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Renfrew Hydro Inc.
2024 Cost of Service Application
EB – 2023 – 0049

Exhibit 3: Customer and Load Forecast

Rates Effective: January 1, 2024
Date Filed: May 24, 2023

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K7V 3Z3

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27 **2.3 Exhibit 3: Customer and Load Forecast**

29 **2.3.1 Load Forecasts**

31 *Introduction*

32 This exhibit describes Renfrew Hydro’s proposed load forecast, the methodology and assumptions used
 33 to determine the rates and rate riders for RHI’s five (5) customer classes. Renfrew Hydro’s five (5)
 34 customer classes are Residential, General Service less than 50 kW, General Service greater than 50 kW,
 35 Unmetered Scattered Load (USL) and Street Lighting. Renfrew Hydro Inc. (RHI) does not anticipate any
 36 changes in its customer classes.

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Renfrew Hydro can confirm that there are no specific factors as depicted below in table 3.1 that would be unique to them or would have caused a significant change in how it determines its load forecast compared to the last board-approved cost of service. The growth rate in Renfrew remains slow and has remained consistent throughout the past several years. We have one ongoing (in progress) new subdivision in our distribution service area and there has been consideration for two (2) other potential developments; however, nothing has yet been confirmed. RHI is predicting a similar pattern of growth to what we have experienced over the past several years. As indicated in our DSP, RHI maintains regular contact with developers, the Town, and the County, and as such we are well informed in advance of any potential new development plans. We have included all known plans and used the most recent and accurate Town of Renfrew development forecasts to derive our load and customer forecast.

Table 3.1: Factors that RHI Considered to Influence Load Forecast

Factors Considered		Influence on RHI's Load Forecast
1	Customer Growth or Decline (historical or future) all classes	Minimal
2	Increased or Reduced System kW Demand (historical or future)	Minimal
3	Increased or Reduced System Consumption kWhs (historical or future)	Minimal
4	Shifting Consumption Levels/Percentages between Customer Classes	Minimal
5	Climate Change	Minimal
6	Change in Customer Demographics	Minimal
7	Growth in Net Metering & DERs	Minimal
8	Growth in Electric Vehicles	Minimal
9	Growth in Energy Conservation	Minimal

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2.3.1.1 Multivariate Regression Model

Renfrew Hydro's load forecast is prepared in two phases. The first phase, a billed energy forecast by customer class for 2024, is developed using a total purchase (Wholesale) basis regression analysis. The methodology proposed in this application predicts wholesale consumption using a multiple regression analysis that relates historical wholesale kWh usage to selected variables. This one-way analysis of variance is used to determine any statistically significant differences between the means of three or

1 more independent (unrelated) groups. This analysis compares the means between the groups and
2 determines whether any means are statistically significantly different. Renfrew Hydro opted to not test
3 the NAC method because NAC is generally seen as an alternative when sound historical data is not
4 available. The most significant variables used in our weather-related regressions are monthly historical
5 heating degree days and cooling degree days. Heating degree-days provide a measure of how much (in
6 degrees), and for how long (in days), the outside temperature was below that base temperature. The
7 most readily available heating degree days come with a base temperature of 18°C. Cooling degree-day
8 figures also come with a base temperature and measure how much, and for how long, the outside
9 temperature was above that base temperature. For degree days, daily observations as reported in
10 Ottawa are used. The regression model also uses other variables which are tested to see their
11 relationship and contribution to the fluctuating wholesale purchases. Each variable is discussed in detail
12 later in this section.

13

14 *Overview of Variables Used*

15 Renfrew Hydro adjusted its base wholesale purchases prior to initiating the regression analysis to
16 normalize the data as best as possible. Adjustments were made to account for the loss of commercial
17 customers and the loss of street lighting volume due to an LED conversion.

18 The following historical data was used as inputs in our regression model:

- 19 • Monthly total system purchased energy data from January 2013 to December 2022 from
20 wholesale meter and billing system data;
- 21 • Weather impacts on load in both the winter heating season and summer cooling season. Both
22 heating degree days (HDD) and cooling degree days (CDD) are modeled. (data from Stats
23 Canada);
- 24 • Number of days in the month; and
- 25 • Average daylight hours (data from Stats Canada)

26

27 *Heating and Cooling Degree Days*

28 In order to establish a relationship between actual weather temperatures and electrical energy
29 consumption, monthly weather observations that impacted the requirement for heating or cooling are
30 required. Environment Canada publishes monthly observations on heating degree days (HDD) and
31 cooling degree days (CDD) for selected weather stations across Canada. Heating degree days for a given

1 day are the number of Celsius degrees that the mean temperature is below 18°C. Renfrew Hydro used
2 the monthly HDD and CDD as reported at Environment Canada’s Ottawa Airport weather station were
3 used. RHI has adopted the 10-year average from 2013 to 2022 as the definition of weather normal. A
4 ten-year average based on the most recent ten calendar years available is a reasonable reflection of the
5 “average” weather experienced and this same methodology has been used by other LDCs during cost-of-
6 service rebasing.

7

8 *Number of Days in a Month*

9 Renfrew Hydro uses a days per month variable. Although this variable has had minimal impact on the
10 results, it assists in making our model more accurate.

11

12 *Daylight Hours*

13 The measurement of the available daylight hours per month is used to capture changes in demand
14 caused by darkness and natural light variations. The average daylight hours calculated from 2013 to
15 2022 are shown below in Table 3.2.

16

17

Table 3.2: Average Daylight Hours from 2013 to 2022

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average (hours)	9.09	10.19	11.51	13.28	14.52	15.35	15.15	14.03	12.29	10.51	9.28	8.47

18

19 *Regression Results*

20 The statistical results associated with the regression analysis are depicted in table 3.3 below. The results
21 confirm that the variable coefficients used have a relationship with overall energy consumed. Our
22 regression analysis yielded an adjusted R-squared value of 91% when actual annual wholesale values are
23 compared to annual predicted values. The mean average percentage error (MAPE) was 1.08%.

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Table 3.3: Regression Results

Regression Statistics	
Multiple R	0.955765564
R Square	0.913487814
Adjusted R Square	0.910478695
Standard Error	216352.8764
Observations	120

ANOVA					
	df	SS	MS	F	Significance F
Regression	4	5.68393E+13	1.42098E+13	303.5731251	4.07854E-60
Residual	115	5.38299E+12	46808567115		
Total	119	6.22223E+13			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	761212.9204	813392.5398	0.9358494	0.351311808	-849961.1563	2372386.997	-849961.1563	2372386.997
HDD	3051.99761	121.9318108	25.03036402	2.31554E-48	2810.47416	3293.521061	2810.47416	3293.521061
CDD	15148.45227	704.7832913	21.49377327	4.37804E-42	13752.41221	16544.49233	13752.41221	16544.49233
Number of Days in	163177.2084	24853.65322	6.565522057	1.56327E-09	113946.9047	212407.5121	113946.9047	212407.5121
Daylight hours	18750.96763	15711.97465	1.193418908	0.235161547	-12371.43025	49873.3655	-12371.43025	49873.3655

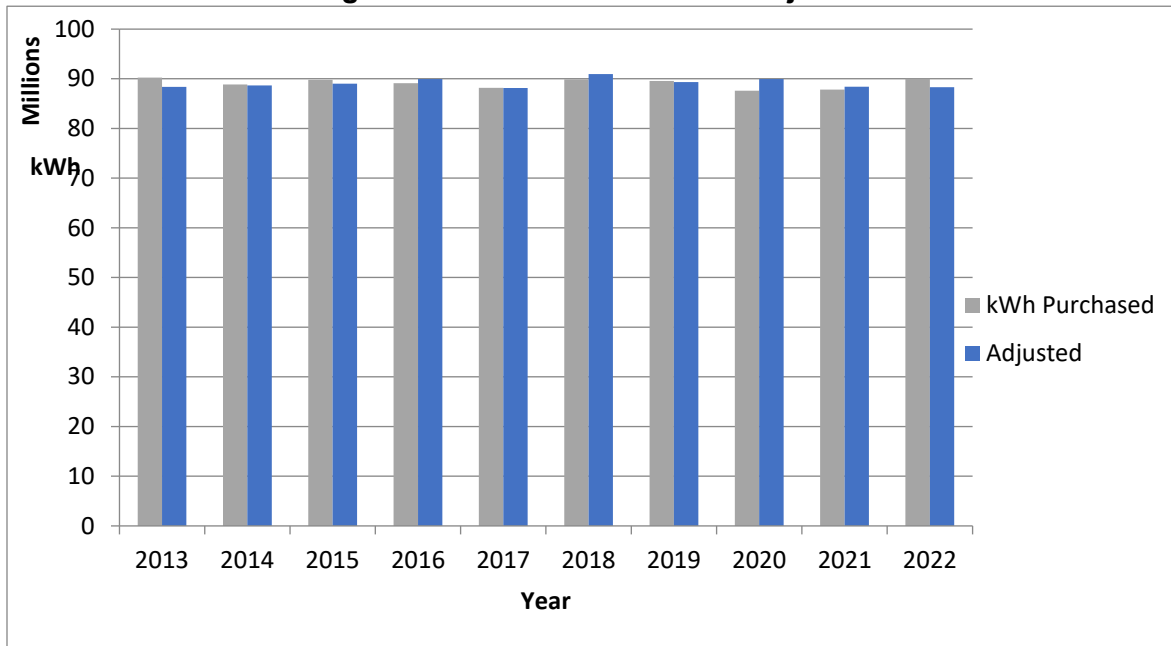
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4 The annual results of the above predicted/adjusted purchases compared with actual annual purchases
 5 from 2013 to 2022 are shown in Figure 3.4 below.

6

Figure 3.4: kWh Purchased vs. Adjusted



7

8 Table 3.5 shown below, shows the results by year comparison between the actual and predicted annual
 9 wholesale purchases from January 1, 2013, to December 31, 2022.

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Table 3.5: kWh Actual Purchased vs. Adjusted

Year	kWh Purchased	Year Over Year (%)	Adjusted kWh	Year Over Year (%)	Purchased Vs Adjusted (%)
2013	90,243,076.26		88,366,010.05		-2.08
2014	88,841,745.26	-1.55	88,661,685.78	0.33	-0.20
2015	89,768,282.26	1.04	89,010,777.47	0.39	-0.84
2016	89,085,775.26	-0.76	89,934,682.75	1.04	0.95
2017	88,171,491.93	-1.03	88,121,279.40	-2.02	-0.06
2018	89,884,663.68	1.94	90,935,675.29	3.19	1.17
2019	89,565,183.47	-0.36	89,937,807.73	-1.78	-0.28
2020	87,584,142.18	-2.21	89,937,807.73	0.70	2.69
2021	87,828,569.65	0.28	88,405,826.87	-1.70	0.66
2022	90,017,844.81	2.49	88,301,617.96	-0.12	-1.91

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Mean Average Percentage Error 1.08%

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Median 0.90%

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5 *2.3.1.2 Normalized Average Use per Customer Model*

6 *Billed kWh Load Forecast and Customer/Connection Forecast by Rate Class*

7 The total weather normalized billed energy amount needs to be distributed by rate class for rate design
 8 purposes taking into consideration the customer/connection forecast and the expected usage per
 9 customer by rate class.

10 To determine our customer/connection forecast Renfrew Hydro reviewed historical data as shown in
 11 Table 3.6 below. The next step in the forecasting process was to determine a customer/connection
 12 forecast. The annual customer/connections data is based on the end of year count.

13

Table 3.6: Growth or Decrease Rate in Customer/Connections

Date	Residential	Growth Rate	General Service < 50 kW	Growth Rate	General Service > 50 to 4999 kW	Growth Rate	usi	Growth Rate	Street Lighting	Growth Rate
	Customers or Connections		Customers or Connections		Customers or Connections		Customers or Connections		Customers or Connections	
2012	3721		435		59		34		1176	
2013	3730	1.0024	436	1.0023	59	1.0000	33	0.9706	1190	1.0119
2014	3756	1.0070	429	0.9839	61	1.0339	33	1.0000	1190	1.0000
2015	3779	1.0061	430	1.0023	61	1.0000	33	1.0000	1190	1.0000
2016	3780	1.0003	435	1.0116	60	0.9836	34	1.0303	1197	1.0059
2017	3810	1.0079	436	1.0023	54	0.9000	34	1.0000	1193	0.9967
2018	3817	1.0018	441	1.0115	54	1.0000	37	1.0882	1195	1.0017
2019	3829	1.0031	460	1.0431	36	0.6667	38	1.0270	1195	1.0000
2020	3853	1.0063	451	0.9804	41	1.1389	37	0.9737	1227	1.0268
2021	3867	1.0036	455	1.0089	42	1.0244	37	1.0000	1227	1.0000
2022	3888	1.0054	454	0.9978	42	1.0000	37	1.0000	1197	0.9756
Geomean		1.0044		1.0043		0.9629		1.0085		1.0018
2023	3905		456		40		37		1199	
2024	3922		458		39		38		1201	

14

1 Historical customer/connection usage is used to forecast future usage. Table 3.7 below provides the
 2 average annual usage per customer rate class.

3 **Table 3.7: Historical Annual Usage per Customer Class (kWh)**

Customer Class Name	Last Board Appr	2017	2018	2019	2020	2021	2022
Residential	29,993,952	28,151,208	29,861,489	29,818,828	30,977,677	30,880,816	30,997,474
General Service < 50 kW	12,181,792	10,907,791	11,124,464	11,527,811	12,195,584	11,040,454	11,513,618
General Service > 50 to 4999 kW	45,032,810	44,820,170	44,536,403	43,765,859	40,141,946	41,367,499	42,952,845
Unmetered Scattered Load	155,148	161,875	174,874	176,820	224,089	269,522	264,699
Street Lighting	1,122,118	1,123,681	1,095,474	1,095,439	1,073,512	332,564	388,078
TOTAL	88,485,820	85,164,725	86,792,704	86,384,757	84,612,808	83,890,855	86,116,714

4
5 *Billed kW Load Forecast*

6 The volumetric revenue components for General Service >50 kW and Street Lighting are calculated
 7 based on bill kW demand. Since the load forecast is calculated based on kWh, forecasted kW for these
 8 classes are correlated with their kWh forecasts in each class.

9 *2.3.1.3 CDM Adjustment for the Load Forecast for Distributors*

10 The effects of Renfrew Hydro’s CDM programs up to the conclusion of the program in 2019 are
 11 embedded and included in the actual billed wholesale values. As such, Renfrew Hydro did not make any
 12 adjustments to the load forecast. We have not initiated any recent CDM programs nor have plans to do
 13 so.

14
15 *2.3.2 Accuracy of Load Forecast and Variance Analysis*

16
17 Please refer to Appendix A.

18 *Customer/Connection Counts*

19 All of Renfrew Hydro’s customer/connection counts for all customer classes are calculated using year
 20 end actual numbers. Table 3.8 below shows both RHI’s historical and forecasted as well as adjusted
 21 customer numbers across all classes.

22 Renfrew’s **Residential** customer base remained relatively flat growing by an annual average of less than
 23 0.5% throughout the last decade. The total number of residential customers went from 3721 in 2012 to
 24 3888 in 2022. Renfrew Hydro did not adjust the growth numbers for residential in our bridge (2023) and

1 test (2024) years. Renfrew Hydro is confident that the forecast of 3922 residential customers in 2024 is
2 accurate.

3 Renfrew Hydro also saw limited growth in our **General Service < 50kW** customer class and it too grew by
4 an annual average of less than ½ % throughout the last decade. The total number of customers went
5 from 435 to 456 throughout the last ten years. We had a 4.3% growth anomaly occur in this class when
6 a number of lower cusp General Service > 50kW customers dropped back into this classification as a
7 result of this lower usage. Our commercial customers took advantage of the available CDM programs
8 and also become more energy aware and literate which caused a lot of this migration. This classification
9 subsequently experienced a drop in numbers in 2020 because of business closures due to challenges
10 from the Covid-19 pandemic. Renfrew Hydro did not adjust the growth numbers for our General Service
11 < 50kW in both our bridge (2023) and test (2024) years. Renfrew Hydro remains confident that the
12 forecast of 458 General Service < 50kW in 2024 is accurate.

13 Renfrew Hydro saw the most volatility in its **General Service > 50kW** customer class where there were
14 some larger variations in customer counts. In both 2017 (6 customers) and 2019 (17) we saw a number
15 of customers that were on the lower cusp of this classification move down to our General Service
16 <50kW class for the same reasons described above. Renfrew Hydro did adjust this classification upward
17 in both the bridge and test years, as we have no indicators that would lead us to believe that any of our
18 present 42 customers will change, as well we have no knowledge of any growth in this classification
19 through 2024.

20 Our **Unmetered Scattered Load** customers have remained relatively stable throughout the last decade.
21 We have experienced a less than 1% increase in this area and this was a result of some increases in the
22 Town's telecom infrastructure. We did adjust this classification down one in our test year as we have no
23 indications of any growth in this classification area.

24 The number of **Street Light** connections fluctuated slightly (less than 1%) throughout the last decade. As
25 growth in Renfrew has been relatively stagnant there were only a small number of new streets that
26 required additional lighting. A Town conversion to LED lighting beginning in late 2020 that was
27 completed in late 2021 caused not only a reduction in energy consumption there was also a reduction in
28 the number of lights required. The reengineering of roadway lighting levels combined with the light
29 distribution patterns of the new fixtures resulted in less lighting attachments required. (30 less lights)

1 We did adjust both the bridge and test years downward slightly because there are no new street lighting
2 requirements forecasted during this period.

3 **Table 3.8: Customer Growth Chart**

	Residential		General Service < 50 kW		General Service > 50 to 4999 kW		usl		Street Lighting	
Date	Customers or Connections	Growth Rate	Customers or Connections	Growth Rate	Customers or Connections	Growth Rate	Customers or Connections	Growth Rate	Customers or Connections	Growth Rate
2012	3721		435		59		34		1176	
2013	3730	1.0024	436	1.0023	59	1.0000	33	0.9706	1190	1.0119
2014	3756	1.0070	429	0.9839	61	1.0339	33	1.0000	1190	1.0000
2015	3779	1.0061	430	1.0023	61	1.0000	33	1.0000	1190	1.0000
2016	3780	1.0003	435	1.0116	60	0.9836	34	1.0303	1197	1.0059
2017	3810	1.0079	436	1.0023	54	0.9000	34	1.0000	1193	0.9967
2018	3817	1.0018	441	1.0115	54	1.0000	37	1.0882	1195	1.0017
2019	3829	1.0031	460	1.0431	36	0.6667	38	1.0270	1195	1.0000
2020	3853	1.0063	451	0.9804	41	1.1389	37	0.9737	1227	1.0268
2021	3867	1.0036	455	1.0089	42	1.0244	37	1.0000	1227	1.0000
2022	3888	1.0054	454	0.9978	42	1.0000	37	1.0000	1197	0.9756
Geomean		1.0044		1.0043		0.9629		1.0085		1.0018
2023	3905		456		40		37		1199	
2024	3922		458		39		38		1201	
2023	3905	1.0099	456	1.0021	42	1.0000	37	1.0085	1197	0.9756
2024	3922	1.0044	458	1.0043	42	1.0000	37	0.9916	1197	1.0000

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6 **Last Board Approved Variance Analysis for Customer/Connection Counts**

7 The last board approved customer classifications and actuals can be found in Table 3.9 below. When
8 comparing the last board approved customer classifications with 2017 actuals they can be described as
9 follows:

10 **Residential** actual counts were slightly (less than 1%) lower than approved, which we deem as an
11 immaterial difference.

12 We experienced a 5% increase in our **General Service < 50kW** customer class which occurred because of
13 lower cusp General Service > 50kW customers dropping back into this classification as a result of lower
14 usage. This movement resulted in an 11% decrease in our board approved **General Service > 50kW**
15 **class.**

16 Both **Unmetered Scattered Load** and **Street Light** classifications were 100% accurate.

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Table 3.9: Last Board Approved Customer Count Variances

Customer Class Name	Last Board Approved	2017	Variance	Variance %
Residential	3,835	3,810	(25)	-0.65%
General Service <50 kW	414	436	22	5.31%
General Service 50 to 4999 kW	61	54	(7)	-11.48%
Unmetered Scattered Load	34	34	0	0.00%
Street Lighting	1,199	1,193	(6)	-0.50%
Total	5,543	5,527	(16)	-0.29%

2

3 Table 3.10 below shows the actual and projected (adjusted) customer counts across all customer
4 classes.

5

Table 3.10: Customer Growth with Forecasts

Customer Class Name	Last Board Appr	2017	2018	2019	2020	2021	2022	2023	2024
Residential	3,835	3,810	3,817	3,829	3,853	3,867	3,888	3,905	3,922
General Service < 50 kW	414	436	441	460	451	455	454	456	458
General Service > 50 to 4999 kW	61	54	54	36	41	42	42	42	42
Unmetered Scattered Load	34	34	37	38	37	37	37	37	37
Street Lighting	1,199	1,193	1,195	1,195	1,227	1,227	1,197	1,197	1,197
TOTAL	5,543	5,527	5,544	5,558	5,609	5,628	5,618	5,637	5,656

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8 *Consumption and Demand*

9 *Converting kWh to kW*

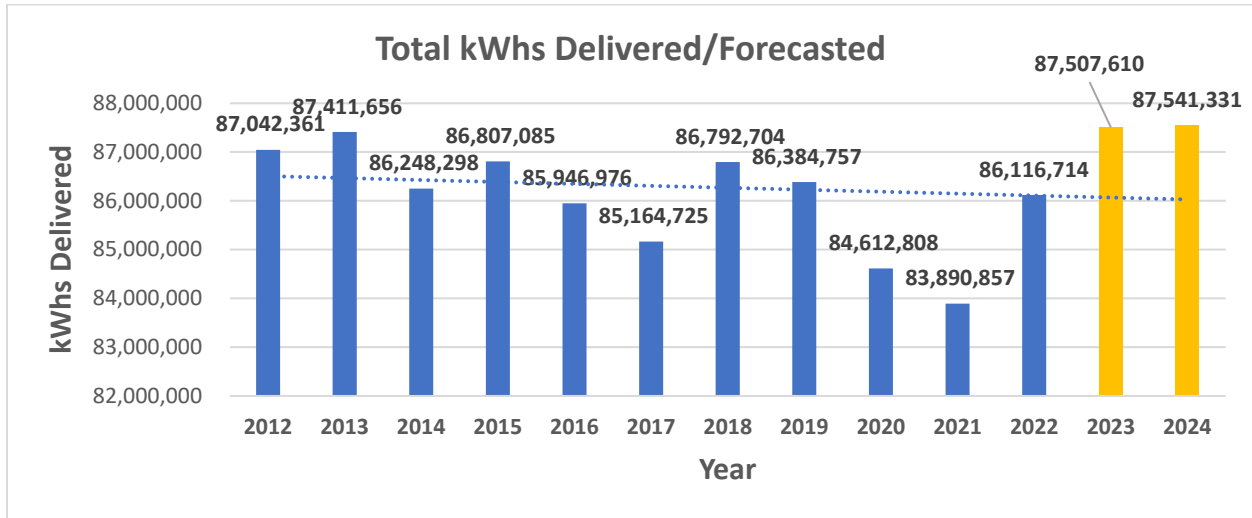
10 To normalize and forecast kW for those classes that are bill based on kW (demand) billing determinants,
11 the relationship between billed kW and kWh is used. The average ratio used in 2022 was utilized to
12 forecast kW for all future years.

13 *Distribution System Totals*

14 The overall system total consumption has remained relatively flat as shown in Figure 3.11 below. There
15 were some minor variances year over year and the Covid pandemic impacted consumption in both 2020
16 and 2021. As previously shown, the Town of Renfrew has experienced little growth across all customer
17 classifications. The small growth in residential customers has been offset by the adoption of more
18 energy efficient appliances, LED street lighting conversion and an overall increase in public
19 awareness/understanding of their energy usage.

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Figure 3.11: Total kWhs Actuals & Forecasted



Our overall system energy delivered remained relatively stable and predictable as per Table 3.12. Table 3.13 shows the historical yearly energy volumes delivered and the relatively low levels of annual variances. As previously described, there was some movement of cusp customers from our General Service > 50kW class to our General Service < 50kW, which impacted customer class consumptions totals. The last Board approved consumption level overall totals were never fully realized throughout this entire period. This verifies the relative stagnant nature of growth within the Town of Renfrew. As shown in **Appendix A** when weather normalized the actuals become more accurate (Table 3.15).

We have forecasted a modest increase in consumption in our Residential, and both General Service classifications. The largest energy usage increase will occur in our GS > 50 kW class due to two ongoing expansion projects within this class. We believe that Renfrew’s adoption rate of electrical vehicles will be one of the slowest in the province given our location and climate (both environmental and economic) and as such have not predicted large increases in consumption due to vehicle charging.

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Table 3.12: Consumption (kWhs)

Customer Class Name	Last Board Appr	2017	2018	2019	2020	2021	2022	2023	2024
Residential	29,993,952	28,151,208	29,861,489	29,818,828	30,977,677	30,880,816	30,997,474	31,265,958	31,290,547
General Service < 50 kW	12,181,792	10,907,791	11,124,464	11,527,811	12,195,584	11,040,454	11,513,618	11,613,343	11,622,476
General Service > 50 to 4999 kW	45,032,810	44,820,170	44,536,403	43,765,859	40,141,946	41,367,499	42,952,845	43,975,532	43,975,532
Unmetered Scattered Load	155,148	161,875	174,874	176,820	224,089	269,522	264,699	264,699	264,699
Street Lighting	1,122,118	1,123,681	1,095,474	1,095,439	1,073,512	332,564	388,078	388,078	388,078
TOTAL	88,485,820	85,164,725	86,792,704	86,384,757	84,612,808	83,890,855	86,116,714	87,507,610	87,541,331

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Table 3.13: Class & Total Consumption Variances (kWhs & KW)

Customer Class Name		Last Board Appr	2017	Variance	2018	Variance	2019	Variance	2020	Variance	2021	Variance	2022	Variance
Residential	kWh	29,993,952	28,151,208	(1,842,744)	29,861,489	1,710,281	29,818,828	(42,661)	30,977,677	1,158,849	30,880,816	(96,861)	30,997,474	116,658
General Service < 50 kW	kWh	12,181,792	10,907,791	(1,274,001)	11,124,464	216,673	11,527,811	403,347	12,195,584	667,773	11,040,454	(1,155,130)	11,513,618	473,164
General Service > 50 to 4999 kW	kWh	45,032,810	44,820,170	(212,640)	44,536,403	(283,767)	43,765,859	(770,544)	40,141,946	(3,623,913)	41,367,499	1,225,553	42,952,845	1,585,346
	kW	122,368	114,292	(8,076)	107,394	(6,898)	96,470	(10,924)	91,749	(4,721)	100,013	8,264	102,093	2,080
Unmetered Scattered Load	kWh	155,148	161,875	6,727	174,874	12,999	176,820	1,946	224,089	47,269	269,522	45,433	264,699	(4,823)
Street Lighting	kWh	1,122,118	1,123,681	1,563	1,095,474	(28,207)	1,095,439	(35)	1,073,512	(21,927)	332,564	(740,948)	388,078	55,514
	kW	3,118	3,118	0	3,038	(80)	3,038	0	2,981	(57)	950	(2,031)	1,075	125
TOTAL	kWh	88,485,820	85,164,725	(3,321,095)	86,792,704	1,627,979	86,384,757	(407,947)	84,612,808	(1,771,949)	83,890,855	(721,953)	86,116,714	2,225,859
	kW	125,486	117,410	(8,076)	110,432	(6,978)	99,508	(10,924)	94,730	(4,778)	100,963	6,233	103,168	2,205

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7 Table 3.14 below provides the average annual forecasted energy usage by per customer rate class for

8 both our bridge (2023) and test (2024) years.

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Table 3.4: Forecasted Annual Usage per Customer Class (kWh)

Customer Class Name	Projected 2023	Projected 2024	Variance	Variance %
Residential	31,265,958	31,290,547	24,589	0.08%
General Service <50 kW	11,613,343	11,622,476	9,133	0.08%
General Service 50 to 4999 kW	43,975,532	43,975,532	0	0.00%
Unmetered Scattered Load	264,699	264,699	0	0.00%
Street Lighting	388,078	388,078	0	0.00%
Total	87,507,610	87,541,331	33,721	0.04%

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Table 3.15: Weather Normalized System Loading

Distribution System (Total)

	Calendar Year (for 2017 Cost of Service)	Consumption (kWh) ⁽³⁾		
		Actual (Weather actual)	Weather- normalized	Weather- normalized
Historical	2016	Actual ###; 2:7.997	###; .56.8:5	
Historical	2017	Actual ###; 393.6:4	###; 343.49; Board-approved	88,485,820
Historical	2018	Actual ###; .:6.886	###; 2.:57.897	
Historical	2019	Actual ###; 787.3:5	###; 537.633	
Historical	2020	Actual ###; 9.7:6.364	###; .:59.:2:	
Historical	2021	Actual ###; 9.:4:7.92	###; .627.:49	
Historical	2022	Actual ###; 2.239.:67	###; 523.83:	
Bridge Year	2023	Forecast	###; 288.664	
Test Year	2024	Forecast	###; 358.6:7	

Variance Analysis	Year	Year-over-year		Versus Board- approved
	2016			
2017	-1.0%	-2.0%		
2018	1.9%	3.2%		
2019	-0.4%	-1.8%		
2020	-2.2%	0.7%		
2021	0.3%	-1.7%		
2022	2.5%	-0.1%		
2023	-100.0%	0.9%		
2024		0.1%		0.7%
Geometric Mean		100.8%		

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3 *Last Board Approved vs 2017 Actual*

4 The last board approved customer loading and consumption forecasts were higher than realized (Table
 5 3.16). The overall energy delivered was about 3.8% lower than predicted. Although the overall energy
 6 delivered was close to realization there were a couple of factors that contributed to this shortfall. The
 7 growth anticipated in an ongoing subdivision was slower than anticipated and as such consumption in
 8 this residential class was lower than anticipated. The largest variance occurred in our General Service <
 9 50 kW class and there were a couple of factors impacting this class. Even though we saw a growth in the
 10 number of customers in this class there was a large road reconstruction in our downtown core that
 11 reduced business volumes in this area.

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Table 3.16: Board Approved vs 2017 Actuals Comparator (kWhs)

Customer Class Name	Last Board Approved	2017	Variance	Variance %
Residential	29,993,952	28,151,208	(1,842,744)	-6.1%
General Service < 50 kW	12,181,792	10,907,791	(1,274,001)	-10.5%
General Service > 50 to 4999 kW	45,032,810	44,820,170	(212,640)	-0.5%
Unmetered Scattered Load	155,148	161,875	6,727	4.3%
Street Lighting	1,122,118	1,123,681	1,563	0.1%
TOTAL	88,485,820	85,164,725	(3,321,095)	-3.8%

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1 **Appendix**

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3 **List of Appendices**

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Appendix A	Load Forecast

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Appendix A
Load Forecast



Final Load Forecast Results - CDM Adjusted

Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	
Residential	Cust/Conn	3,726	3,744	3,768	3,780	3,797	3,814	3,824	3,844	3,860	3,879	3,905	3,922
	kWh	29,645,291	29,796,743	29,339,475	29,165,920	28,135,176	30,210,656	29,735,672	31,810,146	31,083,782	30,406,495	30,890,726	31,290,547
	kW	-	-	-	-	-	-	-	-	-	-	-	-
General Service < 50 kW	Cust/Conn	436	433	430	433	436	440	451	456	453	455	456	458
	kWh	11,212,977	11,203,783	10,751,811	10,923,989	10,901,579	11,254,541	11,495,663	12,523,318	11,113,018	11,294,106	11,421,151	11,622,476
	kW	-	-	-	-	-	-	-	-	-	-	-	-
General Service > 50 kW - 4999 kW	Cust/Conn	59	60	61	61	56	54	45	39	42	42	42	42
	kWh	44,119,354	43,640,624	45,095,566	44,950,585	44,820,170	44,536,403	43,765,859	40,141,946	41,367,499	42,952,845	43,975,532	43,975,532
	kW	115,813	114,180	113,922	116,348	114,292	107,394	96,470	91,749	100,013	102,093	104,523	104,523
Streetlighting	Cust/Conn	1,190	1,190	1,190	1,197	1,193	1,195	1,195	1,227	1,227	1,197	1,197	1,197
	kWh	1,118,710	1,121,519	1,123,682	1,127,383	1,123,681	1,095,474	1,095,439	1,073,512	332,564	388,078	388,078	388,078
	kW	3,104	3,110	3,118	3,137	3,118	3,038	3,038	2,981	950	1,075	1,075	1,075
Unmetered Scattered Load	Cust/Conn	34	33	33	34	34	36	37	37	37	37	37	37
	kWh	155,619	155,019	155,364	157,514	161,875	174,874	176,820	224,089	269,522	264,699	264,699	264,699
	kW	-	-	-	-	-	-	-	-	-	-	-	-
0.00	Cust/Conn	-	-	-	-	-	-	-	-	-	-	-	-
	kWh	-	-	-	-	-	-	-	-	-	-	-	-
	kW	-	-	-	-	-	-	-	-	-	-	-	-
0.00	Cust/Conn	-	-	-	-	-	-	-	-	-	-	-	-
	kWh	-	-	-	-	-	-	-	-	-	-	-	-
	kW	-	-	-	-	-	-	-	-	-	-	-	-
Total	Cust/Conn	5,444	5,460	5,481	5,504	5,516	5,538	5,552	5,602	5,619	5,610	5,637	5,656
	kWh	86,251,951	85,917,687	86,465,899	86,325,391	85,142,481	87,271,948	86,269,453	85,773,011	84,166,384	85,306,223	86,940,187	87,541,331
	kW	118,917	117,290	117,040	119,485	117,410	110,432	99,509	94,730	100,963	103,168	105,599	105,599