Questions on Public Service Company of Colorado Transmission Loss Filing

Docket No. ER15-266-000

Holy Cross Energy, Intermountain Rural Electric Association and Tri-State Generation & Transmission Association, Inc. ("Customers") submit the following questions regarding the Public Service Company of Colorado Transmission Loss Filing in FERC Docket No. ER15-266-000 and the Siemens PTI Report Number: R005-14, Electric System Loss Analysis, Prepared for Public Service Company of Colorado ("Loss Study").

1. Introductory Comments

   The questions below address both the development of the Loss Study and the rate implications of the calculated loss values. Customers recognize that the application of the Xcel Energy Open Access Transmission Tariff ("OATT") may have had an impact on the development of the losses. For example, under the OATT, Fixed Costs are allocated to firm transmission service and revenues received from non-firm transmission service are treated as revenue credits. If the reason a particular treatment in the Loss Study relates to how the OATT Transmission Formula Rate ("TFR") operates, please provide an appropriate explanation.

   To the extent that the TFR transmission loss values result in charges under the OATT that are credited to the Production Formula Rate ("PFR"), please explain how those credits will be applied.

2. Transmission Losses.
   a. The Xcel Energy OATT now has a single transmission loss value of 2.56%. What was the origin of this single loss value (i.e., does it represent average energy losses over a year, the capacity losses during a single peak hour, etc.)?
   b. The 2013 PFR true-up shows that the loss factors in the PFR are hard-wired at 2.56 percent for transmission level losses and 2.3 percent for primary line level losses. Does PSCo intend to file changes to the PFR to reflect whatever losses are ultimately adopted as a result of its OATT filing?
   c. The Loss Study states at page 2-1 that "[t]he procedure that was used to calculate transmission losses was to simulate a number of different power flow cases that are representative of the system operation, from maximum to minimum load, taking into account the variation of generation and inter-tie flows."

i. Did this procedure have the effect of capturing power flows associated with third party transmission, such as reported in PSCo's 2012 FERC Form 1 at page 400?

ii. Did this procedure involve the use of actual transmission peak load data as reported at page 400 of PSCo's FERC Form 1 for 2012 or for any other year?

iii. What was the source of the data relied upon by Siemens for its power flow cases?

d. The Loss Study states at page 2-4 that "[t]he sum of hourly losses for 2012 was 578,760,270 kWh. The PSCO peak demand was 6,927 MW (excluding losses) at 17:00 hours on June 25th. The loss at this peak was 169.9 MW or 2.45 percent of the load."

i. According to the PSCo 2012 FERC Form 1, Page 400, the annual transmission peak demand for "Firm Network Service for Self" was 6,939 MW at 17:00 hours on June 25th, 2012. During the same hour the "Monthly Peak MW – Total" was 7,797 MW. In view of the fact that the purpose of the Loss Study is to identify transmission system losses, and the additional fact that under its OATT PSCo charges all transmission customers for losses, why is it not appropriate to include the Transmission Monthly Peak Total in the denominator, which makes the 169.9 MW of peak demand transmission losses only 2.178 percent of the transmission peak load?

e. Under the Transmission Formula Rate, cost responsibility is allocated on a 12 CP basis. The Loss Study states at page 2-4 that Siemens calculated summer peak demand losses as high as 2.27 percent, but that calculated winter peak demand losses were as low as 1.54 percent. Why is PSCo proposing to use the single summer peak hour demand loss percentage when calculating demand cost responsibility during each month of the 12 months of the year rather than using a demand loss percentage that is an average of the demand losses during each of the 12 monthly peak hours?

f. The Loss Study states at page 2-5 that GSU losses were included as transmission losses if the meters were located on the low side of the GSU.

i. Does PSCo charge purchasers of capacity and energy for GSU losses though its power sales contracts and tariffs?

ii. If the answer to the foregoing question is in the affirmative, will inclusion of these losses in transmission loses result in a double recovery?

g. Loss Study Tables 5.1 and 5.2 develop demand and energy loss multipliers. The demand loss multiplier is 1.0252, which when applied to a

transmission sales of 241,699 will produce an input value of 247,790. The 6,091 differential represents demand losses of 2.458 percent. Similarly, the energy loss multiplier is 1.018680, which when applied to transmission sales of 3,203,675,008 will produce an input value of 3,263,520,825. The 59,845,817 differential represents energy losses of 0.018337 percent. PSCo, however, shows in its FERC filing annual peak capacity losses of 2.52 percent, rather than 2.458 percent, and energy losses of 1.87 percent rather than 1.8337 percent.

i. For billing purposes, does PSCo now use its FERC filed demand loss value to develop a loss multiplier, such that a filed demand loss value of 2.52 percent will result in a demand loss multiplier of 1.0258?

ii. For billing purposes, does PSCo now use its FERC filed energy loss value to develop an energy loss multiplier, such that a filed energy loss value of 1.87 percent will result in an energy loss multiplier of 1.0190?

h. Table 5-2 places transmission level energy losses at 59,845 MWH, or 1.8337 percent of transmission level input of 31,971,761 MWH. Table 1-2 identifies actual transmission level energy input of 34,530,183 MWH and Page 401a of PSCo's 2012 FERC Form 1 shows total losses of 1,592,864 MWH based on total transmission input of 34,993,011 MWH.

i. If the purpose of the Loss Study is to determine losses on the transmission and distribution systems, and if the Siemens study modeled typical system operations, including generation for pumping energy and wheeling transactions, should the 34,993,011 value be increased to recognize the energy flows associated with pumping energy, wheeling transactions and interchange transactions, bringing the total number to 39,370,153?

ii. What factors caused the Loss Study to derive a total transmission MWH input value that is 18.79% lower than the 2012 actual transmission energy transfers as reported in PSCo's FERC Form 1?

iii. What factors caused the Loss Study to derive losses that are 6.94% higher than actual losses reported in the 2012 PSCo FERC Form 1?

i. The Loss Study states at page vi that "[t]ransmission system losses were determined with a detailed system model provided by PSCo."

i. Did the PSCo detailed system model reflect the PSCo system as of the time that Siemens was conducting the loss study (i.e., 2014) or did it depict the PSCo system for some prior period (e.g., 2011)?

ii. If the PSCo detailed system model depicted the PSCo system as of an earlier period, what was that prior period?

iii. If the PSCo detailed system model depicted the PSCo system for an earlier period, were there any material changes in the system at the time the Loss Study was prepared? For purposes of this question a "material change" is the addition of new high voltage transmission circuits and the addition of new generation resources with an aggregate capacity of more than 200 MW.

j. Table 2-1, the Power Flow Case Summary sets out values for certain periods, such as Heavy Summer 2011/2013. Are the values shown the calculated peak values during the identified periods or the average monthly peak values for those periods?

k. Was the PSCo detailed system model updated for power flow cases associated with later periods (e.g., Heavy Summer 2012/2013) or was it held static?

l. Does the term "Load" as used in Table 2-1 refer to peak hour load on the PSCo transmission system? If not, what does it refer to?

m. Were the transmission level energy and capacity loss calculations performed by Siemens based on hypothetical, rather than actual operations?

n. Did Siemens make any calculations of transmission level energy losses or capacity losses based on actual 2012 PSCo system operations?

o. The Loss Study states at page vii that calculated losses exceed 2012 FERC Form 1 reported losses by 6.9%. If the calculated losses were based on hypothetical operating conditions, is it reasonable to assume that the calculated values would not match actual reported losses?

p. The Loss Study concludes that it is necessary to allocate the discrepancy as a reduction in losses, such that the factors generate losses that match 2012 reported losses; however it does so by allocating the entire discrepancy as a reduction of distribution losses, with no reduction in transmission losses. The table below shows the effect of allocation of these loss credits as a reduction in distribution losses.

Distribution Primary	Calculated		Allocated		Reduction	Percent
Primary Lines 4.16 kV	723,604		615,157		108,447	0.1763
Primary Lines 12.48 kV	12,053,861		10,247,334		1,806,527	0.1763
Primary lines 13.2 KV	320,815,951		272,735,057		48,080,894	0.1763
Primary Lines 24.9 kV	16,939,332		14,400,613		2,538,719	0.1763
Total	350,532,748		297,998,161		52,534,587	0.1763
Distribution Secondary						

Transformer Load	46,015,146		39,118,799		6,896,347	0.1763
Transformer no-load	143,335,599		143,335,599		0	0.0000
Lines in Service Drops	341,126,640		290,001,570		51,125,070	0.1763
Customer Meters	9,177,585		9,177,585		0	0.0000
Total	539,654,970		481,633,553		58,021,417	0.1205

i. Is it standard industry practice when conducting loss studies to allocate the difference between FERC Form 1 reported losses and calculated losses entirely as a reduction to or increase in distribution losses, with no allocation of such amounts to transmission losses?

ii. Was the decision to apply a 17.63 percent credit of losses to each primary line voltage level supported by an engineering or analytical assessment?

iii. If there is engineering or analytical support for this allocation please provided copies of that support.

iv. If the overall calculated transmission losses are the result of modeling hypothetical operating conditions rather than calculated based on actual 2012 operating conditions, why is it reasonable to assume that the calculated transmission losses are not overstated and only distribution losses are overstated?

q. Does PSCo have meters at each of the inputs to its transmission system (e.g., generator interconnections, transmission interconnections with other utilities) and at each of its transmission substations such that it has the capability to calculate transmission level losses as the difference between energy input over a given interval of time and concurrent energy outputs? If so, does PSCo make use of this capability and did Siemens request and review this data?

r. If such data does exist, please provide the transmission losses for the system peak hour of each month of 2012, and the total energy losses at the transmission level for 2012.

s. The Loss Study states at page 2-4 that Siemens' 56 case load flow analysis showed a correlation between PSCo load and losses, with a summer system maximum of 2.27% and a light winter load maximum of 1.54%. However, the Loss Study then concludes that the peak loss is 2.46%. Please provide copies of the analyses the support a system peak loss based on load of 2.46% rather than 2.27%.

t. Please provide the Siemens calculated transmission level MWh losses during the PSCo transmission system peak hour for each of the twelve months of 2012.

u. The Loss Study states at 3-1 that "PSCo maintains a sophisticated load research program that enables the calculation of loss factors directly from the load research data without having to use empirical formula methods."
    i. Does this statement mean that PSCo has software and data reference points (e.g., circuits, transformer information, voltage levels, line distances, conductor size, loadings, temperature and precipitation, etc.) that are capable of calculating losses based on actual operating conditions?
    ii. If PSCo has such software, please identify it by name and version number.
    iii. If PSCo has such software, please provide the calculated transmission level peak hour losses during the PSCo transmission system peak hour during of each of the twelve months of 2012.

3. Distribution Losses.
    a. The Loss Study states at page 3-1 that "[n]on-coincident peak demands were used to calculate non-coincident peak demand losses, which are a function of the electric current."
        i. What was the source of the non-coincident peak demands used for the calculation?
        ii. Were the non-coincident peak demands the actual 2012 non-coincident peak demands or were they estimated based on the transmission loads determined in the transmission loss portion of the Loss Study?
    b. The Loss Study states at page 3-4 that "[d]ue to the large number of primary lines in the PSCo system, it was not practical to perform detailed loss calculations for each circuit. Instead, the loss calculations for a representative sample of circuits, selected by PSCo, were used as the basis for all PSCo primary lines." PSCo selected 14 of 732 12.47 kV and 13.2 kV circuits (1.9%) and 5 of 71 24.9 kV circuits (7%). The selected circuits were analyzed by PSCo using the SynerGEE distribution computer program.
        i. Table 3-2 shows that 24.9 kV lines comprise only 8.6% of the total number of PSCo primary lines and have an average peak loading of 40.8%. If there is a correlation between losses and line loadings, is there a potential to understate losses when 26.3% of the composition of the primary line "representative" group consists of 24.9 kV lines?
        ii. Table 3-2 shows that 12.47 kV and 13.2 kV circuits comprise 88.6% of PSCo's primary lines, and have average peak loadings of

57.3 and 63.8 percent, respectively. If there is a correlation between losses and line loadings, is there a potential to understate losses when only 73.63% of the primary line "representative" group consists of 12.47 kV and 13.2 kV lines?

iii. Does the SynerGEE distribution computer program referred to in the Loss Study have the capability to model all 825 primary line circuits?

iv. Has PSCo included the characteristics (e.g., voltage level, conductor size, line length, etc.) of all of its 825 primary circuits in any of its software and can that software create an export file that can be used to import the data into the SynerGEE software used by Siemens?

c. The Loss Study derives primary line demand losses of 2.28 percent and energy losses of 1.81 percent, each of which is less than the corresponding transmission level losses.

i. Is it Siemens' experience that primary line losses typically are less than transmission level losses?

ii. What portion of the primary line loss analyses was performed by Siemens and what portion was performed by PSCo?