multiplier applied to the average cost function, such that 70% of aggregate recent project costs are covered by investment.

231 The AESO examined how several investment-related variables changed as multiplier level and investment coverage varied, to further explore the relationship between those variables. Figure 8-7 below illustrates several variables that should be assessed when determining appropriate investment levels, and shows how those variables change as investment coverage (measured as a percentage of total aggregate project costs) increases along the horizontal axis.

232 The number of projects fully covered by investment increases gradually as investment coverage increases, represented by the dotted line labeled “Projects Covered”.
Aggregate construction contributions, represented by the thick grey line labeled “Contribution” decreases linearly as aggregate investment, represented by the thick black line labeled “Investment” increases.

The unused investment level, also measured as a percentage of total aggregate project costs and represented by the thick red line labeled “Unused Investment”, increases slowly at first and then increases exponentially with the steepest part of the unused investment curve beginning after about 80% of project costs are covered by investment.

Figure 8-7 also shows the multiplier, represented by the thin black line labeled “Multiplier” that must be used to achieve the increase percentages of investment coverage. The multiplier must be set to almost double the average cost function to achieve 80% investment coverage.

The AESO examined the detailed results provided by the multiplier calculator while considering the contribution policy principles discussed earlier in this application and historic investment levels to establish a range of reasonable investment coverage.

The AESO considers that one aspect of providing effective price signals is avoiding excessive unused investment that may result in market participants failing to appropriately consider the costs of connections. Consideration of unused investment thus establishes an upper bound for a reasonable level of investment coverage. The AESO suggests that investment coverage greater than about 76% creates excessive unused investment, as it results in more than 20% of aggregate project costs being available as unused investment.

The AESO examined the size and frequency of contributions when establishing a lower bound for a reasonable level of investment coverage. After detailed examination using the multiplier calculator, the AESO suggests that investment coverage of at least 64% would provide an effective price signal while still maintaining intergenerational equity with prior contribution policies.
The AESO considers that investment coverage from 64% to 76% represents a reasonable target range for transmission investment levels. From Figure 8-7, the AESO notes that most variables have reasonable levels within that range of investment coverage:

- 40% to 50% of projects are fully covered by investment, while 50% to 60% of market participants are required to pay a contribution;
- 64% to 76% of aggregate project costs are covered by investment, while 24% to 35% of project costs are paid by contribution; and
- potential unused investment is limited to 8% to 20% of aggregate project costs.

Within this range of reasonable investment coverage, the AESO proposes that the midpoint of 70% be established as the target investment coverage for transmission maximum investment levels. That target investment coverage is achieved with a multiplier of 1.33 applied to the average cost function to establish investment levels. With a 1.33 multiplier, there is reasonable investment coverage and potential unused investment is limited to 13% of aggregate project costs. A 1.33 multiplier results in 46% of projects with costs fully covered by investment (and therefore with some amount of potential unused investment available) and 54% of projects requiring a contribution to be paid.

These numbers represent totals for both recent greenfield and recent upgrade projects. The proposed 70% investment coverage would result in 76% investment coverage for greenfield project costs and 55% coverage for upgrade project costs. Other statistics for the proposed multiplier of 1.33 are summarized in Table 8-8 below.

Table 8-8  Summary of Investment Coverage Using 1.33 Multiplier

<table>
<thead>
<tr>
<th>Description</th>
<th>Number of Projects</th>
<th>Dollars %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upgrade Projects (42)</td>
<td>20</td>
<td>48%</td>
</tr>
<tr>
<td>Greenfield Projects (26)</td>
<td>11</td>
<td>42%</td>
</tr>
<tr>
<td>Total Projects (68)</td>
<td>31</td>
<td>46%</td>
</tr>
<tr>
<td>Coverage at 2011 Investment Levels</td>
<td>10</td>
<td>15%</td>
</tr>
<tr>
<td>Investment Increase Over 2011 Levels</td>
<td>210%</td>
<td>210%</td>
</tr>
<tr>
<td>Projects With Unused Investment</td>
<td>31</td>
<td>46%</td>
</tr>
<tr>
<td>Projects With ≥$5 Million Unused Investment</td>
<td>6</td>
<td>9%</td>
</tr>
</tbody>
</table>

As noted in Table 8-8, a multiplier of 1.33 results in a 64% increase in aggregate investment in connection projects compared to the investment provided by current 2011 investment levels. This aggregate investment increase reflects that some projects will have investment limited by project costs such that an increase in maximum investment levels will not result in an increase in actual investment in those projects.

On an individual project basis, if project costs are high enough that the maximum investment can be applied to a project, the amount of investment for a project will increase by 80%, on average, compared to current 2011 investment levels.

As investment is recovered through rates, an increase in investment will result in an increase in rates, compared to rates that would exist with the lower investment levels. More information on the rate impact of the proposed investment levels is provided in section 10.2 of this application.

As noted above, the AESO examined the detailed results provided by the multiplier calculator when assessing multipliers. Figure 8-9 below illustrates the project cost coverage with a multiplier of 1.33.
To further assess the reasonableness of the proposed 70% investment coverage (achieved through a multiplier of 1.33), the AESO reviewed the proposal in the context of the primary contribution policy principles discussed in section 3 of this application.

The AESO concludes that the proposed 70% investment coverage satisfies the primary principles, as follows.

1. **It provides effective price signals** — As discussed in the preceding section, with 70% investment coverage, over half of connection projects will be required to pay a contribution. However, most contributions are reasonable in magnitude and, in aggregate, represent only 30% of project costs.

2. At the same time, about 46% of connection projects will have potential unused investment available. However, as can be seen from Figure 8-9, in many cases the potential unused investment will be relatively small and represents a total of only 13% of aggregate project costs. Unused investment will be $5 million or more at only 9% of connection projects.

3. The AESO considers that the proposed investment levels that provide 70% investment coverage over all connection projects represent a reasonably effective price signal that will encourage the best long-term economic and technical alternatives for connection projects.
(2) It maintains intergenerational equity — As discussed earlier in this application, it is challenging to assess intergenerational equity as connection project costs and investment coverage have varied considerably in the past.

As an aid to such an assessment, Figure 8-10 below presents the same information provided earlier in Figure 3-2 but from an investment coverage perspective. The chart illustrates the percentages of project costs covered by investment and paid through contributions for each of the AESO tariff periods included in the project database. This analysis is included in Appendix C of this application. The AESO observes the following from Figure 8-10:

- under the 2000 to 2003 tariffs, investment coverage was 85% to 97%;
- under the 2006 to 2011 tariffs, investment coverage was 32% to 61%; and
- over all tariffs from 2000 to 2011, investment coverage has averaged 68%.

The AESO considers that from the perspective of historical investment coverage, a target of 70% (as represented by the final bar in Figure 8-10) is reasonable. It is slightly higher than the average of 68%, which the AESO considers reasonable as the lower investment levels of recent tariffs have, at least in part, been responsible for this separate contribution policy proceeding.

Figure 8-10 History of Investment Coverage

(3) It is based on cost causation — The refinements to the cost function in this application ensure that the proposed approach continues to support this principle. In particular, the incorporation of upgrade projects into both the cost function development and the investment coverage assessment enhance the cost causation basis for the proposed investment levels. The contract capacity required for a system access service continues to be strong driver of costs, and therefore provides a sound cost causation basis for the investment determination.
The AESO considers that the proposed methodology and 70% investment coverage will result in investment levels that appropriately support the primary contribution policy principles presented in this application. As noted in section 3 of this application, both an average cost multiplier and an investment coverage approach will also support the secondary contribution policy principles, at least to some extent.
9 Recommended 2012 Investment Levels

Based on the preceding analysis, the AESO proposes an average cost function of $1,976,728 x MW^{0.5810} to be used as the basis for investment levels in this application.

The AESO also proposes that a multiplier of 1.33 be used to establish maximum investment levels, where the multiplier is set to achieve target investment coverage of 70% of aggregate recent project costs.

The cost function and 1.33 multiplier result in the investment levels provided in Table 9-1 below, which included current 2011 investment levels for comparison. These investment levels are incorporated into section 8 of the ISO tariff, which is included as Appendix D of this application.

<table>
<thead>
<tr>
<th>Tier</th>
<th>Rate DTS Investment</th>
<th>PSC Factor</th>
<th>Rate PSC Investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012 Proposed Maximum Investment Levels</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Substation fraction (for new points of delivery only)</td>
<td>$29 250/year</td>
<td>21%</td>
<td>$6 140/year</td>
</tr>
<tr>
<td>First (7.5 × substation fraction) MW of contract capacity</td>
<td>$52 600/MW/year</td>
<td>21%</td>
<td>$11 045/MW/year</td>
</tr>
<tr>
<td>Next (9.5 × substation fraction) MW of contract capacity</td>
<td>$27 150/MW/year</td>
<td>21%</td>
<td>$5 700/MW/year</td>
</tr>
<tr>
<td>Next (23 × substation fraction) MW of contract capacity</td>
<td>$19 100/MW/year</td>
<td>21%</td>
<td>$4 010/MW/year</td>
</tr>
<tr>
<td>All remaining MW of contract capacity</td>
<td>$12 450/MW/year</td>
<td>0%</td>
<td>$0/MW/year</td>
</tr>
<tr>
<td>2011 Approved Maximum Investment Levels</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Substation fraction (for new points of delivery only)</td>
<td>$50 050/year</td>
<td>21%</td>
<td>$10 510/year</td>
</tr>
<tr>
<td>First (7.5 × substation fraction) MW of contract capacity</td>
<td>$34 000/MW/year</td>
<td>21%</td>
<td>$7 140/MW/year</td>
</tr>
<tr>
<td>Next (9.5 × substation fraction) MW of contract capacity</td>
<td>$12 550/MW/year</td>
<td>21%</td>
<td>$2 635/MW/year</td>
</tr>
<tr>
<td>Next (23 × substation fraction) MW of contract capacity</td>
<td>$7 600/MW/year</td>
<td>21%</td>
<td>$1 595/MW/year</td>
</tr>
<tr>
<td>All remaining MW of contract capacity</td>
<td>$4 100/MW/year</td>
<td>0%</td>
<td>$0/MW/year</td>
</tr>
</tbody>
</table>

Individual investment tiers are provided in Table 9-1. Investment tiers have remained the same as in the current tariff as they appropriately represent economies of scale in the point of delivery cost function.

As well, the total investment available to a connection project is illustrated in Figure 9-2 below.

Finally, the AESO also provides Table 9-3 as a subset and extension of the summary of transmission contribution policies provided earlier in Table 2-2, to summarize the investment levels that have existed since the 2007 tariff when the AESO’s current tiered investment levels were first introduced.
Table 9-3  Summary of Transmission Contribution Policies, 2008-Proposed

<table>
<thead>
<tr>
<th>Years</th>
<th>Tariff</th>
<th>Maximum Investment</th>
<th>Example Investment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008-2009</td>
<td>2007 Tariff</td>
<td>$51,400/year × SF, plus</td>
<td>7.5 MW $5,363,000</td>
</tr>
<tr>
<td></td>
<td>Effective: Aug 1, 2008</td>
<td>$28,900/MW/year for first (7.5 × SF) MW</td>
<td>17 MW $7,263,000</td>
</tr>
<tr>
<td></td>
<td>Approved: Order U2008-217</td>
<td>$10,000/MW/year for next (9.5 × SF) MW</td>
<td>40 MW $9,977,000</td>
</tr>
<tr>
<td></td>
<td>and Decision 2009-105</td>
<td>$5,900/MW/year for next (23 × SF) MW</td>
<td>Average $7,534,333</td>
</tr>
<tr>
<td></td>
<td>$3,100/MW/year for all remaining MW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010-2011</td>
<td>2010 Tariff</td>
<td>$51,050/year × SF, plus</td>
<td>7.5 MW $6,218,500</td>
</tr>
<tr>
<td></td>
<td>Effective: Jan 1, 2010</td>
<td>$34,650/MW/year for first (7.5 × SF) MW</td>
<td>17 MW $8,650,500</td>
</tr>
<tr>
<td></td>
<td>Approved: Decision 2010-606</td>
<td>$12,800/MW/year for next (9.5 × SF) MW</td>
<td>40 MW $12,215,500</td>
</tr>
<tr>
<td></td>
<td>$7,750/MW/year for next (23 × SF) MW</td>
<td>Average $9,028,167</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$4,200/MW/year for all remaining MW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td>2011 Tariff</td>
<td>$50,050/year × SF, plus</td>
<td>7.5 MW $6,101,000</td>
</tr>
<tr>
<td></td>
<td>Effective: Jul 1, 2011</td>
<td>$34,000/MW/year for first (7.5 × SF) MW</td>
<td>17 MW $8,485,500</td>
</tr>
<tr>
<td></td>
<td>Approved: Decision 2011-275</td>
<td>$12,550/MW/year for next (9.5 × SF) MW</td>
<td>40 MW $11,981,500</td>
</tr>
<tr>
<td></td>
<td>$7,600/MW/year for next (23 × SF) MW</td>
<td>Average $8,866,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$4,100/MW/year for all remaining MW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>Proposed Policy</td>
<td>$29,250/year × SF, plus</td>
<td>7.5 MW $8,475,000</td>
</tr>
<tr>
<td></td>
<td>Effective: Jul 1, 2012</td>
<td>$52,600/MW/year for first (7.5 × SF) MW</td>
<td>17 MW $13,633,500</td>
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<td></td>
<td>Applied for: Jun 20, 2012</td>
<td>$27,150/MW/year for next (9.5 × SF) MW</td>
<td>40 MW $22,419,500</td>
</tr>
<tr>
<td></td>
<td>$19,100/MW/year for next (23 × SF) MW</td>
<td>Average $14,842,666</td>
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</tr>
<tr>
<td></td>
<td>$12,450/MW/year for all remaining MW</td>
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</table>
10 Impacts of Changes in Contribution Policies on Market Participants

262 A change in contribution policy may impact market participants in two respects:
- it may affect the amount of construction contribution an individual market participant must pay for connection of a new service or expansion of an existing service, and
- it may affect the average rates paid for system access service by all market participants inasmuch as it affects the amount of investment recovered through rates.

263 In addition, revisions to the cost function as discussed in section 7 of this application may also affect the average rates paid for system access service by all market participants, as the cost function provides the cost causation basis for both investment levels and the point of delivery charge in Rate DTS. The cost function itself is not a product of the contribution policy, however, and cost function changes would occur in due course in a comprehensive ISO tariff application that reviews and updates the cost causation information on which the tariff’s rates are based.

264 These impacts are discussed in more detail in the following sections.

10.1 Impact on Construction Contributions

265 A change in contribution policy typically has an immediate, and potentially large, impact on construction contributions to be paid after the effective date of the change.

266 The change in policy may increase or decrease the amount of construction contribution to be paid for connection of a new service or expansion of an existing service. As such, this will result in a direct financial impact on a market participant. Assuming the change in contribution policy reflects the principles discussed previously, the construction contribution will align with cost causation and provide an effective price signal that will influence the market participant’s decisions with respect to the service. However, in the AESO’s experience a change in construction contribution will have little, if any, effect on the number or size of system access service requests it receives. The costs of a transmission service connection are usually small compared to the total cost of the end-use development being built and owned by the market participant, and are usually not a determining factor in whether a project proceeds.

267 However, the construction contribution paid by a market participant may still represent a material cost. Market participants appear to respond to the price signal of a construction contribution by optimizing the stages or timing of their project, the nature or details of their service requirements, or the service location on their property, to minimize their construction contributions.

268 Market participants also assess their construction contributions against construction contributions paid in the past for other services, or paid for similar services elsewhere in Alberta or in other jurisdictions. Assessment against construction contributions for prior services is a measure of intergenerational equity. Market participants typically challenge changes that they feel are inequitable compared to amounts they paid, or are aware that other market participants paid, for prior connections. In effect, market participants will challenge changes that they perceive result in intergenerational inequity.

269 In addition to assessments relative to other contribution policies, some market participants make assessments of the reasonableness or fairness of a contribution policy on a more absolute basis. For example, most market participants assume that a contribution policy should provide increased investment (and require smaller contribution) for a larger load. If changes in contribution policy do not align with expectations of a reasonable or fair policy, market participants may express dissatisfaction or complain about a current policy.
In summary, changes to a contribution policy:

- may have a direct financial impact on a market participant,
- will not affect the number or size of system access service requests, and
- may result in questions, arguments, dissatisfaction, and complaints expressed by market participants.

The AESO currently hears frequent expressions of dissatisfaction and complaints from market participants arising from the frequency and magnitude of construction contributions paid for connections of new services or expansions of existing services. These concerns are expressed by both distribution system owners and direct-connected market participants who have received releases under section 101 of the Act. The AESO summarizes those concerns as arising from investment levels that are perceived as too low in the context of connection project costs, of investment levels under prior contribution policies, and of investment levels in some other jurisdictions.

The AESO believes that the changes to investment levels proposed in this application will alleviate many of these concerns. The AESO notes that the proposed investment levels will reduce the number of projects for which contributions must be paid, and will also significantly reduce the size of contributions when they are required. There will still be some projects that will pay large contributions, but those contributions typically arise from several identifiable factors that reflect costs arising from common project characteristics such as long radial connections. Overall, the proposed investment levels should address many of the concerns currently expressed by market participants.

The impacts on construction contributions affect only those market participants who are requesting connections of new services or expansions of existing services. A market participant who is continuing to take service with no changes that require construction of transmission facilities is generally not impacted by changes to construction contributions. However, such market participants are affected by associated changes to rates, as discussed below.

### 10.2 Rate Impacts From Higher Levels of Investment

Investment in new and expanding services increase the rate bases of transmission facility owners, compared to the rate base that would exist without such investment. Cost associated with the rate bases of transmission facility owners, including depreciation, return on investment, interest on debt, and income taxes, are recovered through transmission facility owner tariffs paid by the AESO. The transmission facility owner tariffs will accordingly increase when investment levels increase, compared to the tariffs that would exist with no investment level increase.

An investment-related increase in transmission facility owner tariffs will be gradual, for three reasons.

First, investment is recovered over the expected life of transmission facilities which typically last 40 or more years.

Second, recovery of investment in new and expanding services will be blended with on-going recovery of prior investment in existing services. On average, every year about 20 new and expanded services are added to the approximately 500 existing load services connected to the transmission system. As the number of new and expanding services represents only about 4% of the number of existing services in an average year, the effect of investment in those new and expanding services will be diluted.

Finally, costs related to investment in new and expanding services represent a relatively small portion of transmission facility owner costs. Other components of transmission facility owner tariffs, including those related to the bulk and regional transmission system and to operating, maintenance, and administration, are unaffected by investment in new and expanding services and further dilute the impact of increases in investment in those services.
The cost of transmission facility owner tariffs is recovered by the AESO primarily through Rate DTS, which is charged for system access service to load market participants in accordance with the ISO tariff. Additional revenue from new and expanding services will offset at least some of the transmission facility owner tariff increases resulting from investment in those services (as referred to in the discussion of the revenue test mechanism in section 4.1 of this application). Besides being offset, at least in part, by additional revenue, the impact of investment-related increases in transmission facility owner tariffs will be further diluted by the additional costs recovered through the ISO tariff, including costs for ancillary services as well as for the AESO’s own administration.

In summary, although the AESO is proposing investment levels that are expected to result in a 64% increase in transmission facility owner investment in new and expanding services, the impact on transmission charges under Rate DTS is expected to be small and gradual. Figure 10-1 below illustrates that the cumulative impact of increased investment over 10 years is about a $1.36/MWh increase in point of delivery charges under Rate DTS. (The increase is presented as a $/MWh amount for comparability to other discussions of average rate increases such as in the AESO 2011 long-term plan; actual point of delivery amounts under Rate DTS will continue to be charged on a $/MW basis as approved in the ISO tariff.) The estimated increase to the point of delivery charge in Rate DTS due to the proposed investment level is indicated by the “Proposed (1.33×)” line in Figure 10-1.

Figure 10-1 also illustrates the increases in charges under Rate DTS estimated for other levels of investment. In particular, the AESO estimates that current 2011 investment levels are already resulting, and will continue to result, in increases to charges under Rate DTS. The AESO believes that this reflects the material increases in project costs and investment levels that have occurred over the past several years, as summarized in Table 2-2 earlier in this application. Current investment levels reflect an increase in the dollar amounts invested in recent connection projects compared to amounts invested for the older projects which comprise the majority of the system access services provided by the AESO. Accordingly, the point of delivery charge in Rate DTS reflects the average costs for these older services, and effectively does not provide sufficient revenue to offset the additional revenue requirement arising from current investment levels.

The AESO estimates that current rates support investment coverage of about 30%, based on the review of historical contribution policies included in this application. The AESO’s current 2011 investment levels provide coverage of about 43%, and will therefore increase the point of delivery charge in Rate DTS over time. The estimated increase is indicated by the “Existing (0.70×)” line in Figure 10-1.

The existing investment levels were established using a cost function multiplier of 1.06. The AESO has included a line in Figure 10-1 that represents the increase in the point of delivery charge in Rate DTS that would result if investment levels continue to be established by applying a multiplier of 1.06 to the average cost function for recent project. This increase is indicated by the “Maintaining (1.06×)” line in Figure 10-1.

For comparison, the AESO’s currently-approved Rate DTS is equivalent to about an average $22/MWh, of which about $5/MW is attributable to the point of delivery charge. The $1.36/MWh increase estimated with the proposed investment levels therefore represents an increase of about 6% in Rate DTS over a 10-year period.
10.3 Rate Impacts From Cost Function Changes

As mentioned above, the point of delivery charge in Rate DTS is based on the same cost function as the investment levels. Changes to the cost function may therefore also impact rates, regardless of whether the actual amount of investment recovered through rates changes.

In section 7 of this application, the AESO proposed changes to the cost function to reflect updated project data, a revised inflation index, and incorporation of upgrade projects. The point of delivery charge in Rate DTS will change in response to changes in the “shape” of the cost function rather than changes in the level. Figure 10-2 provides the proposed and existing cost functions scaled to illustrate the differences in the shapes of the two curves.

The change in the shape of the cost function is estimated to result in lower point of delivery charges for services smaller than about 20 MW and higher point of delivery charges for services larger than about 20 MW. The impact of the change will be smaller when considered in the context of the total charges issued under Rate DTS. The AESO estimates that the impact on a total bill will be less than ±5%, depending on the size of the service. The AESO notes that the impact on an individual service will depend on the billing capacity, load factor, operating reserve charges, and other aspects of charges under Rate DTS.

Although the AESO has provided this information to illustrate potential rate impacts that will result from a change to the cost function, the AESO is not requesting any change to its rates at this time. The AESO anticipates that the use of an updated cost function for rate design purposes will be examined in the comprehensive tariff application it will file in March 2013, in accordance with directions included in Decision 2010-606 on the AESO’s 2010 ISO tariff application.
The AESO submits that changes to its rates are beyond the scope of matters to be addressed in this construction contribution policy application. Rate design matters are more appropriately reviewed in a comprehensive tariff application.
11 Implementation

As mentioned in section 1.3 of this application, the AESO requests that the proposed investment levels be approved to be effective retroactive to July 1, 2012.

11.1 Effective Date

The investment levels proposed in this application represent a material increase relative to currently approved investment levels. The AESO considers the proposed investment level increase to be large enough that some market participants may attempt to delay projects until this 2012 construction contribution policy proceeding has concluded. Such delays could create inefficiencies and schedule changes that impact many market participants, including transmission facility owners. The AESO submits that retroactive implementation of the 2012 investment levels to July 1, 2012 would avoid the potential for such delays and inefficiencies.

As already established in the AESO’s tariff, the contribution policy applicable to a connection project is the policy that is in effect when the Commission issues permit and licence for that project. A July 1, 2012 effective date would affect all connection projects that receive permit and licence after this date.

For additional clarity, the AESO does not propose that the recommended investment levels be retroactively applied to re-calculate construction contributions determined under previously-approved contribution policies. Such contribution policies were approved by the Commission or its predecessor on a final basis and are generally not subject to revision except through a review and variance process. This approach is consistent with changes to regulations, standards, and other authoritative documents.

Prior approvals of contribution policies (and the AESO’s tariff in general) were based on the best information available at the time of those approvals. The AESO considers that it would be inappropriate to revisit those approvals based on later information that was not available at that time. As well, an approach of retroactive revisions would just as likely disadvantage as benefit a market participant, if such an approach were consistently applied to each contribution policy or tariff revision.

In addition, the AESO considers that market participants made project decisions based on the contribution policies that applied to their projects at the time those decisions were made. Their decisions considered the circumstances that existed, the policies in place, and the investment available. A project which went ahead effectively responded to the price signal sent by the contribution policy at that time. Changing that price signal retroactively would not affect the decisions made in the past.

The AESO’s tariff has evolved since industry restructuring began in 1996 through a series of improvements approved through AESO tariff proceedings. Each improvement generally represented an incremental change that reflected greater understanding and consideration of the different aspects of the tariff, including the contribution policy. Incremental improvements implemented on a go-forward basis generally support predictability and stability of the AESO’s tariff, whereas retroactive application of changes can lead to uncertainty and volatility.

For all these reasons, and consistent with implementation of past changes to the AESO’s construction contribution policy, the AESO is not requesting the recommended investment levels be retroactively applied to prior contribution policies.

The AESO does, however, consider that retroactive approval of the proposed investment levels, to the first of the month following the filing of this application, is appropriate and reasonable for the reasons discussed above.
11.2 AESO 2014 ISO Tariff Application

The proposals requested to be approved in this application relate to the methodology for determining a cost function and investment levels, and to specific investment levels to be implemented in the AESO's tariff. No other changes to the AESO's tariff are being requested as part of this application.

As already mentioned, the AESO will file its 2014 ISO tariff application in March 2013. In preparation for that application, the AESO will review other aspects of the AESO contribution policy and potentially propose changes to its terms and conditions as a result of that review. However, the AESO does not anticipate that it will propose charges to investment levels as part of that 2014 tariff application, given that investment levels will be reviewed in this contribution policy proceeding shortly before the tariff application will be filed.

11.3 Future Updates to Investment Levels

Although the AESO does not propose to change investment levels in its 2014 ISO tariff application (to be filed in March 2013), the AESO does plan to update recent project information and assess investment levels in mid to late 2013.

The AESO's tariff currently includes an annual update of investment levels to reflect inflation. Inflation has not kept pace with costs of connection project, however, as illustrated earlier in this application. The AESO proposes to continue annual investment level updates, but with an additional assessment of investment coverage of recent projects. This annual assessment will involve compiling updated or final cost information when available for connection projects and collecting information on new projects to be added to the database.

The AESO will then review recent projects and assess the investment coverage provided by current investment levels as well as investment levels adjusted by inflation. If the inflation-adjusted investment levels provide investment coverage within ±5% of the target levels approved by the Commission, the AESO will apply for approval to adjust investment levels by inflation.

However, if the review indicates that inflation-adjusted investment levels would no longer provide appropriate investment coverage, the AESO will propose a revised multiplier at that time. After completing this initial review process in mid to late 2013, the AESO will evaluate the effectiveness and efficiency of the process to determine an approach to future updates to investment levels.

The above information is presented for information purposes only. At this time the AESO is not requesting approval of any specific methodology to update investment levels, beyond the annual update to reflect inflation already approved in prior proceedings.