

Lead Lag Study General Description

A lead lag study is a widely used and acceptable method for developing the Cash Working Capital (CWC) component of rate base in connection with the determination of revenue requirements in public utility rate case proceedings. The underlying objective is to measure the average length of time between the utility's provision of service and subsequent payment by customers (revenue lag), and between the incurrence of costs necessary for the provision of service and subsequent payment by the utility (expense lead). The measurement is in days. The lead lag study does not produce the computed cash working capital allowance. It provides the factors resulting from the revenue lag and various expense leads used in the Cost of Service Study model. Total cash working capital is the sum of the net working capital required or provided for each includible element of cost of service.

The CWC factors are calculated with this formula.

$$(\text{Composite Revenue Lag} - \text{Applicable Expense lead}) / 365 \text{ days} = \text{CWC factor}$$

The CWC factor is applied to the appropriate test year expense amount. A positive result indicates a CWC requirement. A positive result represents an investor source of capital. A negative result indicates, on average, cash is received from customers before the Company must pay the applicable expense. A negative result represents a non-investor source of capital. The CWC results of each appropriate expense are added together. This total CWC requirement is included in rate base. A positive CWC requirement is added to rate base. A negative CWC requirement is deducted from rate base.

To complete a lead lag study, a twelve-month period of time is used. The current Lag Study is based on analysis of South Dakota electric jurisdiction twelve-months ended December 2023 revenue receipts. The current Lead study is based on twelve-months ended December 2023 NSPM Company electric utility payment disbursements. The revenue receipts are from electric sales. The payment disbursements are placed in categories such as fuel, purchased power, labor, payroll taxes, O&M expenses, property tax, federal and state income taxes, sales tax paid and franchise fees paid.

Revenue Lag

The revenue lag is the average time period from the date that customers receive service from the company and the date they pay for those services. Revenue lag is measured in days and is calculated for each rate group. Data for calculating revenue lags comes from the actual billing and payment history of customers as captured in the company's billing system.

The 2023 revenue lag analysis was calculated based on a census of the total population of billing records information available for each rate group. The census contained all the customers and all revenue with metered consumption or lighting loads in that rate class.

After the census data was extracted, lag days were calculated for each invoice. All Debtors with an Account Status code indicating the account was in receivership, pending write-off, written off or bankrupt were excluded from the analysis.

Each payment or transaction date that was applied to an invoice was used in the calculation of lag days. The calculation for the revenue lag is:

Service Period = Invoice To Date – Invoice From Date + 1

Midpoint Date = Invoice From Date + Service Period / 2

Lag Days = Payment Date – Midpoint Date + .5

An average lag day value for each rate group was calculated and weighted based on each rate group's percent of total revenue shown in Table 1. The sum of these weighted means equals the overall average lag days.

Table 1. Electric Retail Revenue Lag Population Statistics by Rate Class

Rate Code	Rate Description	Total Revenues	% Total Revenues	Average Lag Days	Weighted Average Lag Days	Number Invoices
E01	Residential Service (Overhead)	\$51,894,760	19.37%	25.3098	4.9034	542,508
E02	Residential Time of Day Service (Overhead)	\$15,115	0.01%	35.3666	0.0020	109
E03	Residential Service (Underground)	\$68,052,336	25.41%	32.2469	8.1925	494,627
E04	Residential Time of Day Service (Underground)	\$23,755	0.01%	32.4584	0.0029	143
E06	Residential Heat Pump Service (Two Meter Rate)	\$168,751	0.06%	33.7475	0.0213	889
E10	Energy Controlled Service (Non-Demand Metered)	\$110,499	0.04%	34.2463	0.0141	817
E11	Limited Off Peak Service	\$33,306	0.01%	31.7363	0.0039	21
E12	Automatic Protective Lighting Service	\$486,087	0.18%	26.7016	0.0485	6,983
E13	Small General Service	\$11,301,774	4.22%	33.9995	1.4345	78,597
E14	Small General Time of Day Service (Metered)	\$349,076	0.13%	39.0143	0.0508	4,190
E15	General Service	\$78,158,675	29.18%	37.1842	10.8498	40,408
E16	General Time of Day Service	\$42,237,272	15.77%	37.0014	5.8345	2,430
E20	Peak Controlled Service	\$6,694,919	2.50%	37.8525	0.9461	621
E21	Peak Controlled Time of Day Service	\$5,019,897	1.87%	37.7504	0.7075	131
E22	Energy Controlled Service	\$1,458,828	0.54%	36.2456	0.1974	71
E30	Street Lighting System Service	\$1,015,115	0.38%	30.2884	0.1148	774
E31	Street Lighting Energy Service	\$233,024	0.09%	14.4589	0.0126	72
E32	Street Lighting Energy Service - Metered	\$553,779	0.21%	38.3750	0.0793	3,715
E33	Street Lighting - Ornamental - Metered Energy Only	\$52,289	0.02%	31.7476	0.0062	1,062
E40	Fire and Civil Defense Siren Service	\$3,785	0.00%	NA	NA	NA
Total		\$267,863,040	100.00%		33.42	1,178,168

Expense Leads

The expense lead is the average time period from the receipt of goods or services by the utility to the date the utility pays for the goods and services. Expense lead is measured in days. Costs may be incurred over a period of time (i.e. month, year). The expense lead is measured from the midpoint of the service period to the date of payment. A separate expense lead is computed for each major category of operating expenses or account class (fuel, labor, payroll taxes, taxes, etc.). This expense lead is compared to the overall composite revenue lag to determine whether working capital is required from the company's investors (net revenue lag), or provided by the company's customers (net expense lead). Expenses leads are broken into a service period, midpoint date and lead days. The calculations for these are:

$$\text{Service Period} = \text{To Service Date} - \text{From Service Date} + 1$$
$$\text{Midpoint Date} = \text{From Service Date} + \text{Service Period} / 2$$
$$\text{Lead Days} = \text{Payment Date} - \text{Midpoint Date} + .5$$

The "From Service Date" is the first day goods or services were received. The "To Service Date" is the last day goods or services were received. If goods or services were received on just one day, the "From Service Date" and the "To Service Date" are the same. For those expense account classes with invoices, the invoices were reviewed for service date information. If no information about the service dates was available, the invoice date was used. After service dates were determined, the lead day values are calculated. The expense lead day value is measured from the midpoint of the dates the service was received to the date the cash was disbursed.

Expense leads are calculated using statistical samples for some expense categories, while other expense categories have statutory payment dates that are strictly adhered to for payment. The expense categories where statistical sampling was done are those with invoices generated from vendors including fuel gas for generation, fuel coal, fuel oil for generation, purchased power, and operations & maintenance expenses.

For those expense categories where statistical sampling was done, the sample population had to be determined. Appropriate general ledger accounts for each expense category are reviewed to obtain the accounts payable records population. Only records that were actually paid can be used for the expense lead. A transaction was included if it was expensed to an account included in the expense category during the test period and paid. Once the population is determined, the population is reviewed to determine if the entire population ("census group") or a statistical sample will determine the expense lead. Once records are selected for the census group or sample, invoices are viewed to determine dates the goods and/or services were received. Payment dates are generally included in the record. Once all service dates are determined and midpoint dates and lead days are calculated, the sample is ready for the overall expense lead mean to be determined.

Fuel, Purchased Power and Operations & Maintenance

Gas for Generation

Gas for generation purchases is invoiced monthly. A census of the 2023 invoices in this account class was used in the analysis to calculate the lead days.

Coal and rail transportation

The expense lead is calculated on the purchases made for inventory replenishment during the test period. Coal for generation is purchased from several vendors. Coal is shipped from the mines to generation stations by the freight companies. Purchases are invoiced as shipments are made. A census of the 2023 invoices in this account class was used in the analysis to calculate the lead days.

Oil for Generation

The expense lead is calculated on the purchases made for inventory replenishment during the test period. Purchases are invoiced as shipments are made. A census of the 2023 invoices in this account class was used in the analysis to calculate the lead days.

Purchased Power

Purchased power is purchased from numerous vendors. Purchases are invoiced monthly. A census of the 2023 invoices in this account class was used in the analysis to calculate the lead days.

Other Non-Labor Operations & Maintenance Expense

Other non-fuel operations and maintenance (O&M) expense encompasses the non-labor O&M expense for production, transmission, distribution, customer operations and administrative and general expenses. This category has a large volume of transactions. As a result, a statistical sample was selected to calculate the lead day analysis.

In order to estimate the average expense lead days for the Company, expenses were divided by account class. For all account classes, the expenses were grouped together by document number, which combined those expenses that were paid together into payment groups. Lead days for the Fuel Gas, Fuel Coal, Purchased Power, and Fuel Oil account classes were calculated exactly based on a census of the 2023 test year expense amounts and actual lead days.

The sample described above, including the stratification scheme and the associated sample sizes, was designed to yield a 90% confidence interval that was approximately $\pm 10\%$ of the mean lead day value. The mean and the variance for the Other Non-Labor Operations & Maintenance Expense account class from the previous 2020 Northern States Power - Minnesota Company Lead Study were used as a proxy to determine the 2023 sample size. A minimum of 30 sample points was required and at least twenty percent of the calculated sample size of the second stratum was added to account for missing data and unknown differences between the 2020 and 2023 data (Table 2). It is important to remember that the estimates were used for planning purposes only. Once actual values for the mean and variance were calculated from the new twelve-month period ending December 2023 sample, they were used in all analysis.

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Once the payment date, payment due date, and service dates were determined for all available expense items, lead day values were calculated for each payment and a weighted lead day value was calculated for each document number. A mean and variance were calculated by stratum and then a weighted mean and the associated stratified variance were calculated for the entire account class. The variance of this estimator was also calculated, which was then used to calculate a 90% confidence interval and a 95% confidence interval for the account class mean (Table 3).

Table 3. Statistics by Expense Category

Expense Category	Record Count	Weighted Average Lead	Weighted Variance	90% Confidence Interval	90% Precision	95% Confidence Interval	95% Precision
Fuel Coal	203	16.940	Census - Not Applicable	Census - Not Applicable	Census - Not Applicable	Census - Not Applicable	Census - Not Applicable
Fuel Oil	78	11.150	Census - Not Applicable	Census - Not Applicable	Census - Not Applicable	Census - Not Applicable	Census - Not Applicable
Fuel Gas	168	38.810	Census - Not Applicable	Census - Not Applicable	Census - Not Applicable	Census - Not Applicable	Census - Not Applicable
O&M	577	34.495	2.1155	2.393	6.936%	2.851	8.264%
Purchased Power	1,253	39.100	Census - Not Applicable	Census - Not Applicable	Census - Not Applicable	Census - Not Applicable	Census - Not Applicable

Labor

Payroll expenses are separated into two groups, Regular Payroll and Incentive Compensation. Employer taxes are discussed in the Taxes section of this study.

Regular Payroll

There are four types of payrolls at the Company: monthly, semi-monthly, bi-weekly and weekly. Monthly payrolls are paid once a month with the pay date the last business day of the month. Semi-monthly payrolls are paid twice a month. The first pay period covers the first through the fifteenth of the month with the pay date on the fifteenth or the prior business day. The second pay period of the month covers the sixteenth through the end of the month with the pay date on the last business day of the month. Bi-weekly payrolls run from Monday through Sunday with a pay date the following Friday or prior business day. Weekly payrolls run from Sunday through Saturday with a pay date the following Thursday or prior business day. Employees are paid either by a direct deposit to their bank or by a check mailed to their home. Checks are mailed so that receipt is on or before the pay date.

For net pay, the expense lead period is measured from the midpoint of the payroll period to the paycheck/pay advice issue date for net pay. For payroll deductions, the expense lead period is measured from the midpoint of the payroll period to the date funds are remitted to the vendor.

To determine the average expense leads for each of the payrolls, payroll reports showing the breakdown of gross payroll by withholding tax (FICA Withheld, Federal Income Tax Withheld,

State Income Tax Withheld) or employee deduction (Union Dues, 401k deductions and Other Deductions) were obtained. This payroll information was summarized by type of payroll by pay period. The summary dollar information was used to dollar-weight the components of gross pay (net pay, taxes withheld, other employee deductions) in the calculations of average expense lead of each component.

Next, an average expense lead for each gross pay component was computed. The lead for net pay and each of the various withholdings was computed for each of the two payroll types. For net pay, the actual payroll check clear date was used to calculate the expense lead. For tax withholdings the actual payment dates that correspond with the dates required by the IRS or state statute were used to calculate the expense lead. Other Employee Deductions were summarized by type of payroll by pay period. Deductions having the same payment date were grouped together. Then the scheduled payment date was used to calculate the expense lead of that group. Once expense leads for all the groups were determined, the average Other Employee Deductions expense lead was determined by dollar-weighting the various group expense leads. Other Employee Deductions are a component for Regular Payroll and Incentive Compensation.

Incentive Compensation

Incentive compensation is processed similarly to Regular Payroll. Separate payrolls, semi-monthly and bi-weekly, are run for incentive compensation. Other employee deductions are treated similar to regular payroll. The Incentive Compensation was dollar weighted by its components.

Tax Expense Leads

The average expense leads computed for the various tax categories are based on actual amounts paid during the test year and the payment dates presently required by statute.

Property Taxes

Because investments in utility plant are pooled system-wide and then jurisdictionally allocated, property tax expenses are not reflected in cost of service studies on a state basis. Rather, they are reflected on an overall Company basis. The average property tax payment leads were computed on an overall composite basis for electric and gas operations. Statutory payment dates are used to determine the property tax lead days.

Employer Payroll Taxes

FICA matching and employer unemployment taxes are included in this section. The Employer FICA Tax expense lead is the same as the FICA tax withheld expense lead in the payroll expense lead. The statutory payment dates for the taxes are used to calculate the unemployment tax expense lead days.

Franchise Fees Paid

As consideration for franchise rights granted to the Company, the Company pays a franchise fee to furnish, sell, transmit and distribute electricity. The Company charges a franchise fee to its customers. The fees are considered a “pass through” from customers to the city. The company collects the fees and remits them to the city.

Sales and Use Taxes

The Company pays both sales and use taxes. Sales tax occurs in two instances. The first instance occurs when the Company bills customers for sales tax in connection with sales of taxable goods and services. This type of sales tax is not an expense to the Company. The Company is the collection agent and remits the sales tax to the state. The second instance of sales tax occurs when the Company makes purchases of taxable goods and services from vendors that are required to charge the tax and remit it to the state. The tax paid in this instance is considered an expense to the Company.

The use tax is a complement of the sales tax and designed to level the playing field for companies that are required to collect the sales tax. It typically occurs in a situation where a taxable purchase is made by the Company from a vendor that is not required to collect a sales tax, usually because the vendor lacks a physical presence (nexus) in the taxing jurisdiction. Here, the Company must self-assess and pay the use tax directly to the state. Use tax is an expense to the Company. Sales tax and use tax are remitted together. The statutory payment dates were used in the calculation of the sales tax expense lead.

Sales tax (collected from customers) and use taxes are remitted together. Minnesota city sales/use taxes are remitted to the state of Minnesota at the same time as the state sales/use tax. Minnesota taxes are due the 20th of the following month. In North Dakota, electric revenues are exempt from sales tax. North Dakota city use taxes are remitted at the same time as state use tax to the state of North Dakota. North Dakota use taxes are due the last business day of the following month. South Dakota city sales taxes are remitted at the same time as state sales tax to the state of South Dakota. South Dakota sales taxes are due the 23rd day of the following month. For all jurisdictions, the statutory payment dates were used in the calculation of the sales tax expense lead.

Federal and State Income Taxes

The expense leads computed for Federal and State Income Taxes reflect corporate payment dates and required minimum estimate payment levels. By law, required minimum estimated payments during the tax year are 100%. Corporate policy is consistent across all state jurisdictions. Xcel Energy makes four estimated payments during the tax year of 25% each for 100%. The payment dates are April 15, June 15, September 15 and December 15 in North Dakota and March 15, June 15, September 15 and December 15 in Minnesota.