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Q. Please provide the calculations which show that Alternative 3, the transfer of customer load to an adjacent substation, is the least cost alternative.

A. ***Background***

There are typically 3 alternatives to deal with a substation transformer that is approaching its design capacity. Alternative 1 is to replace the transformer with a larger capacity unit. Alternative 2 is to add another transformer to the substation. Alternative 3 is to transfer customer load to an adjacent substation that has available transformer capacity.

Alternatives 1 and 2 typically involve the purchase of a new power transformer, and the cost involved with installing the transformer and modifying the substation to accommodate the new unit. Typically Alternative 3 is the least cost alternative as it defers the purchase of an additional transformer to a future date.

Broad Cove substation has one power transformer with a capacity of 25MVA supplying 4 distribution feeders at 12.5kV. Newfoundland Power's 2009 substation load forecast has determined that the Broad Cove transformer will exceed its design capacity during the winter peak. To deal with this situation, additional capacity is required at the substation.

Alternative 1 – Replace Existing Broad Cove Transformer

For the purpose of this analysis, the purchase and installation of a larger capacity transformer is similar in cost to Alternative 2, the purchase of an additional transformer and will not be considered separately.

Alternative 2 – Add a Second Transformer at Broad Cove

The estimated cost for the purchase, installation and substation modifications for a second 25 MVA transformer at Broad Cove substation in 2009 is $3,000,000.

For the purpose of a net present value comparison all related costs must be included in the analysis. As Alternative 3 involves feeder load transfers from Broad Cove substation to Hardwoods substation, the need for additional transformer capacity at Hardwoods substation would be accelerated. According to the current substation load forecast additional transformer capacity will be required at Hardwoods substation in 2016.

The present value of the purchase and installation of a 25 MVA transformer at Broad Cove substation in 2009 and the purchase and installation of a 25 MVA transformer at Hardwoods substation in 2016 is $5,619,480.

Alternative 3 – Load Transfer from Broad Cove to Hardwoods Substation

Transferring load from Broad Cove substation to Hardwood's substation in 2009 would defer the requirement for additional capacity at Broad Cove substation to 2014. This transfer would involve converting a section of a Broad Cove feeder from 12.5kV to 25kV. However, the additional load at Hardwoods substation would advance the requirement for additional transformer capacity at Hardwoods substation from 2016 to 2014.

The revised load forecast for Broad Cove substation, accounting for the transfer of feeder load to Hardwoods substation, has determined a second transformer will now be required in 2014. Therefore two 25 MVA power transformers will be required in 2014, one each for Broad Cove and Hardwoods substations.

The present value of the feeder load transfers in 2009, the purchase and installation of a 25 MVA transformer at Broad Cove substation in 2014 and the purchase and installation of a 25 MVA transformer at Hardwoods substation in 2014 is $5,109,630.

Conclusion

The calculations included here for the present value of costs associated with Alternative 2 and Alternative 3 results in a net present value benefit of $509,850 favouring Alternative 3 over Alternative 2.

The scenarios where power transformers are required in 2014 and 2016 are based upon current load forecasts. If load growth materially varies from the amounts or areas forecast then the requirements for additional transformer capacity will vary from those presented here.