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December 19, 2023

By Email & PIVOTAL

Ms. Nancy Marconi, Registrar
Ontario Energy Board
2300 Yonge Street, 27th Floor
P.O. Box 2319 Toronto
ON M4P 1E4

Re: EB-2023-0033 Decision and Order - Line Loss Study

Dear Ms. Marconi,

As per the EB-2023-033 Decision and Order, InnPower Corporation is fulfilling its commitment to file the line loss study in this proceeding by January 1st, 2024.

Following the results of the study, InnPower will investigate and use reasonable efforts to implement cost-effective, technically feasible, reliable and safe measures to reduce line losses and report back at its next rebasing application.

If you have any further questions, please do not hesitate to contact the undersigned.

Regards,

Glen McAllister, B.Sc., CPA, CMA
CFO

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GENERAL ORDER: EHN23J0107.1

ENERGY LOSS CALCULATION STUDY

FOR

INNPOWER

7251, YONGE ST
INNISFIL, ON L9S 0J3

DECEMBER 2023
REVISION 1

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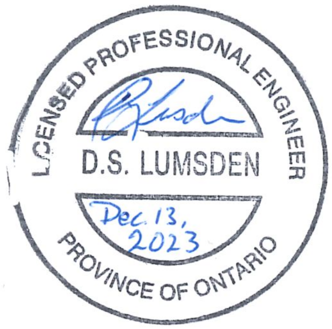
Revision History

Revision #	Date Issued	Remarks
-	November 29th 2023	Initial issue
1	December 8th 2023	Updated results based on yearly hourly consumption data for subtransmission networks



1.0 EXECUTIVE SUMMARY

This report contains the results of the analysis performed for InnPower. The purpose of this analysis is to provide power loss, loss factor, and energy loss in the system. System data and necessary modeling assumptions are provided under Section 2.0.

1.1 Objectives

1. Distribution system model

   The CYME distribution model, including substations, feeders, and loads, was obtained from InnPower. The model was used to perform load allocation based on demand, perform load flow analysis and compute load losses. Load data for some of the large customers was also used to obtain energy loss over the course of one year for the InnPower grid system.

2. Load Assessment

   Average and peak load was determined from the load data at the substation level for 5 transmission lines 9M1, 9M2, 9M4, 9M6, 13M3. This load was then applied in the CYME model and allocated to the downstream connected loads.

3. Methodology

   Based on the daily load consumption in kWh, using the CYME model, load allocation was performed for two scenarios: average demand and maximum demand. The loss factor and the energy loss for one year using the two scenarios were obtained. Design and methodology are explained in Section 2.0.

4. Average yearly energy loss with average power loss method

   Using that approach, the allocation of loads relies on the annual average demand data for subtransmission feeders. Due to the proportional relationship between power losses and the square of the current, this method employed is deemed inaccurate and unable to precisely depict the actual power losses within the system. Therefore, we will disregard this method and it will not be elaborated in this study.

5. Average yearly energy loss with peak power loss method

   Using that method, the loads were allocated based on the peak demand data for subtransmission feeders 9M1, 9M2, 9M4, 9M6, and 13M3. The found peak power loss was used to compute average energy losses and derive the loss factor. The loss factor was determined using two methods: 1. The exact method involving hourly power losses over one year. 2. The estimation method using the load factor.

6. Recommendations

Provide specific recommendations for improving the electrical distribution system performance and correcting any deficiencies found.

2.0 METHODOLOGY AND DESIGN

2.1 Methodology

Every electrical distribution system has losses, which are the difference between the energy input into the system and the energy consumed by end users. Electrical system losses can be categorized into technical losses, stemming from the equipment energizing and current flowing through electrical devices, and non-technical losses, commonly attributed to theft and unmetered loads. This report offers insights and recommendations concerning technical losses and prevalent forms of unmetered load.

Technical losses in an electric system consist of two main components: fixed losses and variable losses. Fixed losses refer to the energy needed by the system to activate equipment and maintain readiness, even when no load is being served. These losses, such as iron losses in transformers, are often termed "no-load" losses. Conductors in the system supplying transformers also encounter fixed losses as they transport the magnetizing current to energize the transformers, though these losses are typically considered part of variable losses. Equipment like meters and voltage transformers (PT) also contribute to fixed losses. Since fixed losses generally remain constant, multiplying the magnitude of fixed losses (kW) by time (hours) provides the energy losses (kWh). Given that the no-load losses of transformers, typically categorized as fixed losses, are not explicitly defined in the CYME model, a factor of 1.25 has been adopted as an accepted multiplier in engineering practice. This choice is made to assess the impact of fixed losses on the annual energy losses in this report.

Variable losses refer to the losses that occur when the system experiences an increase in load and these losses vary in direct proportion to the load. They encompass losses associated with the flow of current through transformer windings, both primary and secondary conductors, and equipment like line regulators. Various contributors need consideration in loss studies, such as street lighting load, station service, theft, and other unmetered load. The energy consumed by these components comprises a combination of fixed and variable losses.

Hourly data allows for more detailed studies and calculations, leading to more accurate results. On the other hand, annual data necessitates more assumptions and relies on system average data, potentially yielding less accurate results. In cases where detailed information is unavailable, utilities are advised to employ sampling techniques to determine losses for each category. A sample size of typically 15% is considered sufficient to establish a solid foundation for determining total system losses.

For the current study, 16% of the total load from InnPower was provided, which is acceptable for extracting the loss factor and energy loss for the entire system.

Using metering data, the total system losses were obtained by calculating the difference between power purchased and power delivered, while also accounting for unmetered loads. Standard categories for distribution system losses encompass:

- Substation transformers
- Substation equipment
- Primary lines
- Line equipment
- Distribution transformers
- Secondary and service lines
- Meters
- Unmetered load, which includes streetlights and losses due to theft.

There are two methods for energy losses calculation: 1. The method based on average load loss and 2. The method that uses peak loss and loss factors. Each method has its own set of advantages and disadvantages.

The first method relies on the calculation of average load loss over a year, which is not precise due to the nonlinearity of power losses. Power loss is proportional to the square of the current, making the calculation non-linear. This is why utilities often prefer the peak loss method. Given the inaccuracies associated with the initial method, this study employs the second, more precise peak loss method. As mentioned earlier, for the peak loss method to be acceptable, it is essential to have information for at least 15% of the loads.

In the calculation of load losses with an estimated equation, a factor expected to closely align with the characteristics of the InnPower utility system was incorporated. This factor is valuable in computing the loss factor as a function of the load factor. That approach involves using a tailored factor that is anticipated to have a strong correlation with the utility system's behavior, aiming to enhance the accuracy of loss factor calculations.

2.2 Input Data and Assumptions

Typically, the substation and distribution transformers constitute the major share of losses in an electrical system.

1. Input Data:

   The following data have been used in this study to calculate the energy loss and analyse the results:

   - **System data** includes the System peak data and purchased and sold energy provided by InnPower.
   - **CYME model** provided by InnPower. The model includes subtransmission line from 44kV, the OHL, cables, distribution transformers, distribution station transformers and loads. The 44kV substation transformers are not included in the provided CYME model.
   - **Load Data:** Average daily customers' consumption has been assigned to the loads based on the results from a given period (provided by InnPower.)
   - **Demand:** Subtransmission Feeder Monthly Average kW (2022)

2. Assumptions

   - The power losses calculated from the CYME model do not account for fixed losses. To incorporate all types of fixed losses, including the no-load losses of transformers, the load losses are multiplied by a factor of 1.25.
   - Average and peak demand have been used for load allocation to calculate the average and peak power losses respectively.
   - The daily consumption for the No Frills customer in the CYME model was inaccurately entered, resulting in an overload on the transformer. To rectify this, it has been adjusted to 4539 kWh for a period of 31 days, as specified in the consumption load spreadsheet.

3.0 RESULTS

3.1 Energy loss calculation

1. Peak Power Loss method:

Because power losses are not linear parameters, relying on the average power loss method, which is based on the overall system's average losses, may not accurately represent energy losses during peak load periods. To address this issue, peak load losses methods was introduced. Using that approach, the loss factor is calculated based on the load data for an entire year.

Recognizing the impracticality of calculating losses for all loads in the system, utilities typically opt to analyze at least 15% of the total loads. This selection ensures a reasonable and accurate energy loss factor for the system. The loss factor equation for each load is given by:

$$LsF = \frac{\sum_{n=1}^{T} kW(n)^2}{(Peak(kW))^2}\left(\frac{1}{T}\right) \qquad (3\text{-}1)$$

where LsF is the load loss factor for each load, kW is hourly consumption load, T is a period of 8760h, and Peak(kW) is the peak of the load for one year.

Load factor is another parameter in the power system that represents the relation between the peak load and average load and is given by:

$$LdF = \frac{Ave(kW)}{Peak(kW)} \qquad (3\text{-}2)$$

The following equation allows calculating the loss factor based on a known load factor:

$$LsF = (k \times LdF^2) + (1 - k) \times LdF \qquad (3\text{-}3)$$

The variable "k" is a factor that is normally between 0.7 and 1. For residential feeders, "k" is typically set to 0.9. To validate this assumption, the Loss Factor (LsF) is calculated using two different methods, demonstrating that the results are very similar.

Th initial step of this method consists of deriving the peak loss from the CYME model for the specified larger customers. These larger customers account for more than 15% of the total load within the InnPower customer base. Average energy losses for the given loads are obtained using the following equation:

$$AverageLosses(Load) = (LsF \times PeakLoss)$$
$$AverageEnergyLoss(Load) = (LsF \times PeakLoss) \times 8760h \qquad (3\text{-}4)$$

The average energy losses represent the cumulative energy losses incurred by all loads (larger loads in this case) over the course of a year.

Table 3.1 displays the loads with their corresponding annual consumption which were examined as part of this study to calculate the loss factor.

Table 3.1: InnPower Grid System Largest Loads

Customer Name	Installed Power (MVA)	44kV Feeder	Account	kWh for 2022
Customer 1	1.5	Barrie 13M3		767,733
Customer 2	2.5	Alliiston 9M4		4,337,232
Customer 3	2.5	Alliiston 9M4		965,851
Customer 4	1	Alliston 9M4		1,448,658
Customer 5	1	Alliston 9M1		3,274,753
Customer 6	2	Alliston 9M1		3,973,622
Customer 7	2.5	Alliston 9M1		5813142
Customer 8	1	Alliston 9M2		678,884
Customer 9	1	Alliston 9M2		44,865
Customer 10	1	Alliston 9M2		2,095,508
Customer 11	2.5	Alliston 9M2		3,336,488
Customer 12	1	Alliston 9M2		2,651,977
Customer 13	0.75	Alliston 9M2		467,036

In table 3.2, for every load defined in table 3.1, the following parameters are presented:

1. Loss factor (Loads)
2. Peak load (kW)
3. Load factor= (Average load)/(Peak load)
4. Peak variable losses extracted from CYME model for maximum demand load allocation.
5. Average power losses (kW)= Loss factor (Loads) x Total fixed and variable losses (1.25xvariable losses)
6. Annual average Energy losses (kWh)= Average power losses (kW) x 8760
7. Annual consumption (kWh) provided by InnPower.
8. Total fixed and variable losses (1.25xvariable losses) = Peak (variable) loss from CYME model (kW) x 1.25
9. Loss factor from load factor method: following equation with a k factor 0.9 has been used.

Table 3.2 reveals a noteworthy similarity between the loss factor obtained through the precise calculation using equation 3-1 and the estimated method derived from the load factor in equation 3-3.

Stated differently, for the InnPower grid, using a k factor of 0.9, it is possible to determine the power losses for the entire system for various loads, provided that their load factors are known, eliminating the necessity for complete yearly hourly data.

Table 3.2: Loss Factor Parameters

Loads	Loss Factor	Peak load (kW)	Load Factor	Peak (variable)Loss from CYME model (kW)	Average losses (kW)	Annual average Energy losses (kWh)	Annual consumption (kWh)	Total fixed and variable losses (1.25xvariable losses) (kW)	Loss factor from load factor method
Customer 1	0.10	357.00	0.25	12.32	1.54	1,3490.40	767,733	15.40	0.08
Customer 2	0.39	801.54	0.61	96.50	47.04	412,103.25	4,337,232	120.62	0.39
Customer 3	0.06	520.87	0.21	30.00	2.25	19,710.00	965,851	37.50	0.06
Customer 4	0.44	250.60	0.66	29.30	16.12	141,167.40	1,448,658	36.62	0.46
Customer 5	0.43	589.80	0.63	32.00	17.20	150,672.00	3,274,753	40.00	0.42
Customer 6	0.38	748.44	0.60	29.00	13.77	120,669.00	3,973,622	36.25	0.38
Customer 7	0.38	1162.00	0.57	140.82	66.89	585,952.02	5,813,142	176.06	0.35
Customer 8	0.50	111.84	0.70	7.00	4.37	38,325.00	678,884	8.75	0.51
Customer 9	0.07	975.60	0.25	31.50	2.75	24,144.75	2,095,508	39.37	0.08
Customer 10	0.16	1035.60	0.37	94.50	18.90	165,564.00	3,336,488	118.12	0.16
Customer 11	0.37	502.00	0.60	20.00	9.25	81,030.00	2,651,977	25.00	0.38
Customer 12	0.20	129.12	0.40	2.00	0.50	4,380.00	467,036	2.50	0.18
Customer 13	0.21	2101.00	0.43	100.54	26.39	231,191.73	7,833,970	125.67	0.21
Customer 14	0.47	1266.67	0.67	87.61	51.47	450,884.86	7,505,321	109.51	0.47
Total	4.16				278.46	2439284.42	45,150,175		4.15
Average	0.30								0.30

The total energy losses of the system are calculated as follows:

$$LsF(total) = \frac{EnergyLoss(total)}{EnergyLoss(total) + EnergyConsumption(Loads)} \quad (3\text{-}5)$$

$$LsF(total) = \frac{2{,}439{,}284.415}{2{,}439{,}284.415 + 45{,}150{,}175} = 0.0512$$

$$LsF(total)\% = 5.12\%$$

Table 3.3 presents the purchased and sold energy for 5 years based on the OEB data.

Table 3.3: Total Energy Purchased and Sold by InnPower For 5 Years Provided By IESO

		Historical Years						5-Year Average
		2017	**2018**	**2019**	**2020**	**2021**	**2022**	
	Losses Within Distributor's System							
A(1)	"Wholesale" kWh delivered to distributor (higher value)	262,143,775	285,074,581	288,210,355	299,261,031	303,807,771	307,736,609	296,818,069
A(2)	"Wholesale" kWh delivered to distributor (lower value)	256,769,435	278,813,236	280,581,537	291,404,252	295,240,254	299,934,504	289,194,757
B	Portion of "Wholesale" kWh delivered to distributor for its Large Use Customer(s)	-	-	-	-	-		-
C	Net "Wholesale" kWh delivered to distributor = **A(2) - B**	256,769,435	278,813,236	280,581,537	291,404,252	295,240,254	299,934,504	289,194,757
D	"Retail" kWh delivered by distributor	242,651,316	263,499,386	270,098,352	275,892,822	278,373,132	283,532,335	274,279,205
E	Portion of "Retail" kWh delivered by distributor to its Large Use Customer(s)							-
F	Net "Retail" kWh delivered by distributor = **D - E**	242,651,316	263,499,386	270,098,352	275,892,822	278,373,132	283,532,335	274,279,205
G	Loss Factor in Distributor's system = **C / F**	1.0582	1.0581	1.0388	1.0562	1.0606	1.0578	1.0543
	Losses Upstream of Distributor's System							
H	Supply Facilities Loss Factor	1.0209	1.0225	1.0272	1.0270	1.0290	1.0260	1.0263
	Total Losses							
I	Total Loss Factor = **G x H**	1.0803	1.0819	1.0671	1.0847	1.0914	1.0854	1.0821

The total loss in table 3.3 includes the losses from the secondary of the substation transformer that is related to the InnPower and the power losses of the substation transformer and the transmission line that is determined by IESO.

The lower value of total wholesale kWh delivered to distributor in 2022 as indicated on row A(2) in table 3.3, amounted to 299,934,504 kWh. Multiplied by the total power loss factor calculated using equation (3-5), the resultant value is as follows:

$$299{,}934{,}504 \times 0.0512 = 15{,}356{,}646.6kWh$$

$$15{,}356{,}646.6/8760 = 1753kW$$

Alternatively, the retail kilowatt-hours (kWh) supplied by the distributor, as indicated on row D in table 3.3, amounts to 283,532,335 kWh.

Consequently, the energy and power losses of the system, determined through actual measurements, are as follows:

$$299{,}934{,}504 - 283{,}532{,}335 = 16{,}402{,}169kWh$$

$$16{,}402{,}169/8760 = 1{,}872.4kW$$

The difference between the calculated and measured losses amounts to 119.4 kilowatts.

$$1{,}872.4 - 1753 = 119.4kW$$

It can be seen that the calculated energy losses derived from the total loss factor are slightly less than the actual value obtained through measurement centers.

It is expected to observe some deviation between calculated losses and measured losses. It can be attributed to the following reasons:

- Losses occurring on the utility's side of the meter involve equipment such as potential transformers, communication devices, relays, surge arrestors, shunt reactors, rectifiers, meters, line regulators, network protectors, and capacitor equipment.
- Unmetered load typically includes streetlights, traffic lights, security lights, and theft.

- Load unbalance: For 3 phase loads, the CYME model distributes loads equally among the three phases, which masks the effects of unbalance in the losses calculated by the Cyme model for that load.
- Inaccuracies in load allocation: The discrepancies between calculated and measured losses may arise from inaccuracies in load allocation, especially when the load has been distributed based on the average model rather than the actual loads.
- The state of power system equipment, encompassing transformers, conductors, and other components, may diverge from the anticipated values as a result of wear, aging, or maintenance issues.

The energy losses calculated using the CYME model are from the secondary of the substations to the loads including the distribution transformers and not including the transmission substation transformers.

The loss factor shown on row G in table 3.3, (LsFdefined by IESO) and the one calculated using equation (3-5) (LsFfromEq3-5) is different. However, both show the loss factor of the system. These two equations are interchangeable:

$$LsF(total)_{fromEq.3-5} = \frac{LsF_{defined\_IESO} - 1}{LsF_{defined\_IESO}}$$

$$Or$$

$$LsF(total)_{defined\_IESO} = \frac{1}{1 - LsF_{fromEq.3-5}} \qquad (3\text{-}6)$$

Substituting equation (3-5) into equation (3-6) yields the total loss factor as defined by IESO.

$$LsF(total)_{defined\_IESO} = 1 + \frac{EnergyLoss(total)}{EnergyConsumption(Loads)} \qquad (3\text{-}7)$$

The loss factor (as per IESO terminology, table 3.3, line G) calculated using the peak loss method as per equation 3-6 is given by:

$$LsF_{IESO} = \frac{1}{1 - 0.0512} = 1.054$$

With assumption that the loss factor from transmission line is still valid at 1.026 (table 3.3, line G), the total losses would be calculated as follows:

$$LsF_{IESO-total} = 1.054 \times 1.026 = 1.0814$$

The loss factor specified on line I of table 3.3 for the year 2022 is 1.0854.

It is noteworthy that the calculated loss factor using the Cyme model at 1.0814 closely approximates the value derived from metering.

4.0 CONCLUSION AND RECOMMENDATIONS:

In this study, the energy loss was calculated using the peak loss method. This more precise method is widely accepted by utilities, primarily due to its accountability for the nonlinearity of power losses. The methodology has been implemented for over 16% of the total load on the network, rendering this estimation method widely accepted and credible.

The ultimate loss factor for the InnPower system over the course of one year, determined using peak loss method for the distribution system described in equation (3-5), is as follows:

$$LsF(total) = \frac{2{,}439{,}284.415}{2{,}439{,}284.415 + 45{,}150{,}175} = 0.0512$$

$$LsF(total)\% = 5.12\%$$

The value for the loss factor in accordance with the IESO terminology, derived from equation 3-6, for the distribution system is as follows:

$$LsF_{IESO} = \frac{1}{1 - 0.0512} = 1.054$$

The overall loss factor for the InnPower grid, calculated using the loss factor for the transmission system provided in table 3.3 for the year 2022, is as follows:

$$LsF_{IESO-total} = 1.054 \times 1.026 = 1.0814$$

The loss factor specified on line I of table 3.3 for the year 2022 is 1.0854. It is noteworthy that the calculated loss factor from the Cyme model, which is 1.0814, closely approximates this value.

The computed energy losses based on the total loss factor are marginally lower than the actual values obtained from measurement centers as follows:

$$16{,}402{,}169 - 15{,}356{,}646.6 = 1{,}045{,}522.4kWh$$

$$\frac{1{,}045{,}522.4}{8760} = 119.4kW$$

Deviation between calculated and measured losses is expected and influenced by various factors such as:

1. **Utility-side losses:** Include equipment like potential transformers, communication devices, relays, surge arresters, shunt reactors, rectifiers, meters, line regulators, network protectors, and capacitor equipment.
2. **Unmetered load considerations:** Including streetlights, traffic lights, security lights, and theft, contributing to the observed differences.
3. **Load unbalance:** The CYME model's equal distribution of 3-phase loads among phases may obscure the impact of load unbalance on calculated losses.
4. **Inaccuracies in load allocation:** Discrepancies may arise from inaccurate load allocation, particularly when distributing loads based on the average model instead of actual loads.
5. **Equipment condition:** Variances in the state of power system equipment, such as transformers, conductors, and other components, due to wear, aging, or maintenance issues, can affect the expected values.

Recommendation:

The strategies for minimizing losses could be beneficial if incorporated into the utility system, particularly in anticipation of the future challenges posed by the increasing loads from electric vehicle chargers.

.

APPENDIX A

Demand data

Month	January			February		
Feeder	**KW**	**KVAR**	**KVA**	**KW**	**KVAR**	**KVA**
9M1	6777.99	995.45	6853.97	7077.85	1015.17	7152.32
9M2	15353.65	170.67	15357.29	14196.36	43.83	14196.96
9M4	9636.11	589.99	9657.51	11630.33	589.21	11648.73
13M3	8717.85	244.12	8723.98	5775.54	141.09	5778.36
CWF2	1379.48	242.28	1400.79	1331.71	243.54	1354.02
CWF4	1138.17	268.67	1169.73	1101.33	266.70	1133.41
TWF3*	869.39	168.51	885.83	835.95	169.24	853.15
9M6**	2517.66	510.94	2570.53	2433.04	510.23	2487.43
Inn 9M4***	8766.72	421.48	8771.68	10794.38	419.97	10795.58
TOTAL	42133.88	2342.67	42277.45	40277.17	2130.29	40410.64
Projected Total Annual Energy Usage (kWh)	369,092,804.26			352,827,982.39		

Low Value for 2022

High Value for 2022

						LIGHT LOAD					
March			April			May			June		
KW	KVAR	KVA	KW	KVAR	KVA	KW	KVAR	KVA	KW	KVAR	KVA
6482.37	942.56	6552.46	5893.29	700.85	5938.24	5512.65	868.70	5587.87	6751.28	1134.37	6858.78
12518.64	3.59	12518.66	10643.60	0.00	10643.60	10170.02	130.25	10178.42	11188.58	483.66	11231.26
13924.59	510.63	13937.80	8379.16	359.02	8388.98	8185.91	674.34	8229.93	3508.40	341.50	3535.74
1751.72	173.29	1794.06	5408.49	656.40	5451.31	4955.29	627.20	5004.18	9974.55	1340.92	10089.79
1212.55	236.61	1235.71	1042.69	228.65	1067.82	958.73	278.63	999.37	1023.82	331.94	1077.17
1003.64	257.40	1036.37	878.62	236.80	910.21	816.85	245.79	853.28	861.78	262.39	901.17
778.51	165.70	796.19	686.31	146.69	701.96	742.54	197.75	768.82	840.76	248.76	877.02
2216.20	494.01	2272.08	1921.30	465.44	1978.03	1775.58	524.43	1852.66	1885.60	594.33	1978.34
13146.09	344.94	13141.61	7692.86	212.34	7687.01	7443.37	476.60	7461.11	2667.65	92.74	2658.72
36115.01	1958.39	36278.87	31559.54	2035.03	31698.19	29856.92	2627.17	30084.23	32467.66	3646.01	32816.89
316,367,508.72			276,461,544.65			261,546,623.85			284,416,743.07		

July			August			September			October		
KW	**KVAR**	**KVA**	**KW**	**KVAR**	**KVA**	**KW**	**KVAR**	**KVA**	**KW**	**KVAR**	**KVA**
6153.49	1289.32	6291.42	6614.71	1495.44	6785.48	6040.47	911.71	6121.31	5599.38	724.10	5649.26
12913.86	778.90	12964.97	13218.23	869.88	13278.51	10478.14	190.01	10487.76	10629.90	0.00	10629.90
2153.11	166.45	2162.68	2191.42	176.15	2201.62	1887.59	63.34	1890.26	6785.01	249.40	6792.27
13906.77	2014.49	14085.26	14200.61	2164.05	14397.67	12097.53	1031.54	12165.38	6242.20	441.00	6265.11
618.16	177.72	643.59	626.72	172.75	650.36	537.86	137.42	555.39	521.68	107.62	532.88
925.51	297.49	972.67	943.48	296.43	989.38	834.30	263.17	875.18	836.63	249.83	873.45
939.50	300.49	986.50	947.75	301.60	994.72	801.80	246.84	839.24	715.01	182.74	738.48
1543.67	475.21	1616.25	1570.19	469.18	1639.75	1372.16	400.59	1430.56	1358.31	357.46	1406.33
1213.61	-134.04	1176.17	1243.67	-125.45	1206.90	1085.79	-183.51	1051.01	6070.00	66.66	6053.79
35731.40	4423.89	36134.07	36847.41	4873.10	37308.32	31074.10	2350.34	31256.02	29899.80	1589.22	30004.39
313,007,025.05			322,783,343.12			272,209,120.97			261,922,256.93		

November			December			Yearly Average			Maximum hourly consumtion	
KW	KVAR	KVA	KW	KVAR	KVA	KW	KVAR	KVA	kWh	Feeder
6210.59	826.94	6267.77	7966.31	613.96	8000.65	6423.37	959.88	6504.96	24348.00	9M1
11839.87	1.49	11839.88	11825.44	15.26	11826.07	12081.36	223.96	12096.11	30101.00	9M2
8533.87	333.53	8542.73	9930.15	511.77	9945.44	7228.80	380.44	7244.47	21894.00	9M4
6033.72	451.10	6055.04	6954.55	355.77	6966.35	8001.57	803.41	8064.71	27458.00	13M3
586.85	108.69	597.04	953.07	199.02	974.06	899.44	205.41	924.02	1606.00	CWF2
937.66	258.21	973.00	1051.78	267.62	1085.64	944.15	264.21	981.13	2101.00	CWF4
756.14	166.94	774.70	840.93	161.81	856.72	812.88	204.76	839.45	-	TWF3
1524.52	366.90	1570.04	2004.84	466.64	2059.70	1843.59	469.61	1905.14	3707.00	9M6
7777.73	166.59	7768.03	9089.21	349.96	9088.71	6415.92	175.69	6405.03	21894.00	9M4 (NET)
33386.42	1813.02	33500.76	37840.36	1801.59	37941.48	34765.81	2632.56	34975.94	-	TOTAL
292,465,035.75			331,481,594.14			304,548,465.24				