Sharing the Costs of Line Losses

A note submitted on behalf of the Ontario Federation of Agriculture to the hearing
Hydro One Distribution Rates 2015-2019 EB-2013-0416

Appropriate Loss Factors For the Short Term

In 2005 Hydro One estimated total line losses at 5.65% including 0.6% transformation losses. (RP-2005-0020/EB-2005-0378 Exhibit A Tab 15 Schedule 2 Page 4 of 45)

Loss factors for three customer classes, R2, Seasonal and General Service energy, are proposed to increase. (EB 2013 – 0146, Exhibit G1 Tab 8 Shed 1 Page 3 of 5) This increase, indeed the total loss factor rates for all classes hinges on the appropriateness of averaging the actual total loss factors for 2010 when losses were 8.9%, 2011 with 6.6% losses and 2012 with 4.8% losses in Figure ES-3 Variance Between Actual and Approved Losses. (EB 2013 – 0146, Exhibit G1 Tab 8-2 Attachment 1 Page 5 of 42)

OFA's concern is that line losses, with the proposed increase in loss factor will add more than 10% to the cost of power, and that given the increase and in spite of more distributed generation and major conservation efforts, line loss rates are proposed to increase, while the evidence for 2011 and 2012 suggest they are falling.

OFA does not accept that the average losses for three years is the appropriate basis for line loss factors when the recent data shows sharp declines.

OFA suggests that 6% is a better basis for the outset of the five year rate period, rather than 6.8%, as the average for the last two years is 5.7%. This change would provide for a 12% reduction in proposed line loss factors. Without considering any other changes that may be suggested; the proposed R2 rate, for example, would go from the proposed 10.5% to 9.2% and remain unchanged. All other line loss rates that are proposed by HONI to be increased would fall slightly, and those that were proposed to fall, would fall still more.

There is consequence to this as payments into the line losses suspense account are based on volume consumed. However, reconciliation credits of surplus payments are the same for all customers. Accordingly, after reconciliation, a large volume customer pays a higher rate more for line losses.

OFA also feels that the derivation of line loss factors should move away from density and rate classes to coincident peaks as measured by smart meters.

Moving to More Accurate Line Loss Factors

OFA feels line loss factors by class based on 'average' length of line per customer and service voltage, base loss factors on characteristics which are outside the customers' control. Line loss charges should also provide greater incentive to Hydro One to reduce line losses.

Line losses are viewed as consisting of two types; non-technical and technical.

Non-technical line losses consist of losses such as theft and non-payment of bills. These losses are outside the control of customers who pay their bills. To a limited extent such losses can be controlled by vigilance by utilities and police looking for theft and acting to reduce it. Costs of non-technical losses are shared by paying customers in proportion to their volume of business.

Rate design does not provide a means for making honest non-paying customers more able to pay or for improving or enforcement to address those without any intention of paying. Utilities, however, have some ability to curb theft via enforcement.

Technical losses are power losses due to the physical equivalents of leakage and friction. Leakage, ground fault and stray voltage losses go to the ground or the air. Losses become heat and/or noise much as mechanical friction in motors becomes heat and noise.

Technical losses increase:

1. in proportion to the resistance of the wire, which increases as the wire gets hotter and which in turn is a function of the size of the wire relative to load and the number and quality of repairs
2. with the number of stages of transformation between generators and customers
3. proportionally with the distance between generators and customers, and
4. with the square of current flow, hence peak flows have greater losses than off peak flows.

As with non-technical losses, paying customers have little control over technical losses. Customers can control their:

1. coincident peak power use, and
2. total power use.

Customers cannot control:

1 distance from generators and substations as indicated by average density of the class
2 condition of the lines, (number of repairs and splices per kilometer etc.)
3 number, age and condition of transformers
4 voltage of the distribution lines (losses are inversely related to voltage so lower voltage lines have proportionally higher losses)
5 number of transformations between generator and customer
6 installation of capacitor banks
7 relative adequacy of primary and return neutral lines for the load
8 whether the area has three phase power or single phase power
9 the work done (or not done) that might reduce line losses
10 installation of distributed generation, and
11 addition of new customers to existing lines leading to load growth

To the extent that these factors can be controlled, they are controlled by the utility, not by customers, yet these factors influence line losses. If possible, customers should not be subject to rates based on costs or factors they cannot avoid or control. OFA feels sound alternatives are possible and that practices in other places and the known potentials of smart meters can help Ontario develop a better method of charging for line losses.

What Do Other Places Do

OFA has looked at line loss allocation methods elsewhere. Most estimate non-technical and technical line losses and assign non-technical losses in proportion to use. Technical losses are assigned differently in different places.

Alberta estimates a non-technical loss rate which is charged proportionally for use to all customers in the province, regardless of distributor and a technical loss rate that is measured for each major transformation area and charged in proportion to use for all customers in that transformation area regardless of class or location or further stages of transformation. (http://www.aeso.ca/downloads/Raw_LF_2014.pdf)

The Mid-Continent Independent System Operator (MISO) uses a 12 month coincident peak basis for setting the transmission loss rate. Loss factors are based on peak use. (https://www.misoenergy.org/Library/Repository/Meeting%20Material/Stakeholder/MSWG/2013/20130312/20130312%20MSWG%20Item%2005%20Transmission%20Line%20Losses%20and%20Behind-the-Meter%20Generation.pdf

Jackson County in Georgia charges each customer for all losses in proportion to use. (http://www.jacksonemc.com/business-manage-my-account-commercial-rates-options/schedules/large-general-service)

Energex in Queensland Australia calculates transmission losses for its over 33 kv lines based on load duration curves computed from half-hour average demands over a year. The load duration curve is squared and averaged to obtain the load loss factor (LLF). LLF's are applied to losses calculated at peak demand to determine actual losses. This is a coincident peak loss estimate applied to transmission and HV distribution service. (https://www.energex.com.au/about-us/network-regulation-and-pricing/distribution-loss-factor-methodology)

The State of Ohio provides utilities with a method to recover costs for work meant to reduce line losses. This is set out in section 4901:1-39-07 of Ohio's administrative code. (http://codes.ohio.gov/oac/4901:1-39-07)

OFA has not found a jurisdiction with all the features OFA regards as desirable. But as there are few other smart metered jurisdictions, this was not unexpected.

OFA wants Hydro One to move to a method of allocating line losses that reflects the following features:

1. a reasonable estimate of theft and non-payment losses to be shared by all customers in proportion to each customer's use
2. a reasonable estimate of technical losses to be shared by all customers in proportion to their contribution to coincident peaks, and
3. an incentive for Hydro One to reduce line losses.

Non-payment of bills is known to Hydro One. Theft might be estimated from a review of payments received versus power used for transformer service areas that are felt by those who know the area to be largely free of theft and comparing that loss rate for areas where theft (grow ops etc.) is thought to be more common.

Smart meters can provide Hydro One with coincident peak use measures for most customers. Coincident peak can be controlled by customers, so causality applies. Coincident peak is strongly related to losses and is used in several jurisdictions to estimate transmission losses. A loss factor, proportional to the customer's share of the Hydro One system peak can be used to recover line losses, and such a factor will be more in the control of customers and more closely related to causality than the present factors.

OFA realizes that such a system cannot be implemented immediately as no preparations have been made. **OFA asks that:**

1. the OEB ask Hydro One to work with stakeholders and develop a system of line loss recovery that charges for technical losses based on customer's coincident peak use and that this new method be implemented in May 2016, and
2. for the interim, the total loss rate should be set at 6% rather than the proposed 6.8%, with proportional adjustments for all rate classes.

The present line loss accounting has no incentive for Hydro One to invest to reduce line losses. It is noted above that Ohio allows rapid recovery of costs that reduce line losses. This reduces impediments to such efforts but may not on its own be a positive encouragement. Accordingly **OFA asks that**:

1. the OEB consider a supplemental rate of return (10% rather than 9.12%) for the first five years on investments that reduce line losses and which are otherwise economically sound.

Summary of OFA Requests in Respect of Line Losses

OFA asks that:

1. the average line loss factor be reduced from 6.8% to 6% as this is more in line with the 2011 and 2012 data which average 5.7% actual losses. This in turn will curb over recovery and limit inaccurate crediting back to customers.
2. That the present basis for line loss costing be continued for two years and that it then be replaced by a method that would use smart meters to measure each customer's coincident peak and charge technical losses based on each customer's share system of the peak as this is in the customer's control and is more directly related to losses than average density or customer class.
3. Investments that reduce line losses qualify for a premium rate of return of 10% for five years, at which time they would continue to earn the normal rate of return.