

ComEd Secondary and Service Loss Study

Commonwealth Edison Company

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Summary

Distribution system energy loss factors are utilized to determine the amount of energy consumed in the delivery of power to end use customers. These factors are used to formulate the values listed in the ComEd Rate RDS tariff. The purpose of this study is to provide the basis for estimating the peak losses in secondary and service conductors by customer class. The results of this analysis will be used to determine overall distribution energy loss factors by customer class.

Study Approach

Various configurations of secondary and service conductors are used to provide service to ComEd customers. Depending on the customer load, customer proximity to the distribution transformer and the size and proximity of nearby customers, secondary conductors may not be utilized. All customers are served by some, if only a nominal length of service conductor. The location of customer and company facilities; magnitude of peak load; and design standards in effect at the time of installation can result in differences in the facilities used to serve individual customers.

In order to compute losses associated with secondary and service conductors, ComEd utilized a set of randomly selected customers to determine the average loss for each customer class category. In 2012, for the four customer categories that have the largest number of customers, a field survey of conductors that serve the selected customers was performed. The field survey analyzed the size, type and length of secondary and service conductors used to serve those customers. Losses were calculated for customers surveyed using the secondary and service conductor configuration found and those customers' most recent annual peak load. Peak loads, conductor information and calculated losses for those surveyed customers are contained in "ComEd Ex 8.02" filed in ICC Docket No. 13-0387.

Beginning in October 2013, for all remaining customer categories that utilize secondary and service conductors, a second field survey of conductors that serve the selected customers was performed. The field survey analyzed the size, type and length of secondary and service conductors used to serve those customers. Losses were calculated for customers surveyed using the secondary and service conductor configuration found and those customers' most recent annual peak load. These losses were calculated as a percent of peak customer load and then averaged by customer category. Peak loads, conductor information and calculated losses for the surveyed customers are listed in the supporting document file Sec-Serv analysis results_2.xlsx. Loss calculations that significantly deviated from typical results for each applicable category, were excluded from the final results.

Secondary and service losses were not calculated for the Railroad, HV or Primary service categories since only primary conductors are used to provide service to these customers.

Selections of Sampled Customers

The accounts for the field study completed in ComEd Ex. No 8.02 were randomly selected from those accounts used in ComEd's Load Research data. Specifically, Excel's random number function was used to assign a number to each load research account. The accounts were then sorted in order by the assigned number and a certain number of the accounts in ascending order were then chosen for each category to use in the study. For the four most populated customer categories (Single Family, Multi Family, Multi Family with Space Heat, and the Small Load nonresidential category), actual data was collected for a total of four hundred accounts.

For the current study, ComEd extracted all of the active accounts in each of the remaining delivery classes (other than the lighting delivery classes) that utilize secondary and service conductors. This account list was entered into an Excel spreadsheet using one sheet for each delivery class. A random number was then assigned to each account using the Random Number Function. The accounts were then sorted so the lowest random number was sorted to the top of the list and accounts from each delivery class was selected for the survey from the list starting at the top of the list. For the Single Family with Electric Space Heat accounts, any account with less than 20% of the average usage for the first 200 accounts on the January 2013 bill was excluded in order to assure the list did not include locations that are temporarily vacant. Similarly, for the Watt-hour Only accounts, any account with zero usage on the July 2013 monthly bill was excluded from the survey list. There were no accounts with zero usage selected for any of the other categories.

Lighting delivery class locations were chosen for Chicago from City of Chicago streetlight maps selected from various parts of the city. Representative lighting strings were selected for survey based upon the configuration of the string shown on the maps. Suburban locations were chosen based upon proximity to the selected accounts in the other customer classes. These suburban locations were inspected on Google Maps as well to confirm the existence of lighting facilities.

The current study was comprised of the following customer classes: Single Family with Space Heat, Watthour, Medium, Large, Very Large, Extra Large, Dusk-to Dawn/fixture included lighting, and General Lighting.

The following table summarizes the ratio of the total number of customers to number of customers sampled for these customer classes:

| Delivery Class | 2012 Customers | Samples in Study | % of 2012 Customers |
|--------------------------|-----------------------|-------------------------|----------------------------|
| Single Family Space Heat | 34,999 | 103 | 0.3% |
| Watt Hour | 91,928 | 99 | 0.1% |
| Medium | 17,308 | 45 | 0.3% |
| Large | 4,191 | 30 | 0.7% |
| Very Large | 1,873 | 14 | 0.8% |
| Extra Large | 49 | 10 | 20.4% |
| Lighting | 6,446 | 118 | 1.8% |
| Total | 156,794 | 419 | 3.5% |

Loads

Loads used in the loss calculations are based upon the peak kW load for July 2013 for all categories except Single Family with Space heat which used January 2013 values. For customers for whom the Company has only kWh meter usage data, a monthly category load factor was used to approximate the kW load from the monthly kWh reading. This load factor was developed from the 2012 applicable month loads in the “Final” tab of “Distribution Loss Factors” spreadsheet referred to in the “2012 Distribution System Loss study “(ComEd Ex. 8.01 ICC docket 13-0387).

Results

The results from the previous and current studies are listed in the following table and are utilized in the 2013 Distribution System Loss Study (ComEd Exhibit 9.01 dated April 14, 2014)

| Service Class | Ave Sec Loss | Ave Service Loss |
|------------------------|---------------------|-------------------------|
| Single Family | 0.50% | 0.31% |
| Multi Family | 0.26% | 0.24% |
| Single Family_Sp. Heat | 0.14% | 0.50% |
| Multi Family _Sp Heat | 0.02% | 0.16% |
| Watthour | 0.12% | 0.08% |
| Small 0-100kW | 0.33% | 0.20% |
| Medium 100-400kW | 0.68% | 0.54% |
| Large 400-1000 kW | 0.04% | 0.10% |
| Very Large 1-10 MW | 0.12% | 0.10% |
| Extra Large >10MW | 0.22% | 0.23% |
| D-D Lighting | 0.18% | 0.44% |
| General Lighting | 0.48% | 0.09% |

The Dusk-to-Dawn/Fixture Included category average is based upon a 2013 tabulated weighting of the percent of total class load with a single light (46%) and percent of total class load with more than one light (54%).

Calculations and Supporting Documents

| File | Description |
|----------------------------------|--|
| Sec_Service.mdb | CYME Power Flow simulation base file |
| Sec-Serv analysis results_2.xlsx | Field reviewed results for most recent study |
| Sec-Serv analysis results_1.xlsx | Field reviewed results for previous study |

Power Flow Simulation Application

Cyme 5.4 revision 8

Prepared by: L. Whittington

Approved by: M. Born