2.6 EXHIBIT 3: OPERATING REVENUE

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EXHIBIT 3: OPERATING REVENUE

2.6.1 LOAD AND REVENUE FORECASTS

Weather Normalized and Customer/Connection Forecast

The ensuing evidence describes the process used by Guelph Hydro to prepare its weather-normalized load and customer/connection forecast which underpin the proposed distribution rates. Guelph Hydro has used the same, Board-approved, Load Forecast model and methodology as in Guelph Hydro's 2012 Cost of Service application file number EB-2011-0123 (i.e., a Multivariate Regression Model). Since that approval, the functional form of Guelph Hydro's Load Forecast model has been maintained monthly and it has been used extensively to produce the Company's 2012 to 2016 base distribution revenue budgets and forecasts.

2.6.1.1 MULTIVARIATE REGRESSION MODEL

Rationale as to why the Multivariate Regression model was chosen

Guelph Hydro proposes to use the same multivariate regression model for the following reasons. First, Guelph Hydro re-tested the Board-approved Load Forecast model against actual data for 2012, 2013, and 2014, and the forecast output compared very favourably to actual consumption as shown in the table below. In addition, Guelph Hydro tested multivariate regression models using other economic, demographic, and weather-related variables to determine whether further improvements relative to the Board-approved model were possible. The alternate models did not produce results that were statistically better than Guelph Hydro's proposed model. The tests of the alternative models and their statistical results are described in detail later in this section, under the heading Load Forecast Trials.

Table 3-1

Guelph Hydro's Total System Purchases GWh

	Actual	Predicted Weather Normalized	% Difference
1998	1,368	1,334	-2.53%
1999	1,420	1,415	-0.34%
2000	1,492	1,491	-0.05%
2001	1,489	1,489	0.00%
2002	1,521	1,535	0.92%
2003	1,508	1,533	1.65%
2004	1,579	1,575	-0.23%
2005	1,641	1,632	-0.58%
2006	1,634	1,621	-0.79%
2007	1,632	1,648	0.99%
2008	1,594	1,628	2.11%
2009	1,504	1,566	4.12%
2010	1,641	1,630	-0.68%
2011	1,696	1,674	-1.29%
2012 Board-Approved (1)		1,698	-2.25%
2012	1,737	1,703	-1.95%
2013	1,756	1,725	-1.81%
2014	1,769	1,772	0.16%

Note (1): -2.25% is the variance between the 2012 Board- Approved Purchases and the 2012 Actual Purchases of 1,737 (GWh).

Second, this type of Multifactor Regression model is widely used and applied in economic forecasting. The method uses independent variables (e.g., economic, weather, and seasonal variables) which explain the dependent variable (electricity consumption) very well statistically (a detailed explanation of variables is presented in this Exhibit, Tab 1, Schedule 1, page 5, 2.6.1.1 Multivariate Regression Model). The method provides flexibility in choosing the parameters that have historically affected consumption in Guelph Hydro's service area and these parameters continue to provide exceptional statistical indicators for forecast electricity consumption. Guelph Hydro understands that similar Multivariate Regression Models and weather normalization

methodologies have been accepted by the Board, and Guelph Hydro submits that this approach is appropriate for this Application.

A similar method was also approved by the Board for the majority of 2013, 2014 and 2015 cost of service applicants (e.g., Cambridge and North Dumfries Hydro file number EB-2013-0116, Kitchener – Wilmot Hydro Inc. file number EB-2013-0147, Brantford Power Inc. file number EB-2012-0109).

In summary, Guelph Hydro has used regression analysis to derive its load forecast. With regard to the overall process of load forecasting, Guelph Hydro's evidence shows that regression analysis on historical purchases using a statistically significant multi-factor equation produces a robust load forecast, and this methodology continues to be appropriate. Guelph Hydro knows with certainty the exact amount of kWhs purchased from the IESO for use by customers of Guelph Hydro on a monthly basis. By using regression analysis, these purchases can be related to monthly explanatory variables such as heating degree days and cooling degree days. The results of the regression analysis form a strong basis for forecasting purchases based on the predetermined and statistically significant explanatory variables. This prediction model is then used as the basis to forecast the total amount of weather-normalized purchases for Guelph Hydro for the Bridge Year and Test Year, and these results are converted to billed kWh by rate class. A detailed explanation of the process follows.

The intervenors in Guelph Hydro's 2012 COS application agreed and settled on a revenue requirement based on the same Load Forecast model that is being relied upon by Guelph Hydro in this Application. The model is the one proposed by one of the intervenors, Energy Probe (Board-Approved Settlement page 25, and Technical Conference Guelph Hydro's response to TCQ14 – Energy Probe).

Guelph Hydro submits the load forecasting methodology is reasonable for the purposes of the application.

Load Forecast and Methodology

Guelph Hydro's weather-normalized load forecast is developed in a three-step process. First, a total system weather-normalized purchased energy forecast is developed based on a multifactor regression model that incorporates historical load, weather, and economic data. Second, the weather-normalized purchased energy forecast is adjusted by an historical loss factor to produce a weather-normalized billed energy forecast. Finally, the forecast of billed energy by rate class is developed based on a forecast of customers and historical usage patterns per customer. For rate classes that have weather sensitive load, their forecasted billed energy is adjusted to ensure that the total billed energy forecast by rate class is equivalent to the total weather-normalized billed energy forecast that has been derived from the regression model. The forecast of customers by rate class is determined using a geometric mean analysis. For those rate classes that use kW for the distribution volumetric billing determinant, an adjustment factor is applied to class energy forecast based on the historical relationship between kW and kWh. The forecasting process is detailed in the section below.

Independent Variables used in the Multivariable Regression Model

The forecast of total system purchased energy is developed using a multifactor regression model with the following independent variables:

<u>Weather:</u>

1. Heating degree-days (HDD) - measure of coldness in winter
2. Cooling degree-days (CDD) - measure of summer heat

<u>Economic output:</u>

3. Canadian (National) Manufacturing GDP Monthly %

<u>Calendar variables:</u>

4. Days in month

5. Number of peak hours in month

Specific drivers:

6. Blackout flag
7. Trend variable

In Guelph Hydro's view, the above variables are the main drivers of its historical and future consumption.

Weather impacts on load are apparent in both the winter heating season, and in the summer cooling season. For that reason, both Heating Degree Days (i.e., a measure of coldness in winter) and Cooling Degree Days (i.e., a measure of summer heat) are modeled.

Heating Degree Days (HDD) and Cooling Degree Days (CDD) are measured by comparing the mean daily temperature against a specific temperature threshold. This measurement is useful in estimating how much energy a home or facility will use for heating and cooling on a given day, taking into consideration outside weather conditions. Heating degree days are defined relative to a base temperature - the outside temperature above which a building needs no heating. The most appropriate base temperature for any particular building depends on the temperature that the building is heated to, and the nature of the building (including the heat-generating occupants and equipment within it). Heating Degree Days and Cooling Degree Days are traditionally measured against an 18^{o}C baseline, which indicates that when the temperature is below 18^{o}C, buildings require heating, and when the mean temperature is above 18^{o}C, buildings require cooling.

For the purposes of load forecasting, Guelph Hydro submits that most homes and buildings require only minimal (if any) heating when the mean outside air temperature is between 10^{o}C and 18^{o}C. At outdoor air temperatures in this range, indoor air temperatures are comfortable. This is partially due to increased building performance of

building envelopes, and technological advancements in buildings materials such as insulation and windows. Guelph is a rapidly growing community with a relatively high proportion of modern homes and buildings which are built with efficient materials. Guelph Hydro has conducted its load forecast using a relative baseline temperature of 10^{o}C for HDD and 18^{o}C for CDD (the same HDD and CDD baseline temperatures were used in the 2102 Board-approved Load Forecast).

The 2015 Bridge Year and 2016 Test Year forecasts are based on 17 year historical HDD and CDD averages. In addition to the proposed Test year load forecast, Guelph Hydro provided load forecasts based on 10-year average and 20-year trend HDD and CDD.

The third type of explanatory factor determining energy use in the model can be classified as "calendar factors". For example, the number of days in a particular month will impact energy use. The modeling of purchased energy uses number of days in the month, the number of peak hours in a month, and a “dummy” variable to capture the impact of the August 2003 blackout on energy use in that month. This same dummy variable would be equally relevant should a similar system-wide event occur in the future.

The process of developing a model of energy usage involves formulating and estimating models using different input variables to determine the best statistical fit.

Guelph Hydro used six explanatory variables and a Trend variable for predicting the purchased kWh: HDD, CDD, Number of Days in Month, Number of Peak Hours, Blackout Flag and Manufacturing Production GDP. As previously noted, the Trend variable was added at intervenors’ request to improve the Load Forecast statistics (reference: Decision and Order dated February 22, 2012– Board File EB-2011-0123, Appendix A – Guelph Hydro Electric Systems Inc. Settlement Agreement, issue 3.2 , and Technical Conference Guelph Hydro’s responses to question 14 (TCQ 14 – Energy Probe) dated October 26, 2011).

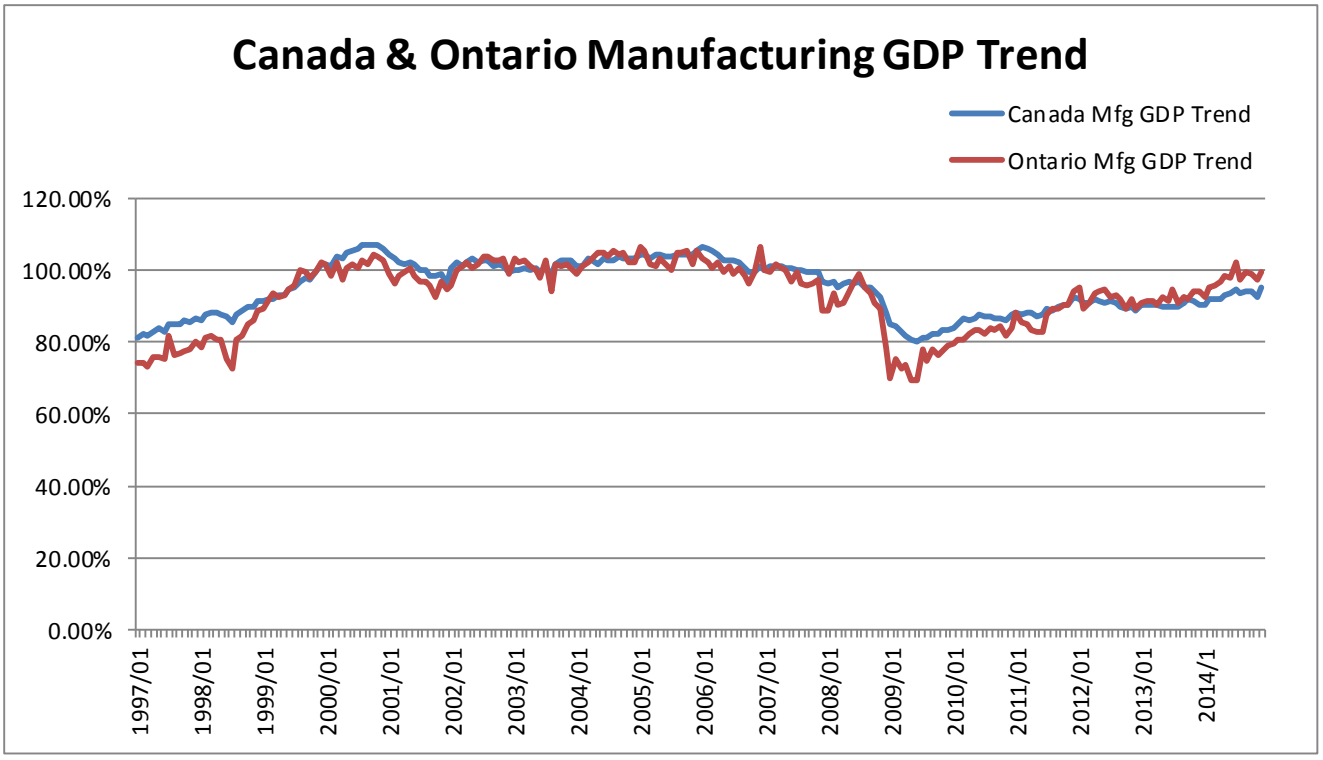
Guelph Hydro reviewed local economic conditions and concluded that the National Manufacturing Production GDP correlated well with the Guelph economy.

Manufacturing Production GDP is the most representative of the industrial sector of Guelph's economy. According to the Ministry of Finance's report on Ontario Economic Accounts - Third Quarter of 2014 and as shown in Table 3-2 below, Manufacturing sector production represents 13% of the total production (source: http://www.fin.gov.on.ca/en/economy/ecaccts/).

Based on an interrogatory in the 2012 cost of service application regarding the use of National vs. Ontario Manufacturing GDP, Guelph considered using Ontario's Manufacturing GDP in the regression analysis. However, a comparison of Ontario's Manufacturing GDP with Canadian (National) Manufacturing GDP indicated, as illustrated in the chart below, a strong relationship between Canadian and Ontario manufacturing GDP. In addition, the Canadian Manufacturing GDP, as variable in the regression model, shows a strong significance of 13.00%. As a result, Guelph Hydro decided to maintain Canadian (National) Manufacturing GDP as the explanatory variable in the regression model since the strong correlation indicated the two variables are virtually interchangeable. Therefore, Guelph Hydro is not proposing any changes from the Board-approved Load Forecast model used as part of its 2012 Cost of Service Rates Application.

In its 2012 cost of service proceedings (file number EB-2011-0123), responses to the Board Staff's interrogatories (IR 15) submitted on September 30, 2011, Guelph Hydro presented a manufacturing GDP analysis. Guelph Hydro considers it relevant to support its evidence by updating the GDP manufacturing analysis presented below:

Chart 3-1



The above chart demonstrates that Canada and Ontario Manufacturing GDP have a similar trend and that changing Canada Manufacturing GDP variable to Ontario Manufacturing GDP variable is not expected to have a material impact on Guelph Hydro's Load Forecast results.

Table 3-2
OEA Tables - Quarterly Data
ONTARIO PRODUCTION BY INDUSTRY AT 2007 PRICES
Seasonally adjusted data at annual rates, millions of chained (2007) dollars

	2014 III	
1. Goods Producing Industries	136,819	
2. Primary	13,367	
3. Agriculture, Forestry, Fishing & Hunting	4,075	
4. Mining	9,271	
5. Utilities	11,514	
6. Electric Power	8,387	
7. Natural Gas, Water and Other	3,157	
8. Construction	32,752	
9. Residential Buildings	13,184	
10. Non-Residential Buildings and Engineering	19,721	
11. Manufacturing	78,378	13%
12. Food, Beverage, & Tobacco Products	11,615	
13. Textile, Clothing, & Leather Products	942	
14. Wood Products and Furniture	3,218	
15. Paper Products and Printing	4,612	
16. Chemical and Petroleum Products	8,086	
17. Plastic and Rubber Products	4,855	
18. Primary Metal & Fabricated Metal Products	11,823	
19. Machinery	5,034	
20. Electrical and Electronic Products	5,187	
21. Transportation Equipment	19,114	
22. Auto Industry (Vehicles & Parts)	16,156	
23. Other Transportation Equipment	2,753	
24. Other Manufacturing	4,344	
25. Services Producing Industries	466,479	
26. Wholesale Trade	40,997	
27. Retail Trade	32,955	
28. Transportation and Warehousing	22,908	
29. Information & Culture (including Telecommunications)	23,356	
30. Finance, Insurance,	56,926	
31. Real Estate, Rental & Leasing	82039	
32. Professional and Administrative Services	56,819	
33. Management of Companies and Enterprises	4536	
34. Education	34,393	
35. Health Care and Social Services	41,258	
36. Arts, Entertainment & Recreation	4,457	
37. Accommodation and Food	11,711	
38. Other Services	11,974	
39. Public Administration	42,366	
40. Total Production	**603,722**	

The above table presents the percentage (13%) of Manufacturing industry production versus the total production as reflected by Statistics Canada at the end of the third quarter of 2014 (Manufacturing share of Total Production: $78,378M Manufacturing production divided by $603,722M Total Production).

Purchased KWh Load Forecast

The regression model uses monthly values for purchased kWh and independent variables from January 1998 to December 2014, to estimate monthly regression coefficients. The purchases include metered kWhs from the grid and embedded generation (FIT and microFIT generated kWhs). The 2015 and 2016 forecast was finalized in January 2015.

Data for Guelph Hydro's total system load is available dating back to January 1998. This data set provides 204 monthly data points, which Guelph Hydro submits is a sufficiently rigorous data set for use in a multiple regression analysis. Based on recent global activity surrounding climate change, historical weather data is showing evidence of a warming trend. In this regard, it is Guelph Hydro's view is that it is appropriate to review the impact of weather on energy usage and determine the average weather conditions from 1998 to 2014. This impact was applied to the forecasting process to determine a weather-normalized forecast.

Actual data has not been weather-normalized since Guelph Hydro is not aware of a Board-approved method to weather-normalize actual data.

Guelph Hydro’s monthly kWh purchases were predicted based on the following equation:

Table 3-3

Intercept	+	-32,742,178.65
Heating Degree Days 10 =V1	X	29,491.73
Cooling Degree Days=V2	X	82,774.46
Number of Days in Month=V3	X	2,186,974.16
Number of Peak Hours=V4	X	75,396.21
Blackout Flag=V5	X	-14,847,022.32
Manufacturing GDP chained in Jan 2007= V6	X	507,655.96
Trend variable "Dummy" = V7	X	171,272.04

The resulting prediction of Guelph Hydro's total consumption for 2015 and 2016 is 1,799 GWh and 1,809 GWh, respectively. This estimate is adjusted for CDM (as explained in this Exhibit, Tab 1, Schedule 3, 2.6.1.3 CDM Adjustment for the Load Forecast for Distributors.

Predicted Purchases

Year	GWh
2015	1,799
2016	1,809

The monthly data used in the regression model and the resulting monthly prediction for actual and forecasted years are provided in Appendix 3-A.

Sources of data used for both endogenous and exogenous variables

a) Environment Canada's website for monthly heating degree day and cooling degree information. Data for Toronto's Lester B. Pearson International Airport[1] weather station was used, which in June 2013 was renamed to "Toronto International Airport".

[1] Source: Government of Canada, Climate, http://climate.weather.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=ON&StationID=5097&dlyRange=1937-11-01|2013-06-12&Year=2013&Month=6&Day=01

Toronto International Airport[2] is the most appropriate climatological measurement point for Guelph Hydro's service territory because it reflects the climatological changes in Guelph Hydro's jurisdiction. When examining weather data from the Waterloo weather station, Guelph Hydro observed that many historical weather data points were missing and, in some instances, the Waterloo weather station data were imported from Toronto International Airport's weather station. For accuracy and consistency with the 2012 Board-Approved load forecast, Guelph Hydro opted to use Toronto International Airport weather station.

b) Canadian (National) Manufacturing GDP - from Statistics of Canada (CANSIM Table 379-0031)[3];

c) The IESO MV-Web for wholesale kWh delivered; and

d) The calendar provided information related to number of days in the month and number of peak hours.

e) Trend variable (1, 2,… to 204 number of observations): Trend estimation is a statistical technique to aid interpretation of data. When a series of measurements of a process are treated as a time series, trend estimation can be used to make and justify statements about tendencies in the data, by relating the measurements to the times at which they occurred.

The monthly national gross domestic product by industry data undergoes broad historical revisions on a periodic basis. Statistics Canada released a methodological

[2] Source: Government of Canada, Climate, http://climate.weather.gc.ca/climateData/dailydata_e.html?timeframe=2&Prov=ON&StationID=51459&hlyRange=2013-06-11|2015-03-24&Year=2015&Month=1&Day=1

[3] Sources: Statistics Canada - Table 379-0031 Gross domestic product (GDP) at basic prices, by North American Industry Classification System (NAICS), monthly (dollars x 1,000,000)(1)

http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=3790031&paSer=&pattern=&stByVal=1&p1=1&p2=-1&tabMode=dataTable&csid=

and statistical improvement to this data set in January 2013[4]. These changes were part of a revision to the Canadian system of national economic accounts.

The Statistics Canada's Manufacturing GDP changes included:

- Conversion of the industrial structure from North American Industrial Classification System 2002 (NAICS 2002) to NAICS 2007
- A new reference year (2007) for the chained dollars series replaces the 2002 reference year data.

Guelph Hydro monitored Statistics Canada's projection of Manufacturing GDP, and updated its load forecast to conform to Statistics Canada's changes. The prior Cost of Service (CoS) application's load forecast included data that was "chained" to 2002 because the data obtained from Statistics Canada (GDP at Basic Prices, by Industry, Table 379-0027) was originally "chained" to 2002 at the time of 2012 COS application. This table has been discontinued by Statistics Canada and replaced with a new table (GDP at Basic Prices, Table 379-0031), which uses chained 2007 dollars. Guelph Hydro converted to the updated data set in keeping with Statistics Canada's update. All manufacturing GDP growth rate statistics in Guelph Hydro's load forecasting model are calculated based on chained January 2007 data.

Statistics of the regression equation

The multifactor regression outputs are shown in Table 3-4 below.

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[4] Statistics Canada. Summary of Changes Over Time – Gross Domestic Product by Industry – National (Monthly) (GDP). http://www23.statcan.gc.ca/imdb/p2SV.pl?Function=getMainChange&SurvId=1301&SurvVer=2&InstaId=15554&SDDS=1301&lang=en&db=imdb&adm=8&dis=2

Please refer to this Exhibit, Appendix 3-A for a description of the statistics used to analyze the regression model results. Multiple R, R-square and adjusted R-square are above 0.95, 0.91 and 0.90 respectively, indicating a strong relationship between actual load and the chosen variables. The t-statistics for each variable have an absolute value between 4.25 and 37.03, indicating that each independent variable is significant. The P-values and the significance-F, measurements representative of the probability that the chosen variables do not contribute to the variation in load, are all insignificant-to-zero.

Table 3-4: Multifactor Regression Statistics

Regression Statistics	
Multiple R	0.9517
R Square	0.9057
Adjusted R Square	0.9023
Standard Error	3,430,067.84
Observations	204

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	7	2.21515E+16	3.1645E+15	268.9675784	7.33336E-97
Residual	196	2.30601E+15	1.17654E+13		
Total	203	2.44575E+16			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-32,742,178.65	10,127,575.92	-3.23	0.00	-52,715,188.60	-12,769,168.69	-52,715,188.60	-12,769,168.69
Heating Degree Days 10 =V1	29,491.73	1,649.76	17.88	0.00	26,238.18	32,745.29	26,238.18	32,745.29
Cooling Degree Days=V2	82,774.46	5,871.22	14.10	0.00	71,195.59	94,353.33	71,195.59	94,353.33
Number of Days in Month=V3	2,186,974.16	320,050.01	6.83	0.00	1,555,790.34	2,818,157.97	1,555,790.34	2,818,157.97
Number of Peak Hours=V4	75,396.21	15,711.81	4.80	0.00	44,410.30	106,382.12	44,410.30	106,382.12
Blackout Flag=V5	-14,847,022.32	3,491,457.69	-4.25	0.00	-21,732,669.96	-7,961,374.69	-21,732,669.96	-7,961,374.69
Manufacturing GDP chained in Jan 2007= '	507,655.96	39,042.42	13.00	0.00	430,658.80	584,653.12	430,658.80	584,653.12
Trend variable "Dummy" = V7	171,272.04	4,624.78	37.03	0.00	162,151.33	180,392.76	162,151.33	180,392.76

Note: the explanation of the results returned by the Regression tool is presented in this Exhibit, Appendix3-A

Guelph Hydro has also calculated the *mean absolute percentage error.*

The mean absolute percentage error (MAPE), also known as mean absolute percentage deviation (MAPD), is a measure of accuracy of a method for constructing fitted time series values in statistics, specifically in trend estimation. It usually expresses accuracy as a percentage, and is defined by the formula:

$$\mathrm{M} = \frac{1}{n}\sum_{t=1}^{n}\left|\frac{A_t - F_t}{A_t}\right|,$$

where A_t is the actual value and F_t is the forecast value.

The difference between A_t and F_t is divided by the Actual value A_t again. The absolute value in this calculation is summed for every fitted or forecasted point in time and divided again by the number of fitted points *n*. Multiplying by 100 makes it a percentage error.

Guelph Hydro has used:

A_t = *Actual purchases in kWh*

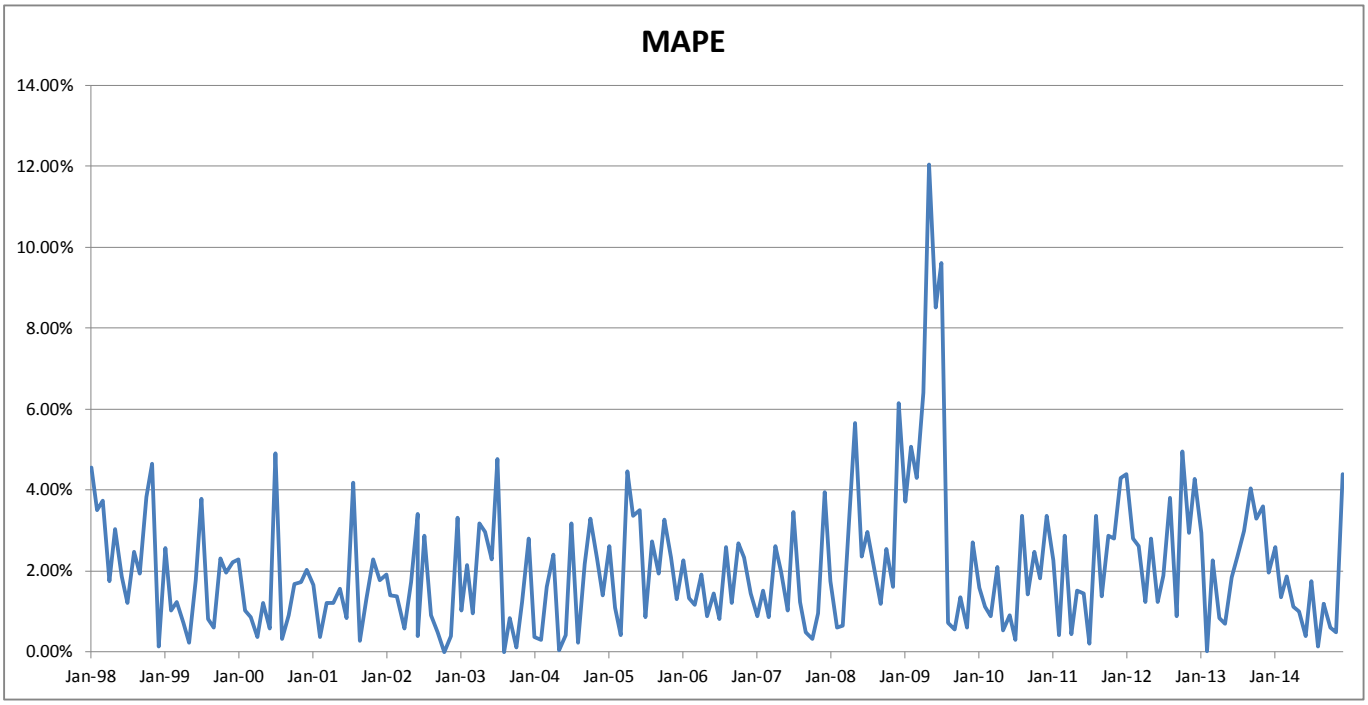
F_t = *Forecast purchases in kWh*

n = number of monthly data points

(Please see "Guelph_Weather Normalization Regression Model_20150424" file submitted in Excel format).

The resulted MAPE is 2.06% which indicates that the accuracy of the Load Forecast model is very good. Chart 3-2 below shows the monthly MAPE of Guelph Hydro's Load Forecast.

Chart 3-2



The 2009 results reflect the economic recession.

The Root Mean Squared Error (Standard Error) also indicates that the load forecast is strong.

$$\mathrm{RMSE} = \sqrt{\frac{1}{n}\sum_{j=1}^{n}(y_j - \hat{y}_j)^2}$$

The Root Mean Squared Error is calculated by finding the difference between the actual purchases and predicted purchases for each month, taking the square of each figure, then averaging the squares, and taking the square root of that figure.

Where:

y = represents the dependent variable (actual purchases)

y with accent =represents predicted purchases returned by the regression model

n = number of monthly data points

j = represents the month

The proposed load forecast shows that the standard deviation between predicted purchases and actual purchases is 2.6% as a monthly average.

Guelph Hydro has applied the *Multicollinearity (or Correlation)* test to its load forecast model. The correlation between variables does not imply multicolliniarity since the correlation percentages are relatively low as demonstrated in Table 3-5 below.

Table 3-5: Variable Correlation

	Heating Degree Days	Cooling Degree Days	Number of Days in Month	Number of Peak Hours	Blackout Flag	Manufacturing GDP	Trend Variable
Heating Degree Days	100.00%						
Cooling Degree Days	-54.36%	100.00%					
Number of Days in Month	-19.28%	20.57%	100.00%				
Number of Peak Hours	-13.86%	10.76%	34.68%	100.00%			
Blackout Flag	-6.14%	13.76%	4.84%	-6.47%	100.00%		
Manufacturing GDP	0.13%	2.91%	1.04%	6.75%	2.96%	100.00%	
Trend Variable	0.92%	-1.04%	1.46%	-3.95%	-4.11%	-46.98%	100.00%

The multifactor regression model has determined that the primary drivers of year-over-year changes in Guelph Hydro's load growth are economic conditions and weather. Both of these effects are captured within the multifactor regression model.

Economic growth – which encompasses customer trends in Guelph Hydro’s service area as well as general economic conditions - is captured in the model using one index of economic output - Canadian (National) Manufacturing Production GDP.

Load Forecasts based on 10-year average and 20-year trends HDD and CDD

In addition to the proposed 2016 Test Year load forecast based on 17-year HDD and CDD data, Guelph Hydro has also provided load forecasts based on both 10-year average and a 20-year trend HDD and CDD (see the following 3-6 to 3-7 tables).

The 10-year average HDD and CDD results in a predicted load of 1,810 GWh for 2016, or 1 GWh greater than the prediction using 17-year average data.

The 20-year trend HDD and CDD results in a predicted load of 1,796 GWh for 2016, or 13 GWh lower than the prediction using 17-year average data.

Table 3-6A - Monthly 10-year average (2005 to 2014)

	HDD	CDD
January	450.4	0.0
February	413.9	0.0
March	297.8	0.0
April	98.0	0.1
May	11.7	18.9
June	0.0	76.3
July	0.0	138.0
August	0.0	108.7
September	0.6	31.5
October	47.3	3.4
November	184.0	0.0
December	359.2	0.0

Table 3-6B - Monthly 20-year trend (1995 to 2014)

	HDD	CDD
January	463.9	0.0
February	420.1	0.0
March	291.5	0.0
April	89.4	0.3
May	9.0	23.3
June	0.0	70.8
July	0.0	143.4
August	0.0	105.9
September	0.1	32.6
October	45.0	3.0
November	172.7	0.0
December	350.1	0.0

Table 3-7 -Sensitivity Analysis 2016 Forecasted purchases [GWh] based on 10-year and 20-year CDD and HDD

	10-year average HDD and CDD	**20-year trend HDD and CDD**	**17-year average HDD and CDD**
January	158	158	158
February	153	157	152
March	156	154	156
April	147	148	147
May	149	147	149
June	152	151	152
July	158	156	157
August	159	154	159
September	148	147	148
October	148	146	148
November	152	150	152
December	157	155	157
Total year	**1,837**	**1,823**	**1,836**
CDM Adjustment	28	28	28
Total year after CDM adjustment	1,810	1,796	1,809

Explanation of any specific adjustments

Other than CDM adjustments presented in this Exhibit, Tab 1, Schedule 3, 2.6.1.3 CDM Adjustment for the Load Forecast for Distributors, Guelph Hydro has not made any other specific adjustments (e.g. to adjust for loss or gain of major customers or load, significant re-classification of customers, etc.).

Load Forecast Trials

While the 2012 Board-approved load forecast model provided robust predictions of the 2012 to 2014 customer numbers and actual energy consumption, Guelph Hydro exercised diligence and undertook extensive testing to determine whether the load forecast model could be improved with the inclusion of additional or different economic, demographic, or weather-related variables. All of the trials are adjusted by CDM in the same manner as the proposed Load Forecast model. The statistical results of the trials are outlined below. At the conclusion of these trials, Guelph Hydro determined that the same variables used to produce the load forecast in Guelph Hydro's 2012 Cost of Service project continue to produce the most relevant and accurate load forecast.

The following Table 3-8 presents the results achieved when testing additional or different variables. A discussion of the results of each individual trial is outlined below.

Table 3-8 Load Forecast Trial Results
(Baseline is the proposed Load Forecast variables and statistical results)

LF Trial #	Variables Added or Removed for Trial	Multiple R	R-Square	Adjusted R-square	MAPE	P-Value of Added variable(s)	T-Stat of Added variable(s)	Coefficient of Added Variable(s)	Predicted Purchases (GWH)		Reason for Exclusion
									2015	2016	
Proposed		0.9517	0.9057	0.9023	2.06%	Baseline	Baseline	Baseline	1,799	1,809	n/a
1	Modified: HDD based on 18 °C baseline	0.9497	0.9019	0.8984	2.09%	0.00	17.20	22,808.71	1,810	1,820	Statistically HDD 10 °C baseline has better results
2	Added: HDD/CDD based on KW Airport	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Poor quality of weather data
3	Added: Population	0.9510	0.9045	0.9006	2.06%	0.99	(0.02)	(5.47)	1,802	1,812	Lower R statistics; T-stat and P-value out of desired range; negative coefficient
4	Added: Ontario Real GDP	0.9082	0.8249	0.8186	2.64%	0.63	(0.48)	(12.56)	1,781	1,789	MAPE is high; Lower R statistics; T-stat and P-value out of desired range
5	Added: Labour Force, Employment, Unemployment, Unemployment Rate	0.9530	0.9082	0.9030	2.03%	0.54 0.54 0.58 0.66	(0.61) 0.61 0.55 0.44	(3,059,137.18) 3,053,139.49 2,740,056.81 1,407,358.96	1,837	1,851	T-stats and P-values out of desired range; strong correlation amongst economic variables
6	Added: Labour Force, Employment, Unemployment, Unemployment Rate	0.9438	0.8907	0.8851	2.15%	0.60 0.60 0.57 0.22	(0.52) 0.52 0.57 (1.24)	(2,833,895.02) 2,841,613.18 3,106,318.90 (4,191,953.55)	1,758	1,763	MAPE is high; lower R-statistics; T-stat and P-values out of desired range

LF Trial #	**Variables Added or Removed for Trial**	**Multiple R**	**R-Square**	**Adjusted R-square**	**MAPE**	P-Value of Added variable(s)	T-Stat of Added variable(s)	Coefficient of Added Variable(s)	**Predicted Purchases** (GWH)		**Reason for Exclusion**
	Removed: Manufacturing GDP										
7	Added: Employment and Unemployment	0.9529	0.9080	0.9037	2.03%	0.37 0.01	(0.89) (2.68)	(17,908.59) (129,472.81)	1,836	1,850	T-stat and P-value out of desired range; strong correlation amongst economic variables
8	Added: Employment	0.9511	0.9046	0.9007	2.06%	0.65	(0.46)	(9,158.87)	1,882	1,894	T-stat and P-value out of desired range; Lower R-statistics
9	Added: Employment Removed: Manufacturing GDP	0.9297	0.8643	0.8594	2.31%	0.00	7.56	123,605.72	1,621	1,611	Lower R-statistics; MAPE is high; kWh results seem unreasonably low
10	Added: Consumer Price Index	0.9517	0.9058	0.9019	2.02%	0.10	(1.66)	(564,173.37)	1,804	1,815	T-stat and P-value out of desired range; negative coefficient
11	Added: Consumer Price Index Removed: Manufacturing GDP	0.9112	0.8302	0.8242	2.63%	0.01	2.54	1,065,575.93	1,766	1,771	MAPE is high; low R-statistics; strong correlations
12	Added: Housing Starts	0.9515	0.9053	0.9014	2.06%	0.19	1.32	1.31	1,790	1,798	Low R-statistics; T-stat and P-value out of desired range
13	Added: Housing Starts Removed: Manufacturing GDP	0.9190	0.8446	0.8391	2.52%	0.00	5.02	5.82	1,721	1,719	Low R-statistics; MAPE is high

1. Using Heating Degree Days with a base temperature of 18° C, rather than 10° C.

Using a base temperature of 18 °C for Heating Degree Days resulted in slightly lower multiple-R, R-square, and adjusted R-square values than when a 10 °C baseline was used, indicating that this change resulted in a less accurate forecast. Additionally, the MAPE was 2.09%, or 0.03% higher than in Guelph Hydro's proposed model. It is evident from the statistical results of the proposed model and this trial that Heating Degree Days is an important variable, though the results are comparable regardless if a 10 °C or 18 °C baseline is used. Using 10 °C for the HDD explanatory variable continues to provide marginally better statistical results, and continues to be preferable as an explanatory variable.

Load Forecast Trial Results 1: HDD with 18 °C

Regression Statistics	
Multiple R	0.9497
R Square	0.9019
Adjusted R Square	0.8984
Standard Error	3,519,503
Observations	204

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	7	2.23312E+16	3.19017E+15	257.5434944	3.39176E-95
Residual	196	2.42783E+15	1.23869E+13		
Total	203	2.4759E+16			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	(28,342,556.10)	10,364,965.97	(2.73)	0.01	(48,783,732.75)	(7,901,379.45)	(48,783,732.75)	(7,901,379.45)
Heating Degree Days 18 =V1	22,808.71	1,326.21	17.20	0.00	20,193.24	25,424.18	20,193.24	25,424.18
Cooling Degree Days=V2	108,854.02	6,943.32	15.68	0.00	95,160.82	122,547.22	95,160.82	122,547.22
Number of Days in Month=V3	1,962,668.77	327,730.28	5.99	0.00	1,316,338.38	2,608,999.16	1,316,338.38	2,608,999.16
Number of Peak Hours=V4	72,710.18	16,113.02	4.51	0.00	40,933.03	104,487.34	40,933.03	104,487.34
Blackout Flag=V5	(14,863,817.79)	3,582,467.39	(4.15)	0.00	(21,928,949.40)	(7,798,686.17)	(21,928,949.40)	(7,798,686.17)
Manufacturing GDP = V6	506,826.13	40,059.27	12.65	0.00	427,823.60	585,828.66	427,823.60	585,828.66
Trend variable "Dummy" = V7	173,154.19	4,744.88	36.49	0.00	163,796.62	182,511.76	163,796.62	182,511.76

Correlation Statistics	*Heating Degree Days 18 =V1*	*Cooling Degree Days=V2*	*Number of Days in Month=V3*	*Number of Peak Hours=V4*	*Blackout Flag=V5*	*Manufacturing GDP = V6*	*Trend variable "Dummy" = V7*
Heating Degree Days 18 =V1	100%						
Cooling Degree Days=V2	-69%	100%					
Number of Days in Month=V3	-18%	21%	100%				
Number of Peak Hours=V4	-13%	11%	35%	100%			
Blackout Flag=V5	-8%	14%	5%	-6%	100%		
Manufacturing GDP = V6	0%	3%	1%	7%	3%	100%	
Trend variable "Dummy" = V7	0%	-1%	1%	-4%	-4%	-47%	100%

Mean absolute error (MAPE)
2.09%

Predicted Purchases

Year	GWh
2015	1,810
2016	1,820

2. Using Heating Degree Days from the Kitchener-Waterloo airport, rather than Toronto's Pearson International Airport.

Environment Canada[5] has multiple data stations in the Region of Waterloo and Wellington County which are in closer proximity to Guelph Hydro's distribution area than Toronto's Pearson Airport. In particular, data from three stations was thought to be relevant:

- "Waterloo Wellington A"
- "Kitchener/Waterloo"
- "Region of Waterloo International Airport"

Daily data is available at each of these stations for only some of the years between 1998 and 2014. It would be possible to build a weather profile for all 17 years by piecing together data from each station. However, Guelph Hydro has determined that it was best to continue to use Toronto's Pearson International Airport, as the data is sourced from one consistent location for all 17 years. For this reason, regression statistics were not tested for weather data from the Kitchener-Waterloo airport weather station.

[5] Source: Government of Canada, Climate. http://climate.weather.gc.ca/advanceSearch/searchHistoricDataStations_e.html?searchType=stnProx&timeframe=1&txtRadius=25&optProxType=city&selCity=43|27|80|29|Kitchener&selPark=&txtCentralLatDeg=0&txtCentralLatMin=0&txtCentralLatSec=0&txtCentralLongDeg=0&txtCentralLongMin=0&txtCentralLongSec=0&optLimit=yearRange&StartYear=1840&EndYear=2015&Year=2015&Month=3&Day=19&selRowPerPage=25&cmdProxSubmit=Search

3. Adding the Population of Guelph as an independent variable

The Population of the City of Guelph[6] and the Population of Rockwood[7] can be obtained from Statistics Canada for census years 1996, 2001, 2006, and 2011. Guelph Hydro summed the Guelph and Rockwood populations together for this exercise. For each five-year interval between 1996 and 2011, Guelph Hydro assumed an equal increase in population each month. A 2016 population projection from the City of Guelph's 2012 Community Profile[8] was used to extrapolate the monthly data from the 2011 census onward.

It should be noted that the 2012 Community Profile contained a population projection for Guelph for the 2011 year of 125,770, which turned out to be an over-estimation of the actual 2011 census results of 121,688 by about 3.3%. The accuracy of the 2016 projection is also questionable based on this result.

The regression model in this trial also showed slightly lower multiple-R, R-square, and adjusted R-square results when the Population variable was added as an explanatory variable in the model, indicating that the new variable weakens the forecast. The Population variable has a T-Stat of (0.02) and a P-value of 0.99, which indicates that Population is not a statistically significant variable for explaining the variation in load. Furthermore, the coefficient for the population

[6] Source: Statistics Canada, Census Profile (Guelph).
http://www12.statcan.gc.ca/census-recensement/2011/as-sa/fogs-spg/Facts-csd-eng.cfm?LANG=Eng&GK=CSD&GC=3523008

[7] Source: Statistics Canada, Census Profile (Rockwood, Ontario).
http://www12.statcan.gc.ca/census-recensement/2011/dp-pd/prof/details/page.cfm?Lang=E&Geo1=POPC&Code1=1209&Geo2=PR&Code2=35&Data=Count&SearchText=Rockwood&SearchType=Begins&SearchPR=01&B1=All&Custom=&TABID=1

[8] Source: City of Guelph, 2012 Community Profile.
http://guelph.ca/wp-content/uploads/2012CommunityProfile.pdf

variable is negative which indicates that it is unintuitive. In addition to the statistically weak results for the Population variable, this version of the model also resulted in an intercept variable that was statistically insignificant as shown by the t-statistic for the intercept term of (0.98). Guelph Hydro endeavours to develop a load forecast model in which every variable has a t-statistic that is higher than an absolute value of 2 (indicating significance), and a P-value (indicating the probability that a variable is not a contributing factor to the dependent variable, Load) of less than 0.02. The MAPE is consistent at 2.06%, indicating that on a month-to-month basis, the mean deviation with the proposed load forecast is no better or worse than this model. As result of these statistics, Population was determined to not be an effective variable to include in the regression model.

Load Forecast Trial Results 3: Population

Regression Statistics	
Multiple R	0.9510
R Square	0.9045
Adjusted R Square	0.9006
Standard Error	3,482,699
Observations	204

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	8	2.23938E+16	2.79923E+15	230.784202	4.45514E-95
Residual	195	2.36519E+15	1.21292E+13		
Total	203	2.4759E+16			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	(32,026,508.40)	32,536,568.36	(0.98)	0.33	(96,195,260.33)	32,142,243.54	(96,195,260.33)	32,142,243.54
Heating Degree Days 10 =V1	29,360.82	1,675.07	17.53	0.00	26,057.24	32,664.40	26,057.24	32,664.40
Cooling Degree Days=V2	83,073.46	5,967.76	13.92	0.00	71,303.81	94,843.10	71,303.81	94,843.10
Number of Days in Month=V3	2,185,685.44	324,974.91	6.73	0.00	1,544,768.59	2,826,602.28	1,544,768.59	2,826,602.28
Number of Peak Hours=V4	75,179.38	15,952.99	4.71	0.00	43,716.83	106,641.93	43,716.83	106,641.93
Blackout Flag=V5	(14,907,294.31)	3,547,772.40	(4.20)	0.00	(21,904,225.40)	(7,910,363.22)	(21,904,225.40)	(7,910,363.22)
Manufacturing GDP = V6	506,401.82	47,083.72	10.76	0.00	413,543.12	599,260.51	413,543.12	599,260.51
Trend variable "Dummy" = V7	173,342.59	51,542.63	3.36	0.00	71,690.01	274,995.17	71,690.01	274,995.17
Population =v8	(5.47)	337.18	(0.02)	0.99	(670.45)	659.51	(670.45)	659.51

	Heating Degree Days 10 =V1	*Cooling Degree Days=V2*	*Number of Days in Month=V3*	*Number of Peak Hours=V4*	*Blackout Flag=V5*	*Manufacturing GDP = V6*	*Trend variable "Dummy" = V7*	*Population =v8*
Heating Degree Days 10 =V1	100%							
Cooling Degree Days=V2	-54%	100%						
Number of Days in Month=V3	-19%	21%	100%					
Number of Peak Hours=V4	-14%	11%	35%	100%				
Blackout Flag=V5	-6%	14%	5%	-6%	100%			
Manufacturing GDP = V6	0%	3%	1%	7%	3%	100%		
Trend variable "Dummy" = V7	1%	-1%	1%	-4%	-4%	-47%	100%	
Population =v8	1%	-1%	2%	-4%	-4%	-42%	100%	100%

Mean absolute error (MAPE)
2.06%

Predicted Purchases

Year	GWh
2015	1,802
2016	1,812

4. Ontario Real Gross Domestic Product (GDP) in place of Manufacturing Gross Domestic Product

Guelph Hydro's 2012 Board-approved load forecast determined that Manufacturing GDP (Canada) was a more effective variable than Ontario Real GDP. Guelph Hydro tested Ontario Real GDP[9] (expenditure based, chained 2007 dollars) as an explanatory variable again for the 2016 load forecast and observed the same result. All other variables used in this trial are identical to those in the proposed model. Comparatively, in the results for the trial which includes the Ontario Real GDP variable, the Multiple R, R-Square and Adjusted R Square-statistics are lower, reflecting a weaker relationship between variables. The MAPE is considerably higher at 2.64%, indicating a greater mean average deviation from the actual load. The T-Stat has an absolute value of (0.48), which shows that the Ontario Real GDP is not a statistically significant explanatory variable in the model. The P-value of 0.63 indicates that the Ontario Real GDP variable is unlikely to explain the variation in load. Based on these results, Manufacturing GDP continues to be the preferred economic variable for explaining load in Guelph.

[9] Source: Ontario Ministry of Finance. Ontario Economic Accounts. Historical Data, Table 3, Quarterly Data, Ontario Real Gross Domestic Product, Expenditure Based, Seasonally adjusted data at annual rates, millions of chained (2007) dollars.
http://www.fin.gov.on.ca/en/economy/ecaccts/#lot

Load Forecast Trial Results 4: Ontario Real GDP

Regression Statistics	
Multiple R	0.9082
R Square	0.8249
Adjusted R Square	0.8186
Standard Error	4,703,519
Observations	204

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	7	2.04229E+16	2.91755E+15	131.8781734	1.31558E-70
Residual	196	4.33613E+15	2.21231E+13		
Total	203	2.4759E+16			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	19,564,126.15	15,807,621.93	1.24	0.22	(11,610,736.67)	50,738,988.98	(11,610,736.67)	50,738,988.98
Heating Degree Days 10 =V1	30,014.10	2,261.25	13.27	0.00	25,554.60	34,473.60	25,554.60	34,473.60
Cooling Degree Days=V2	85,835.92	8,064.42	10.64	0.00	69,931.75	101,740.10	69,931.75	101,740.10
Number of Days in Month=V3	2,171,334.30	439,017.38	4.95	0.00	1,305,530.04	3,037,138.57	1,305,530.04	3,037,138.57
Number of Peak Hours=V4	85,938.32	21,518.50	3.99	0.00	43,500.80	128,375.84	43,500.80	128,375.84
Blackout Flag=V5	(14,377,732.14)	4,787,602.56	(3.00)	0.00	(23,819,560.51)	(4,935,903.77)	(23,819,560.51)	(4,935,903.77)
Trend variable "Dummy" = V6	156,224.00	24,882.06	6.28	0.00	107,153.06	205,294.93	107,153.06	205,294.93
OntarioReal GDP =v7	(12.56)	25.91	(0.48)	0.63	(63.66)	38.54	(63.66)	38.54

	Heating Degree Days 10 =V1	*Cooling Degree Days=V2*	*Number of Days in Month=V3*	*Number of Peak Hours=V4*	*Blackout Flag=V5*	*Trend variable "Dummy" = V6*	*OntarioReal GDP =v7*
Heating Degree Days 10 =V1	100%						
Cooling Degree Days=V2	-54%	100%					
Number of Days in Month=V3	-19%	21%	100%				
Number of Peak Hours=V4	-14%	11%	35%	100%			
Blackout Flag=V5	-6%	14%	5%	-6%	100%		
Trend variable "Dummy" = V6	1%	-1%	1%	-4%	-4%	100%	
OntarioReal GDP =v7	0%	0%	1%	-4%	-4%	97%	100%

Mean absolute error (MAPE)
2.64%

Predicted Purchases

Year	GWh
2015	1,781
2016	1,789

5. Labour Statistics from Statistics Canada

Labour statistics of the Kitchener-Waterloo-Barrie region can be obtained from Statistics Canada (CANSIM tables 282-0122[10] and 282-0054[11]). Four statistics from this chart were tested in the load forecast model simultaneously, including Labour Force (x1000 persons), Employment (x1000 persons), and Unemployment (x1000 persons), and Unemployment Rate (%).

The multiple-R, R-square, and adjusted R-square are slightly improved over the Board-approved model with the inclusion of these statistics, thereby indicating a strong relationship amongst all variables. However, the P-values for the employment statistics range from 0.54 to 0.66 and the T-Stats between (0.61) and 0.61 . As the goal remains to accept variables only with P-values below 0.02

[10] Source: Statistics Canada – Table 282-0122 Labour Force Survey Estimates, by Provinces and Economic Regions based on 2011 census boundaries, 3-month moving average, unadjusted for seasonality.

http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=2820122&pattern=282-0122..282-0136&tabMode=dataTable&srchLan=-1&p1=-1&p2=31

[11] Source: Statistics Canada – Table 282-0054 Labour Force Survey Estimates, by Provinces and Economic Regions based on 2006 Census boundaries, 3-month moving average, unadjusted for seasonality (Terminated).

http://www5.statcan.gc.ca/cansim/a26?lang=eng&id=2820054

and T-stats above the absolute value of 2, these variables indicate a poor fit. Additionally, a strong correlation exists (-80%) between Manufacturing GDP and Unemployment (as quantity of persons and as a rate), which likely introduces multicollinearity into the model. The Manufacturing GDP variable is closely related to the unemployment variable such that these two variables would have an overlapping purpose if both were included in the model. However, because the MAPE showed a slight improvement over the Board-approved model (standard deviation of 2.03%), it was determined that further testing of the Employment and Unemployment statistics should be conducted.

Load Forecast Trial Results 5: Labour Force Statistics

Regression Statistics	
Multiple R	0.9530
R Square	0.9082
Adjusted R Square	0.9030
Standard Error	3,440,002
Observations	204

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	11	2.24869E+16	2.04427E+15	172.7508913	3.07712E-93
Residual	192	2.27205E+15	1.18336E+13		
Total	203	2.4759E+16			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	(18,309,101.61)	25,550,037.15	(0.72)	0.47	(68,703,905.24)	32,085,702.03	(68,703,905.24)	32,085,702.03
Heating Degree Days 10 =V1	28,179.06	1,716.17	16.42	0.00	24,794.10	31,564.02	24,794.10	31,564.02
Cooling Degree Days=V2	85,008.86	6,141.93	13.84	0.00	72,894.53	97,123.19	72,894.53	97,123.19
Number of Days in Month=V3	2,136,461.59	324,568.51	6.58	0.00	1,496,283.79	2,776,639.39	1,496,283.79	2,776,639.39
Number of Peak Hours=V4	74,579.68	15,851.23	4.70	0.00	43,314.77	105,844.58	43,314.77	105,844.58
Blackout Flag=V5	(15,190,814.00)	3,506,746.37	(4.33)	0.00	(22,107,508.24)	(8,274,119.76)	(22,107,508.24)	(8,274,119.76)
Manufacturing GDP = V6	432,870.89	71,505.79	6.05	0.00	291,833.13	573,908.66	291,833.13	573,908.66
Trend variable "Dummy" = V7	199,604.78	21,812.91	9.15	0.00	156,581.07	242,628.48	156,581.07	242,628.48
Labour force (x 1,000) =v8	(3,059,137.18)	5,019,179.21	(0.61)	0.54	(12,958,948.64)	6,840,674.28	(12,958,948.64)	6,840,674.28
Employment (x 1,000) =v9	3,053,139.49	5,021,881.63	0.61	0.54	(6,852,002.22)	12,958,281.21	(6,852,002.22)	12,958,281.21
Unemployment (x 1,000) =v10	2,740,056.81	5,002,876.79	0.55	0.58	(7,127,599.81)	12,607,713.44	(7,127,599.81)	12,607,713.44
Unemployment rate (rate) =v11	1,407,358.96	3,233,595.74	0.44	0.66	(4,970,573.93)	7,785,291.85	(4,970,573.93)	7,785,291.85

	Heating Degree Days 10 =V1	*Cooling Degree Days=V2*	*Number of Days in Month=V3*	*Number of Peak Hours=V4*	*Blackout Flag=V5*	*Manufacturing GDP = V6*	*Trend variable "Dummy" = V7*	*Labour force (x 1,000) =v8*	*Employment (x 1,000) =v9*	*Unemployment (x 1,000) =v10*	*Unemployment rate (rate) =v11*
Heating Degree Days 10 =V1	100%										
Cooling Degree Days=V2	-54%	100%									
Number of Days in Month=V3	-19%	21%	100%								
Number of Peak Hours=V4	-14%	11%	35%	100%							
Blackout Flag=V5	-6%	14%	5%	-6%	100%						
Manufacturing GDP = V6	0%	3%	1%	7%	3%	100%					
Trend variable "Dummy" = V7	1%	-1%	1%	-4%	-4%	-47%	100%				
Labour force (x 1,000) =v8	-6%	7%	4%	-3%	-2%	-35%	97%	100%			
Employment (x 1,000) =v9	-4%	7%	5%	-3%	-2%	-24%	95%	99%	100%		
Unemployment (x 1,000) =v10	-14%	5%	-1%	-4%	-4%	-80%	66%	60%	48%	100%	
Unemployment rate (rate) =v11	-14%	2%	-4%	-4%	-3%	-81%	36%	28%	14%	93%	100%

Mean absolute error (MAPE)
2.03%

Predicted Purchases

Year	GWh
2015	1,837
2016	1,851

6. Inclusion of Labour Force Statistics and Exclusion of Manufacturing GDP

Guelph Hydro conducted a trial with the same Labour Force Statistics as the trial described above, but removed Manufacturing GDP from the analysis to avoid comparing national and local economic statistics in the same trial. The results of this trial were comparatively poor: The MAPE showed an average deviation of 2.15% from actual load, a lower Multiple R, R-square and Adjusted R-Square, all of which indicate a weaker relationship between load and the variables studied. Each of the labour statistics have a T-stat below 1.24 in absolute value, indicating statistical insignificance, and a P-value of greater than 0.22.

Load Forecast Trial Results 6: Labour Force Statistics, Excluding Manufacturing GDP

Regression Statistics	
Multiple R	0.9438
R Square	0.8907
Adjusted R Square	0.8851
Standard Error	3744230
Observations	204

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	10	2.20533E+16	2.20533E+15	157.3070614	4.20117E-87
Residual	193	2.70572E+15	1.40193E+13		
Total	203	2.4759E+16			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	34,682,056.55	26,126,576.51	1.33	0.19	(16,848,217.87)	86,212,330.97	(16,848,217.87)	86,212,330.97
Heating Degree Days 10 =V1	27,171.18	1,859.13	14.62	0.00	23,504.36	30,838.00	23,504.36	30,838.00
Cooling Degree Days=V2	80,394.57	6,633.43	12.12	0.00	67,311.23	93,477.90	67,311.23	93,477.90
Number of Days in Month=V3	1,924,474.37	351,210.61	5.48	0.00	1,231,770.56	2,617,178.18	1,231,770.56	2,617,178.18
Number of Peak Hours=V4	83,503.97	17,178.30	4.86	0.00	49,622.66	117,385.29	49,622.66	117,385.29
Blackout Flag=V5	(15,312,463.30)	3,816,814.03	(4.01)	0.00	(22,840,486.51)	(7,784,440.10)	(22,840,486.51)	(7,784,440.10)
Trend variable "Dummy" = V6	138,344.26	21,032.41	6.58	0.00	96,861.38	179,827.15	96,861.38	179,827.15
Labour force (x 1,000) KW,Barrie =v7	(2,833,895.02)	5,462,916.25	(0.52)	0.60	(13,608,577.79)	7,940,787.74	(13,608,577.79)	7,940,787.74
Employment (x 1,000) KW,Barrie =v8	2,841,613.18	5,465,875.47	0.52	0.60	(7,938,906.14)	13,622,132.51	(7,938,906.14)	13,622,132.51
Unemployment (x 1,000) KW,Barrie =v9	3,106,318.90	5,444,923.97	0.57	0.57	(7,632,877.12)	13,845,514.91	(7,632,877.12)	13,845,514.91
Unemployment rate (rate)KW,Barrie =v1	(4,191,953.55)	3,372,509.86	(1.24)	0.22	(10,843,661.57)	2,459,754.48	(10,843,661.57)	2,459,754.48

	Heating Degree Days 10 =V1	*Cooling Degree Days=V2*	*Number of Days in Month=V3*	*Number of Peak Hours=V4*	*Blackout Flag=V5*	*Trend variable "Dummy" = V6*	*Labour force (x 1,000) KW,Barrie =v7*	*Employment (x 1,000) KW,Barrie =v8*	*Unemployment (x 1,000) KW,Barrie =v9*	*Unemployment rate (rate)KW,Barrie =v10*
Heating Degree Days 10 =V1	100%									
Cooling Degree Days=V2	-54%	100%								
Number of Days in Month=V3	-19%	21%	100%							
Number of Peak Hours=V4	-14%	11%	35%	100%						
Blackout Flag=V5	-6%	14%	5%	-6%	100%					
Trend variable "Dummy" = V6	1%	-1%	1%	-4%	-4%	100%				
Labour force (x 1,000) KW,Barrie =v7	-6%	7%	4%	-3%	-2%	97%	100%			
Employment (x 1,000) KW,Barrie =v8	-4%	7%	5%	-3%	-2%	95%	99%	100%		
Unemployment (x 1,000) KW,Barrie =v9	-14%	5%	-1%	-4%	-4%	66%	60%	48%	100%	
Unemployment rate (rate)KW,Barrie =v1	-14%	2%	-4%	-4%	-3%	36%	28%	14%	93%	100%

Mean absolute error (MAPE)
2.15%

Predicted Purchases

Year	GWh
2015	1,758
2016	1,763

7. Employment and Unemployment Statistics from Statistics Canada

The Employment statistic shows a T-Stat of 0.37 and a P-value of (0.89), both indicative of a poor explanatory value for determining Guelph Hydro's load. Introducing these explanatory variables also resulted in an intercept term that was statistically insignificant. The T-stat shows that Employment is statistically insignificant as an explanatory variable in this equation, and that there is a low probability that it explains the variation in load. The correlation between Unemployment and Manufacturing GDP is evident in this trial (-80%), showing that including Manufacturing GDP statistics in the model captures 80% of the effects of including Unemployment in the model, and including both variables likely introduces multicollinearity into the model. There is no significant correlation between Manufacturing GDP and Employment, however. The resulting R-statistics are slight improvements over the Board-approved model, and the MAPE at 2.03% is also a slight improvement over the Board-approved model. This indicates that overall, there is a strong relationship amongst these variables and actual load. One further attempt to test the Employment variable was deemed necessary based on these results.

Load Forecast Trial Results 7: Employment and Unemployment

Regression Statistics	
Multiple R	0.9529
R Square	0.9080
Adjusted R Square	0.9037
Standard Error	3,426,898
Observations	204

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	9	2.24807E+16	2.49786E+15	212.6990659	1.87576E-95
Residual	194	2.27826E+15	1.17436E+13		
Total	203	2.4759E+16			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	(9,177,657.79)	14,006,195.91	(0.66)	0.51	(36,801,623.24)	18,446,307.65	(36,801,623.24)	18,446,307.65
Heating Degree Days 10 =V1	28,142.23	1,708.06	16.48	0.00	24,773.48	31,510.98	24,773.48	31,510.98
Cooling Degree Days=V2	84,366.66	6,053.77	13.94	0.00	72,427.00	96,306.31	72,427.00	96,306.31
Number of Days in Month=V3	2,136,960.96	321,533.79	6.65	0.00	1,502,810.31	2,771,111.62	1,502,810.31	2,771,111.62
Number of Peak Hours=V4	74,589.03	15,746.51	4.74	0.00	43,532.70	105,645.36	43,532.70	105,645.36
Blackout Flag=V5	(15,080,301.72)	3,489,722.32	(4.32)	0.00	(21,962,967.75)	(8,197,635.69)	(21,962,967.75)	(8,197,635.69)
Manufacturing GDP chained in Jan 20	424,532.66	68,250.14	6.22	0.00	289,925.13	559,140.20	289,925.13	559,140.20
Trend variable "Dummy" = V7	199,005.02	21,655.52	9.19	0.00	156,294.53	241,715.50	156,294.53	241,715.50
Employment (x 1,000) KW,Barrie =v1(	(17,908.59)	20,025.77	(0.89)	0.37	(57,404.77)	21,587.59	(57,404.77)	21,587.59
Unemployment (x 1,000) KW,Barrie =\	(129,472.81)	48,293.52	(2.68)	0.01	(224,720.55)	(34,225.06)	(224,720.55)	(34,225.06)

	Heating Degree Days 10 =V1	*Cooling Degree Days=V2*	*Number of Days in Month=V3*	*Number of Peak Hours=V4*	*Blackout Flag=V5*	*Manufacturing GDP chained in Jan 2007= V6*	*Trend variable "Dummy" = V7*	*Employment (x 1,000) KW,Barrie =v10*	*Unemployment (x 1,000) KW,Barrie =v11*
Heating Degree Days 10 =V1	100%								
Cooling Degree Days=V2	-54%	100%							
Number of Days in Month=V3	-19%	21%	100%						
Number of Peak Hours=V4	-14%	11%	35%	100%					
Blackout Flag=V5	-6%	14%	5%	-6%	100%				
Manufacturing GDP chained in Jan 20	0%	3%	1%	7%	3%	100%			
Trend variable "Dummy" = V7	1%	-1%	1%	-4%	-4%	-47%	100%		
Employment (x 1,000) KW,Barrie =v1(	-4%	7%	5%	-3%	-2%	-24%	95%	100%	
Unemployment (x 1,000) KW,Barrie =\	-14%	5%	-1%	-4%	-4%	-80%	66%	48%	100%

Mean absolute error (MAPE)
2.03%

Predicted Purchases

Year	GWh
2015	1,836
2016	1,850

8. Employment Statistics from Statistics Canada

The Employment (x1000 persons) variable from Statistics Canada's CANSIM table 282-0122 (Kitchener-Waterloo-Barrie area) was tested in the load forecast model independently of the four labour statistics noted in the aforementioned trials.

The result was a P-value of 0.65 and T-stat of (0.46) for the Employment variable, indicating there is no statistically significant relationship between Employment in the region and Guelph Hydro's load, and that including the employment variable in the regression model does not improve the explanatory power of the model on load. Additionally the Multiple-R, R-square, and Adjusted R-square statistics were all slightly lower than the Board-approved model. The MAPE is 2.06%, which is equivalent to the MAPE in the Board-approved model, however given the statistically weak overall results this explanatory variable was also excluded from the regression model.

Load Forecast Trial Results 8: Employment

Regression Statistics	
Multiple R	0.9511
R Square	0.9046
Adjusted R Square	0.9007
Standard Error	3,480,843
Observations	204

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	8	2.23963E+16	2.79954E+15	231.0563822	4.01664E-95
Residual	195	2.36267E+15	1.21163E+13		
Total	203	2.4759E+16			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	(29,799,380.22)	11,889,286.57	(2.51)	0.01	(53,247,479.36)	(6,351,281.08)	(53,247,479.36)	(6,351,281.08)
Heating Degree Days 10 =V1	29,331.83	1,675.38	17.51	0.00	26,027.63	32,636.03	26,027.63	32,636.03
Cooling Degree Days=V2	83,763.97	6,144.83	13.63	0.00	71,645.12	95,882.82	71,645.12	95,882.82
Number of Days in Month=V3	2,197,312.45	325,793.82	6.74	0.00	1,554,780.56	2,839,844.33	1,554,780.56	2,839,844.33
Number of Peak Hours=V4	74,601.81	15,994.38	4.66	0.00	43,057.62	106,146.00	43,057.62	106,146.00
Blackout Flag=V5	(14,877,781.90)	3,543,825.40	(4.20)	0.00	(21,866,928.72)	(7,888,635.08)	(21,866,928.72)	(7,888,635.08)
Manufacturing GDP chained in Jan 20	525,244.71	57,878.54	9.07	0.00	411,096.42	639,393.00	411,096.42	639,393.00
Trend variable "Dummy" = V7	181,858.43	21,015.22	8.65	0.00	140,412.14	223,304.73	140,412.14	223,304.73
Employment Kitchener-Waterloo-Barri	(9,158.87)	20,069.06	(0.46)	0.65	(48,739.15)	30,421.42	(48,739.15)	30,421.42

	Heating Degree Days 10 =V1	*Cooling Degree Days=V2*	*Number of Days in Month=V3*	*Number of Peak Hours=V4*	*Blackout Flag=V5*	*Manufacturing GDP chained in Jan 2007= V6*	*Trend variable "Dummy" = V7*	*Employment Kitchener-Waterloo-Barrie (000's) = v8*
Heating Degree Days 10 =V1	100%							
Cooling Degree Days=V2	-54%	100%						
Number of Days in Month=V3	-19%	21%	100%					
Number of Peak Hours=V4	-14%	11%	35%	100%				
Blackout Flag=V5	-6%	14%	5%	-6%	100%			
Manufacturing GDP chained in Jan 20	0%	3%	1%	7%	3%	100%		
Trend variable "Dummy" = V7	1%	-1%	1%	-4%	-4%	-47%	100%	
Employment Kitchener-Waterloo-Barri	-4%	7%	5%	-3%	-2%	-24%	95%	100%

Mean absolute error (MAPE)
2.06%

Predicted Purchases

Year	GWh
2015	1,882
2016	1,894

9. Inclusion of Employment Statistics and Exclusion of Manufacturing GDP

As Employment and Manufacturing GDP are both economic variables and show significant collinearity in the trial documented above, a trial was conducted which includes Employment and excludes Manufacturing GDP.

Comparatively, the Multiple-R, R-square and Adjusted R-square statistics are considerably lower in the model that excludes Manufacturing GDP, indicating a weaker relationship amongst variables. The MAPE indicates a much greater average deviation at 2.31%. Furthermore, the loads predicted for 2015 and 2016, at 1,621 and 1,611 megawatt-hours, respectively, are too low to be considered reasonable based on actual results in recent years. The results indicate that Manufacturing GDP is a stronger variable than Employment. The trial also proves that Employment is a stronger variable when used in conjunction with Manufacturing GDP. However, since the trial above (Trial 8, including Employment and Manufacturing GDP) was still weaker statistically than the proposed load forecast (which includes Manufacturing GDP, but not Employment), we can conclude that Employment as an explanatory variable can be excluded from the regression model.

Load Forecast Trial Results 9: Employment, Excluding Manufacturing GDP

Regression Statistics	
Multiple R	0.9297
R Square	0.8643
Adjusted R Square	0.8594
Standard Error	4140703
Observations	204

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	7	2.13985E+16	3.05693E+15	178.294086	2.09321E-81
Residual	196	3.3605E+15	1.71454E+13		
Total	203	2.4759E+16			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	(46,144,224.65)	13,979,902.64	(3.30)	0.00	(73,714,566.93)	(18,573,882.37)	(73,714,566.93)	(18,573,882.37)
Heating Degree Days 10 =V1	30,066.80	1,990.65	15.10	0.00	26,140.95	33,992.66	26,140.95	33,992.66
Cooling Degree Days=V2	75,035.13	7,219.59	10.39	0.00	60,797.08	89,273.18	60,797.08	89,273.18
Number of Days in Month=V3	2,023,773.88	386,886.11	5.23	0.00	1,260,779.84	2,786,767.93	1,260,779.84	2,786,767.93
Number of Peak Hours=V4	88,302.89	18,941.47	4.66	0.00	50,947.62	125,658.15	50,947.62	125,658.15
Blackout Flag=V5	(15,067,835.40)	4,215,551.94	(3.57)	0.00	(23,381,499.16)	(6,754,171.65)	(23,381,499.16)	(6,754,171.65)
Trend variable "Dummy" = V6	32,707.38	15,579.02	2.10	0.04	1,983.35	63,431.42	1,983.35	63,431.42
Employment (x 1,000) KW,Barrie =v7	123,605.72	16,342.47	7.56	0.00	91,376.07	155,835.37	91,376.07	155,835.37

	Heating Degree Days 10 =V1	*Cooling Degree Days=V2*	*Number of Days in Month=V3*	*Number of Peak Hours=V4*	*Blackout Flag=V5*	*Trend variable "Dummy" = V6*	*Employment (x 1,000) KW,Barrie =v7*
Heating Degree Days 10 =V1	100%						
Cooling Degree Days=V2	-54%	100%					
Number of Days in Month=V3	-19%	21%	100%				
Number of Peak Hours=V4	-14%	11%	35%	100%			
Blackout Flag=V5	-6%	14%	5%	-6%	100%		
Trend variable "Dummy" = V6	1%	-1%	1%	-4%	-4%	100%	
Employment (x 1,000) KW,Barrie =v7	-4%	7%	5%	-3%	-2%	95%	100%

Mean absolute error (MAPE)
2.31%

Predicted Purchases

Year	GWh
2015	1,621
2016	1,611

10. Consumer Price Index

When the Consumer Price Index[12](CPI) (Canada, All Items) from Statistics Canada (CANSIM table 326-0020) is added to the load forecast as an independent variable, the resulting T-stat is (1.66) and P-value is 0.10 , indicating a weak relationship with Guelph Hydro's load. The T-stat for the intercept term was statistically insignificant. The T-stat for CPI as an explanatory variable indicates that CPI is a marginally statistically significant variable, and the P-value results show that there is minimal probability that CPI is a relevant variable when predicting consumption. The Multiple-R, R-Square, and Adjusted R-square statistics are equivalent to the Board-approved model. The coefficient on CPI is negative which is unintuitive. The MAPE is a slight improvement at 2.02%, however, Guelph Hydro determined that CPI as an explanatory variable should be excluded from the model due to the P-value and T-stat results.

[12] Source: Statistics Canada - Table 326-0020 Consumer Price Index, Monthly, Canada, All Items. http://www5.statcan.gc.ca/cansim/a26?lang=eng&id=3260020

Load Forecast Trial Results 10: Consumer Price Index

Regression Statistics	
Multiple R	0.9517
R Square	0.9058
Adjusted R Square	0.9019
Standard Error	3,458,312
Observations	204

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	8	2.24268E+16	2.80335E+15	234.3954039	1.13679E-95
Residual	195	2.33219E+15	1.19599E+13		
Total	203	2.4759E+16			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	16,891,847.74	31,450,262.71	0.54	0.59	(45,134,487.78)	78,918,183.26	(45,134,487.78)	78,918,183.26
Heating Degree Days 10 =V1	28,538.94	1,735.35	16.45	0.00	25,116.47	31,961.41	25,116.47	31,961.41
Cooling Degree Days=V2	83,406.71	5,922.87	14.08	0.00	71,725.60	95,087.82	71,725.60	95,087.82
Number of Days in Month=V3	2,158,075.45	323,111.60	6.68	0.00	1,520,833.45	2,795,317.46	1,520,833.45	2,795,317.46
Number of Peak Hours=V4	74,437.48	15,847.47	4.70	0.00	43,183.05	105,691.92	43,183.05	105,691.92
Blackout Flag=V5	(14,851,569.85)	3,520,380.89	(4.22)	0.00	(21,794,479.31)	(7,908,660.40)	(21,794,479.31)	(7,908,660.40)
Manufacturing GDP chained in Jan 20	533,162.07	42,626.58	12.51	0.00	449,093.75	617,230.39	449,093.75	617,230.39
Trend variable "Dummy" = V7	274,659.02	61,662.47	4.45	0.00	153,048.05	396,269.98	153,048.05	396,269.98
CPI=v8	(564,173.37)	339,589.31	(1.66)	0.10	(1,233,912.78)	105,566.05	(1,233,912.78)	105,566.05

	Heating Degree Days 10 =V1	*Cooling Degree Days=V2*	*Number of Days in Month=V3*	*Number of Peak Hours=V4*	*Blackout Flag=V5*	*Manufacturing GDP chained in Jan 2007= V6*	*Trend variable "Dummy" = V7*	*CPI=v8*
Heating Degree Days 10 =V1	100%							
Cooling Degree Days=V2	-54%	100%						
Number of Days in Month=V3	-19%	21%	100%					
Number of Peak Hours=V4	-14%	11%	35%	100%				
Blackout Flag=V5	-6%	14%	5%	-6%	100%			
Manufacturing GDP chained in Jan 20	0%	3%	1%	7%	3%	100%		
Trend variable "Dummy" = V7	1%	-1%	1%	-4%	-4%	-47%	100%	
CPI=v8	-2%	1%	2%	-4%	-4%	-44%	100%	100%

Mean absolute error (MAPE)
2.02%

Predicted Purchases

Year	GWh
2015	1,804
2016	1,815

11. Including Consumer Price Index excluding Manufacturing GDP

Guelph Hydro conducted another trial including Consumer Price Index and excluding Manufacturing GDP, to determine whether the CPI is more closely aligned with load with regard to economic trends.

The results of this trial are poor; a MAPE of 2.63% indicates a relatively high deviation between actual and predicted load, and low Multiple R, R-square and Adjusted R-square indicate weak relationships between the variables and load. The Trend Dummy variable and CPI show strong multicollinearity. Though the coefficient on the CPI variable is now positive, which is intuitive and is an improvement over the previous trial which included both CPI and Manufacturing GDP, the CPI variable should be excluded based on the overall regression statistics.

Load Forecast Trial Results 11: CPI, excluding Manufacturing GDP

Regression Statistics	
Multiple R	0.9112
R Square	0.8302
Adjusted R Square	0.8242
Standard Error	4,630,884
Observations	204

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	7	2.05558E+16	2.93654E+15	136.9328432	6.32869E-72
Residual	196	4.20324E+15	2.14451E+13		
Total	203	2.4759E+16			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	(83,015,029.92)	40,732,870.06	(2.04)	0.04	(163,346,002.05)	(2,684,057.80)	(163,346,002.05)	(2,684,057.80)
Heating Degree Days 10 =V1	31,494.55	2,302.09	13.68	0.00	26,954.50	36,034.61	26,954.50	36,034.61
Cooling Degree Days=V2	84,702.08	7,929.86	10.68	0.00	69,063.27	100,340.89	69,063.27	100,340.89
Number of Days in Month=V3	2,229,775.00	432,597.39	5.15	0.00	1,376,631.86	3,082,918.14	1,376,631.86	3,082,918.14
Number of Peak Hours=V4	86,445.65	21,181.71	4.08	0.00	44,672.32	128,218.99	44,672.32	128,218.99
Blackout Flag=V5	(14,519,314.94)	4,713,863.40	(3.08)	0.00	(23,815,719.25)	(5,222,910.62)	(23,815,719.25)	(5,222,910.62)
Trend variable "Dummy" = V6	(45,616.81)	75,113.71	(0.61)	0.54	(193,751.65)	102,518.03	(193,751.65)	102,518.03
Consumer Price Index - Canada - All I	1,065,575.93	419,924.69	2.54	0.01	237,425.14	1,893,726.72	237,425.14	1,893,726.72

	Heating Degree Days 10 =V1	*Cooling Degree Days=V2*	*Number of Days in Month=V3*	*Number of Peak Hours=V4*	*Blackout Flag=V5*	*Trend variable "Dummy" = V6*	*Consumer Price Index - Canada - All Items = v7*
Heating Degree Days 10 =V1	100%						
Cooling Degree Days=V2	-54%	100%					
Number of Days in Month=V3	-19%	21%	100%				
Number of Peak Hours=V4	-14%	11%	35%	100%			
Blackout Flag=V5	-6%	14%	5%	-6%	100%		
Trend variable "Dummy" = V6	1%	-1%	1%	-4%	-4%	100%	
Consumer Price Index - Canada - All I	-2%	1%	2%	-4%	-4%	100%	100%

Mean absolute error (MAPE)
2.63%

Predicted

Year	GWh
2015	1,766
2016	1,771

12. Housing Starts

The quantity of Housing Starts is generally a good economic indicator of future load. Guelph Hydro obtained the Ontario-wide statistics (Residential and Non-Residential, Units x1000) from Statistics Canada[13] (CANSIM table 0027-0054). The resultant Multiple-R, R-square and Adjusted R-square values were slightly lower than the 2012 Board-approved model, indicating a weak relationship between Housing Starts and actual load. The T-stat was 1.32 and P-value was 0.19, which indicates that Housing Starts is a statistically insignificant variable and that there is low probability that it explains the variation in load. The resulting MAPE of 2.06% is equivalent to the MAPE that obtained from the 2012 Board-approved model. However, based on the R-statistics, T-stat and P-value, Guelph Hydro determined that including Housing Starts as an explanatory variable did not improve the proposed model.

[13] Source: Statistics Canada – Table 027-0054 Canada Mortgage and Housing Corporation, housing starts, all areas, Canada and Provinces, seasonally adjusted at annual rates, monthly (units x1000). http://www5.statcan.gc.ca/cansim/a26?lang=eng&id=270054

Load Forecast Trial Results 12: Housing Starts

Regression Statistics	
Multiple R	0.9515
R Square	0.9053
Adjusted R Square	0.9014
Standard Error	3,467,201
Observations	204

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	8	2.24148E+16	2.80185E+15	233.070366	1.87228E-95
Residual	195	2.34419E+15	1.20215E+13		
Total	203	2.4759E+16			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	(29,753,439.80)	10,450,051.65	(2.85)	0.00	(50,363,073.99)	(9,143,805.60)	(50,363,073.99)	(9,143,805.60)
Heating Degree Days 10 =V1	29,471.93	1,669.73	17.65	0.00	26,178.87	32,764.99	26,178.87	32,764.99
Cooling Degree Days=V2	82,730.33	5,940.60	13.93	0.00	71,014.25	94,446.41	71,014.25	94,446.41
Number of Days in Month=V3	2,158,377.13	324,171.33	6.66	0.00	1,519,045.12	2,797,709.14	1,519,045.12	2,797,709.14
Number of Peak Hours=V4	71,117.68	16,176.27	4.40	0.00	39,214.78	103,020.58	39,214.78	103,020.58
Blackout Flag=V5	(14,936,237.48)	3,529,312.97	(4.23)	0.00	(21,896,762.82)	(7,975,712.13)	(21,896,762.82)	(7,975,712.13)
Manufacturing GDP chained in Jan 20	482,820.91	43,182.00	11.18	0.00	397,657.19	567,984.62	397,657.19	567,984.62
Trend variable "Dummy" = V7	163,037.01	8,556.19	19.05	0.00	146,162.45	179,911.57	146,162.45	179,911.57
Housing Starts (Ontario, Res. & NonR	1.31	0.99	1.32	0.19	(0.65)	3.27	(0.65)	3.27

	Heating Degree Days 10 =V1	*Cooling Degree Days=V2*	*Number of Days in Month=V3*	*Number of Peak Hours=V4*	*Blackout Flag=V5*	*Manufacturing GDP chained in Jan 2007= V6*	*Trend variable "Dummy" = V7*	*Housing Starts (Ontario, Res. & NonRes. Units x1000) =v8*
Heating Degree Days 10 =V1	100%							
Cooling Degree Days=V2	-54%	100%						
Number of Days in Month=V3	-19%	21%	100%					
Number of Peak Hours=V4	-14%	11%	35%	100%				
Blackout Flag=V5	-6%	14%	5%	-6%	100%			
Manufacturing GDP chained in Jan 20	0%	3%	1%	7%	3%	100%		
Trend variable "Dummy" = V7	1%	-1%	1%	-4%	-4%	-47%	100%	
Housing Starts (Ontario, Res. & NonR	-6%	6%	10%	11%	-3%	-16%	80%	100%

Mean absolute error (MAPE)
2.06%

Predicted Purchases

Year	GWh
2015	1,790
2016	1,798

13. Housing Starts excluding Manufacturing GDP

Because Housing Starts is a local variable and Manufacturing GDP is national variable, Housing Starts was tested separately. The resulting forecast yielded comparatively low Multiple R, R-Square and Adjusted R-square values, indicating a weak relationship between the variables and load, and a high average deviation between predicted and actual load as demonstrated by a high MAPE of 2.52%. Although the T-stat and P-values reflect that the variables have some significance and relationship with load, it is evident that other trials listed here, and particularly the proposed Load Forecast model, all have better statistical results than this trial.

Load Forecast Trial Results 13: Housing Starts, excluding Manufacturing GDP

Regression Statistics	
Multiple R	0.9190
R Square	0.8446
Adjusted R Square	0.8391
Standard Error	4430340
Observations	204

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	7	2.09119E+16	2.98742E+15	152.202577	1.12528E-75
Residual	196	3.84707E+15	1.96279E+13		
Total	203	2.4759E+16			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	17,777,913.39	12,198,142.50	1.46	0.15	(6,278,546.27)	41,834,373.05	(6,278,546.27)	41,834,373.05
Heating Degree Days 10 =V1	30,369.08	2,131.10	14.25	0.00	26,166.25	34,571.90	26,166.25	34,571.90
Cooling Degree Days=V2	83,528.16	7,590.27	11.00	0.00	68,559.08	98,497.25	68,559.08	98,497.25
Number of Days in Month=V3	2,057,771.03	414,061.89	4.97	0.00	1,241,182.52	2,874,359.55	1,241,182.52	2,874,359.55
Number of Peak Hours=V4	65,928.84	20,661.30	3.19	0.00	25,181.84	106,675.83	25,181.84	106,675.83
Blackout Flag=V5	(14,584,559.09)	4,509,526.46	(3.23)	0.00	(23,477,982.12)	(5,691,136.06)	(23,477,982.12)	(5,691,136.06)
Trend variable "Dummy" = V6	108,168.75	8,956.12	12.08	0.00	90,506.02	125,831.47	90,506.02	125,831.47
Housing Starts (Ontario, Res. & NonR	5.82	1.16	5.02	0.00	3.54	8.11	3.54	8.11

	Heating Degree Days 10 =V1	*Cooling Degree Days=V2*	*Number of Days in Month=V3*	*Number of Peak Hours=V4*	*Blackout Flag=V5*	*Trend variable "Dummy" = V6*	*Housing Starts (Ontario, Res. & NonRes. Units x1000) =v7*
Heating Degree Days 10 =V1	100%						
Cooling Degree Days=V2	-54%	100%					
Number of Days in Month=V3	-19%	21%	100%				
Number of Peak Hours=V4	-14%	11%	35%	100%			
Blackout Flag=V5	-6%	14%	5%	-6%	100%		
Trend variable "Dummy" = V6	1%	-1%	1%	-4%	-4%	100%	
Housing Starts (Ontario, Res. & NonR	-6%	6%	10%	11%	-3%	80%	100%

Mean absolute error (MAPE)
2.52%

Predicted Purchases

Year	GWh
2015	1,721
2016	1,719

2.6.1.2 NORMALIZED AVERAGE USE PER CUSTOMER ("NAC") MODEL

Guelph Hydro does not use an NAC model to predict future purchases. Guelph Hydro uses a regression model to predict future purchases.

2.6.1.3 CDM ADJUSTMENT FOR THE LOAD FORECAST FOR DISTRIBUTORS

On November 12, 2010, the OEB issued its Decision and Order on CDM targets, and stated that each licensed electricity distributor must, as a condition of its licence, meet its respective CDM Targets.

On the same date, the Board amended Guelph Hydro's Electricity Distribution Licence ED-2002-0565 by requiring Guelph Hydro to achieve reductions in electricity consumption and reductions in peak provincial electricity demand through the delivery of CDM programs and meet its 2014 Net Annual Peak Demand Savings Target of 16.710 MW, and its 2011-2014 Net Cumulative Energy Savings Target of 79.530 GWh (collectively the "CDM Targets"), over a four-year period beginning January 1, 2011.

On March 31, 2014, the Minister of Energy issued a directive to the Board and a letter of direction to the OPA regarding new CDM targets for the period January 1, 2015 to December 31, 2020. These targets are structured to achieve 7 TWh of energy reductions province-wide over this six-year period, consistent with the 2013 Long-term Energy Plan. The OPA has allocated the 7 TWh reductions to all Ontario distributors.

Guelph Hydro's energy only and non-cumulative targets were established at:

99.04 GWh (2015-2020 total)

16.51 GWh (2015-2020 incremental annual);

Guelph Hydro has modified Appendix 2-I to take into account projected savings in 2016 for 2016 CDM programs that Guelph Hydro will undertake as part of the new 2015-2020 CDM plan.

Appendix 2-I
Load Forecast CDM Adjustment Work Form (2016)

The 2014 bridge year is the last year of the current four year (2011-2014) CDM program, and 2015 is the first year of a new six year (2015-2020) CDM program, per the Ministirial directives of March 31, 2014. Thus, with 2015, there is a need to recognize the final year of the current 2011-2014 CDM program, as well as to estimate reasonable impacts each year for the new 2015-2020 CDM program. These are combined to estimate the adjustment for CDM program impacts on the 2015 load forecast.

Appendix 2-I was developed to help determine what would be the amount of CDM savings needed in each year to cumulatively achieve the four year 2011-2014 CDM target. This then determined the amount of kWh (and with translation, kW of demand) savings that were converted in dollars balances for the LRAMVA, and also to determine the related adjustment to the load forecast to account for OPA-reported savings. Beginning for the 2015 year, it has been adjusted because of the persistence of 2011-2014 CDM programs will be an adjustment to the load forecast in addition to the estimated savings for the first year (2015) for the new 2015-2020 CDM plan.

It is assumed that the new six year (2015-2020) CDM program will work similar to the existing 2011-2014 CDM program, meaning that distributors will offer programs each year that, cumulatively over the six years (from January 1, 2015 to December 31, 2020) will cumulatively achieve the new six year CDM target. This is the approach contemplated in the Ministerial directive letters of March 31, 2014 to the Board and to the OPA. Thus, distributors will be able to offer programs on a basis so that cumulatively over the period, the impacts, including persistence, of the CDM programs will accumulate towards achieving each distributor's 2015-2020 CDM target.

With this approach, it is necessary to account for estimated savings for the last year of the current program, particularly the estimated savings for new CDM programs offered in 2014, as well as the estimated savings for new CDM programs that the distributor will offer in 2015 towards achievement of the new six year (2015-2020) CDM program. This necessitates expansion of this Appendix 2-I to deal with both the 2011-2014 and 2015-2020 CDM plans. It is expected that this approach will be updated each year.

2011-2014 CDM Program - 2014, last year of the current CDM plan

Input the 2011-2014 CDM target in Cell B21.

Input the measured results for 2011 CDM programs for each of the years 2011 and persistence into 2012, 2013 and 2014 into cells B31 to E31. These results are taken from the final 2011 CDM Report issued by the OPA for that distributor in the fall of 2012.

Measured results for 2012 CDM programs for each of the years 2012 and persistence into 2013 and 2014 are input into cells C32 to E32. These results are taken from the final 2012 CDM Report issued by the OPA for that distributor in the fall of 2013.

Measured results for 2013 CDM programs for each of the years 2013 and persistence into 2014 are input into cells C33 to E33. These results are taken from the final 2013 CDM Report issued by the OPA for that distributor in the fall of 2014. Until that report is issued, the distributor should use the results from the preliminary 2013 CDM Report issued in the spring of 2014.

Based on these inputs, the residual kWh to achieve the 4 year CDM target icalculated for 2014 CDM under the assumption that the distributor will at least achieve the 2011-2014 CDM target that is currently a condition of the utility's Distribution Licence. If the distributor has met its cumulative kWh savings target by the end of 2013, the incremental savings for 2014 are assumed to be zero. Any further savings for 2014 CDM savings and any further compensation for meeting or exceeding the four-year (2011-2014) targets will be dealt with through the disposition of the 2011-2014 LRAMVA balance, which will occur in the next cost of service application filed after the final 2014 CDM Reports issued by the OPA in the fall of 2015.

4 Year (2011-2014) kWh Target:					
		79,530,000			
	2011	**2012**	**2013**	**2014**	**Total**
2011 CDM Programs	18.11%	18.10%	18.08%	17.89%	72.19%
2012 CDM Programs		11.25%	11.21%	11.06%	33.52%
2013 CDM Programs			10.19%	10.06%	20.25%
2014 CDM Programs				6.39%	6.39%
Total in Year	**18.11%**	**29.35%**	**39.48%**	**45.40%**	**132.34%**
		kWh			
2011 CDM Programs	14,406,163.00	14,394,162.86	14,382,162.73	14,229,161.00	57,411,649.59
2012 CDM Programs		8,948,635.14	8,911,636.64	8,798,641.25	26,658,913.03
2013 CDM Programs			8,101,822.80	8,000,825.01	16,102,647.81
2014 CDM Programs				5,078,231.00	5,078,231.00
Total in Year	**14,406,163.00**	**23,342,798.00**	**31,395,622.17**	**36,106,858.26**	**105,251,441.43**

2015-2020 CDM Program - 2015, first year of the current CDM plan

For the first year of the new 2015-2020 CDM plan, it is assumed that each year's program will achieve an equal amount of new CDM savings. The new targets for 2015-2020 do not take into account persistence beyond the first year, but the OPA will encourage distributors to promote and implement CDM plans that will have longer term persistence of savings. This results in each year's program being about 1/6 (18.67%) of the cumulative 2015-2020 CDM target for kWh savings. A distributor may propose an alternative approach but would be expected to document in its application why it believes that its proposal is more reasonable. In its proposal, the distributor should ensure that the sum of the results for each year's CDM program from 2015 to 2020 add up to its 2015-2020 CDM target as established by the OPA.

6 Year (2015-2020) kWh Target:							
			99,040,000				
	2015	**2016**	**2017**	**2018**	**2019**	**2020**	**Total**
			%				
2015 CDM Programs	16.67%						16.67%
2016 CDM Programs		16.67%					16.67%
2017 CDM Programs			16.67%				16.67%
2018 CDM Programs				16.67%			16.67%
2019 CDM Programs					16.67%		16.67%
2020 CDM Programs						16.67%	16.67%
Total in Year	**16.67%**	**16.67%**	**16.67%**	**16.67%**	**16.67%**	**16.67%**	**100.00%**
			kWh				
2015 CDM Programs	16,506,666.67						16,506,666.67
2016 CDM Programs		16,506,666.67					16,506,666.67
2017 CDM Programs			16,506,666.67				16,506,666.67
2018 CDM Programs				16,506,666.67			16,506,666.67
2019 CDM Programs					16,506,666.67		16,506,666.67
2020 CDM Programs						16,506,666.67	16,506,666.67
Total in Year	**16,506,666.67**	**16,506,666.67**	**16,506,666.67**	**16,506,666.67**	**16,506,666.67**	**16,506,666.67**	**99,040,000.00**

Determination of 2015 Load Forecast Adjustment

The Board has determined that the "net" number should be used in its Decision and Order with respect to Centre Wellington Hydro Ltd.'s 2013 Cost of Service rates (EB-2012-0113). This approach has also been used in Settlement Agreements accepted by the Board in other 2013 and 2-14 applications. The distributor should select whether the adjustment is done on a "net" or "gross" basis, but must support a proposal for the adjustment being done on a "gross" basis. Sheet 2-I defaults to the adjustment being done on a "net" basis consistent with Board policy and practice.

From each of the 2006-2010 CDM Final Report, and the 2011, 2012 and 2013 CDM Final Reports, issued by the OPA for the distributor, the distributor should input the "gross" and "net" results of the cumulative CDM savings for 2014 into cells D31 to E33. The model will calculate the cumulative savings for all programs from 2006 to 2012 and determine the "net" to "gross" factor "g".

Net-to-Gross Conversion

Is CDM adjustment being done on a "net" or "gross" basis?				**net**
Persistence of Historical CDM programs to 2014	**"Gross" kWh**	**"Net" kWh**	**Difference kWh**	**Conversion Factor ('g')**
2006-2010 CDM programs		**45,650,466.95**		
2011 CDM program		**14,406,163.00**		
2012 CDM program		**8,948,635.14**		
2013 CDM program		**8,101,822.80**		
2014 CDM program		**5,078,231.00**		
2006 to 2014 OPA CDM programs: Persistence to 2016	0	82,185,319	-82,185,319	0.00%

The default values represent the factor that each year's CDM program is factored into the manual CDM adjustment. Distributors can choose alternative weights of "0", "0.5" or "1" from the drop-down menu for each cell, but must support its alternatives.

These factors do not mean that CDM programs are excluded, but also reflect the assumption that impacts of 2011 and 2012 programs are already implicitly reflected in the actual data for those years that are the basis for the load forecast prior to any manual CDM adjustment.

Weight Factor for Inclusion in CDM Adjustment to 2014 Load Forecast

	2012	**2013**	**2014**	**2015**	**2016**	
Weight Factor for each year's CDM program impact on 2014 load forecast	**0**	**0**	**0.5**	**1**	**0.5**	Distributor can select "0", "0.5", or "1" from drop-down list
Default Value selection rationale.	*Full year persistence of 2011 CDM programs on 2015 load forecast. Full impact assumed because of 50% impact in 2011 (first year) but full year persistence impact on 2012 and 2013, and thus reflected in base forecast before the CDM adjustment.*	*Full year persistence of 2012 CDM programs on 2015 load forecast. Full impact assumed because of 50% impact in 2012 (first year) but full year persistence impact on 2013, and thus reflected in base forecast before the CDM adjustment.*	*Full year impact of persistence of 2013 CDM programs on 2015 load forecast, but 50% impact in base forecast (first year impact of 2013 CDM programs on 2013 load forecast, which is part of the data for the load forecast.*	*Full year impact of persistence of 2014 programs on 2015 load forecast. 2014 CDM programs not in base forecast.*	*Only 50% of 2015 CDM programs are assumed to impact the 2015 load forecast based on the "half-year" rule.*	

2011-2014 and 2015-2020 LRAMVA and 2015 CDM adjustment to Load Forecast

One manual adjustment for CDM impacts to the 2015 load forecast is made. However, the distributor will have two associated annualized CDM impacts, one for the 2011-2014 CDM program and the second for the 2015-2020 CDM plan. In addition, the distributor needs to reflect the CDM adjustment that was explicitly factored into its 2011 load forecast in its 2011 cost of service application (assuming that it rebased in that year). this amount, and equal persistence for 2012, 2013 and 2014 is used as an offset to determine what the net balance of the 2011-2014 LRAMVA balance should be for disposition.

The Amount used for the CDM threshold of the LRAMVA is the kWh that will be used to determine the base amount for the LRAMVA balance for 2014, for assessing performance against the four-year target. The base amount for 2011-2013 is 0 (zero) for 2014 Cost of Service applications, as the utility rebased prior to the 2011-2014 CDM programs, and there was no adjustment to reflect the impacts of the 2011-2014 programs on the load forecast used to determine their last cost of service-based rates.

The proposed loss factor should correspond with the loss factor calculated in Appendix 2-R

The Manual Adjustment for the 2015 Load Forecast is the amount manually subtracted from the load forecast derived from the base forecast from historical data, and is intended to reflect the further CDM savings that the distributor needs to achieve assuming that they meet 100% of the 2011-2014 CDM target that is a condition of their target.

If the distributor has developed their load forecast on a system purchased basis, then the manual adjustment should be on system purchased basis, including the adjustment for losses. If the load forecast has been developed on a billed basis, either on a system basis or on a class-specific basis, the manual adjustment should be on a billed basis, excluding losses.

The distributor should determine the allocation of the savings to all customer classes in a reasonable manner (e.g. taking into account what programs and what OPA-measured impacts were directed at specific customer classes), for both the LRAMVA and for the load forecast adjustment.

	2011	2012	2013	2014	2015	2016	Total for 2014	Total for 2016
	kWh							
Amount used for CDM threshold for LRAMVA (2015) - cost	14,229,161	8,798,641	8,000,825	5,078,231			36,106,858	
2012 CDM adjustment (per Board Decision in 2012 Cost of Service Application) - revenue		15,906,000	15,906,000	15,906,000			47,718,000	
Amount used for CDM threshold for LRAMVA (2016)					16,506,667	16,506,667		33,013,333
Manual Adjustment for 2016 Load Forecast (billed basis)	-	-	-	2,539,116	16,506,667	8,253,333		27,299,116
Proposed Loss Factor (TLF)	2.60%	Format: X.XX%						
Manual Adjustment for 2016 Load Forecast (system purchased basis)	-	-	-	2,605,121	16,935,767	8,467,883		28,008,771

Manual adjustment uses "gross" versus "net" (i.e. numbers multiplied by (1 + g). The Weight factor is also used calculate the impact of each year's program on the CDM adjustment to the 2015 load forecast.

2015 CDM Load Forecast

A manual adjustment has been made to reflect the impact of 2015 and 2016 CDM programs on the load forecast. Guelph Hydro has made these adjustments to reflect the "net" impact of the CDM programs on the load forecast.

The following Tables 3-9 and 3-10, which are consistent with part of Appendix 2-I Load Forecast CDM Work Form, outline the expected savings from 2015 and 2016 CDM programs in order to achieve the licenced 6 year CDM target assigned to Guelph Hydro.

In accordance with the Chapter 2 Filing Requirements updated on July 18, 2014, Guelph Hydro has identified its 2015 and 2016 CDM adjustment of the forecast by customer class as following:

Table 3-9 Total for 2015 Load Forecast Adjustment according Appendix 2-I

10,792,449 = 0.5 x 2014 CDM Savings + 0.5 x 2015 CDM Savings

CDM Savings Forecast by Class			2015 Load Forecast Results		
Class	Percentage of CDM programs Participation	CDM Adjustments	Class	2016 Forecast kWh	2015 Forecast CDM Adjusted kWh
Residential	13.22%	1,427,220	Residential	381,184,211	379,756,990
GS< 50 kW	3.43%	370,617	GS< 50 kW	150,181,687	149,811,070
GS 50 to 999 kW	10.30%	1,111,851	GS 50 to 999 kW	402,528,571	401,416,721
GS 1000 to 4999 kW	2.21%	238,254	GS 1000 to 4999 kW	546,062,946	545,824,692
Large Use	68.27%	7,368,137	Large Use	289,484,146	282,116,008
Unmetered Scattered Load	0.00%	0	Unmetered Scattered Load	1,788,381	1,788,381
Sentinel Lighting	0.00%	0	Sentinel Lighting	21,782	21,782
Street Ligting	2.56%	276,370	Street Ligting	10,139,882	9,863,513
Total	100.00%	10,792,449	Total	1,781,391,607	1,770,599,158

Table 3-10 Total for 2016 Load Forecast Adjustment according Appendix 2-I

27,299,116

CDM Savings Forecast by Class			2016 Load Forecast Results		
Class	Percentage of CDM programs Participation	CDM Adjustments	Class	2016 Forecast kWh	2016 Forecast CDM Adjusted kWh
Residential	13.22%	3,610,103	Residential	385,196,878	381,586,775
GS< 50 kW	3.43%	937,462	GS< 50 kW	151,111,478	150,174,015
GS 50 to 999 kW	10.30%	2,812,387	GS 50 to 999 kW	400,491,137	397,678,750
GS 1000 to 4999 kW	2.21%	602,654	GS 1000 to 4999 kW	563,703,008	563,100,354
Large Use	68.27%	18,637,441	Large Use	295,270,550	276,633,108
Unmetered Scattered Load	0.00%	0	Unmetered Scattered Load	1,700,939	1,700,939
Sentinel Lighting	0.00%	0	Sentinel Lighting	21,457	21,457
Street Ligting	2.56%	699,067	Street Ligting	10,327,137	9,628,070
Total	100.00%	27,299,116	Total	1,807,822,584	1,780,523,469

For 2015, it is assumed the savings achieved in 2014 from 2014 CDM programs will persist into 2015 (half year rule). Therefore, the 2015 CDM adjustment was calculated as half of 2014 CDM savings plus half of 2015 CDM savings (Table 3-9 above). Since the regression analysis is based on actual power purchased data up to and including 2014 actual data, it is assumed that any savings from programs initiated up to and including 2014 are reflected in the prediction equation resulting from the regression

analysis. However, for 2014 it is assumed that for those programs that were initiated in 2014 only one half of the full year results provided by the OPA actually occurred since they were initiated throughout the year.

In accordance with the Guidelines for Electricity Distributor Conservation and Demand Management (EB-2012-0003), issued April 26, 2012 ("CDM Guidelines"), it is Guelph Hydro's understanding that as part of this application expected CDM savings in 2016 from 2015 and 2016 CDM programs will need to be established for lost revenue adjustment mechanism ("LRAM") variance accounts purposes. Guelph Hydro also understands that the OPA will measure CDM results on a full year net basis. As a result, it is Guelph Hydro's view that the units used for 2016 LRAM variance account should also be on a full year net basis. Based on the information provided in Appendix 2-I, the amount used for CDM threshold for LRAMVA is 33,013,333 net kWh savings in 2016 from 2015 and 2016 CDM programs.

For LRAM variance account purposes, the following Table 3-11 outlines how this expected savings has been allocated to rate classes. The expected kWh savings are calculated based on the percentage of CDM program participation from Table 3-10.

The expected kW savings has also been provided for those classes billed distribution charges on a kW basis using the average kW/kWh ratio from Table 3-34.

Table 3-11 expected CDM Savings by Rate Class for LRAM Variance Account

33,013,333 net kWh savings

Year	Residential	General Service < 50 kW	General Service > 50 to 999 kW	General Service 1000 to 4999 kW	Large Use	Street Lighting	Sentinel Lighting	Unmetered Loads	Total
2016 LRAMVA kWh	4,365,766	1,133,691	3,401,072	728,801	22,538,608	845,395	0	0	33,013,333
2016 LRAMVA kW	0	0	8,871	1,546	40,432	2,344	0	0	53,193

Details of the CDM programs, the OPA's CDM results, and the LRAMVA balances calculation are presented in Exhibit 4, Tab 6, 2.7.6 Conservation and Demand Management.

Guelph Hydro has applied the CDM adjustments to all classes at the sales level.

Guelph Hydro's proposal and rationale for the level of CDM reductions reflected in the 2016 load forecast

Table 3-12 Potential Looking Ahead:

GHESI 2015-2020 Energy Reduction Target (net):		APS Category	Savings		% of 2015 - 2020 Target
Anticipated Projects Based on 2014 Preliminary Work:	Gross		Net		
PSUI Cogen (10 Year Averaged) Annual Reduction:	50,760.0	IND	*44,403.7*	MWh / year	44.8%
Retrofit Projects Annual Reduction:	12,652.4	COM	*9,848.1*	MWh / year	9.9%
Retrofit LED Lighting Annual Reduction:	4,315.6	COM	*2,536.1*	MWh / year	2.6%
Subtotal:	67,728.0	MWh	56,787.8	MWh / year	57.3%
Using ICF Marbek Achievable Potential Study Allocation					
		Outstanding Balance:	*42,247.2*	*MWh*	
Residential	31%	RES	13,096.6	MWh	13.2%
Commercial	47%	COM	19,856.2	MWh	20.0%
Industrial	22%	IND	9,294.4	MWh	9.4%
NON-RESIDENTIAL:	*69%*		*29,150.6*	*MWh*	*29.4%*
Subtotal:	100.0%		42,247.2	MWh	42.7%
TOTAL			99,035.1	MWh	100.0%

GHESI RATE CLASS TABLE	Code		Allocation [MWh]	Allocation [%]	Allocation [MWh / yr]
RESIDENTIAL	RES		13,096.6	13.2%	2,182.8
GENERAL SERVICE < 50 kW	GS<50		3,400.9	3.4%	566.8
GENERAL SERVICE 50 - 999 kW	GS<1MW		10,202.7	10.3%	1,700.5
GENERAL SERVICE 1,000 - 4,999 kW	GS<5MW		2,186.3	2.2%	364.4
LARGE USE	LU		67,612.5	68.3%	11,268.7
UNMETERED SCATTERED LOAD	USL		0.0	0.0%	0.0
SENTINEL LIGHTING	SENLT		0.0	0.0%	0.0
STREET LIGHTING	STRLT		2,536.1	2.6%	422.7
Total MWh through 2015-2020 CDM tranche:			99,035.1	100.0%	16,505.8
GHESI 2015-2020 Annual Energy Reduction Target (net):			16,505.8	MWh / year	

2.6.2 ACCURACY OF LOAD FORECAST AND VARIANCE ANALYSIS

Guelph Hydro ran the regression model using historical purchases from January 1998 to December 2014, based on data availability.

The annual results of the above prediction formula compared to the actual annual purchases from 1998 to 2014 are shown in the chart below. The prediction formula has the following results returned by the regression model, which generally indicates the formula produces a good fit to the actual data set:

Multiple R: The Coefficient of Correlation estimates the strength of the relationship between actual load and the explanatory variables. The load forecast model shows a multiple R of 0.95, which is indicative of a strong relationship between actual purchases and the independent (or explanatory) variables used in the regression model.

R Squared: Square of Multiple R (also termed the coefficient of determination): The percentage of the variation in load that is explained by the variables. The model resulted in an R^2 of 0.91; meaning that the independent variables explain the variation of the dependent variable (purchases) quite well.

Adjusted R-Squared: Adding more variables to a model increases the value of R-squared. The Adjusted R-Squared provides a relative measure of fit adjusted for number of variables (degrees of freedom). The model resulted in an Adjusted R-Squared of 0.90 which indicates a good fit.

Tables 3-13 to 3-19 below provides a summary of the weather normalized load and customer/connection forecast used in this application. Guelph Hydro has included the following variance analysis and comparison in order to demonstrate the historical accuracy of the load forecast.

A summary of Guelph Hydro's historical billed energy and average customer count as well as forecast 2015 and 2016 load and customer counts is presented in Table 3-13.

In addition, Table 3-13 provides historical and forecast (Bridge and Test Year) year over year variances.

Table 3-13
Summary of Load and Customer/Connection Historical Actual and Forecast
Year over year Variance

Year	Billed (GWh)	Year over year Variance (GWh)	Year over year Variance %	Customer/ Connection Count	Year over year Variance Accs/Conn.	Year over year Variance %
2003	1,485			53,309		
2004	1,556	71	4.80%	55,139	1,830	3.43%
2005	1,619	63	4.02%	57,118	1,980	3.59%
2006	1,610	-9	-0.56%	58,513	1,395	2.44%
2007	1,610	0	-0.02%	60,010	1,497	2.56%
2008	1,574	-35	-2.19%	61,301	1,291	2.15%
2009	1,486	-89	-5.65%	62,260	959	1.56%
2010	1,626	141	9.48%	63,285	1,025	1.65%
2011	1,673	46	2.84%	64,273	988	1.56%
2012 Board-Approved	1,676	3	0.21%	66,470	2,197	3.42%
2012	1,701	28	1.70%	65,072	798	1.24%
2013	1,710	9	0.54%	65,924	852	1.31%
2014	1,731	21	1.24%	66,857	934	1.42%
2015 (B) Adjusted for CDM savings	1,771	39	2.27%	68,253	1,396	2.09%
2016 (T) Adjusted for CDM savings	1,781	10	0.56%	69,680	1,426	2.09%

Table 3-14 demonstrates the variance between Guelph Hydro's 2012 Board-Approved Load Forecast results with actual 2012 billed energy and average customer count.

Table 3-14 Board Approved vs. Actual - Summary Billed Energy & Customers/Connections

Year	Billed (GWh)	Variance from Board Approved (GWh)	Variance from Board Approved %	Customer/ Connection Count	Variance from Board Approved Accs/Conn.	Variance from Board Approved %
2012 Board-Approved	1,676			66,470		
2012 Actual	1,701	25	1.49%	65,072	-1,399	-2.10%

Years 2003 to December 2014 are weather actual and 2015 to 2016 are weather normalized. Based on the process outlined in this Exhibit, Tab 1, Schedule 1, 2.6.1.1 Multivariate Regression Model, a process to forecast energy on a weather normalized basis has been developed and used in this Application. Actual data has not been weather normalized since Guelph Hydro is not aware of any Board-approved method to weather normalize actual data.

The total Customer count represents the average number of customers over the year, while Street Lighting, Sentinel Lighting and Unmetered Scattered Loads are measured as the average number of connections over the year.

Table 3-14 above presents the 2012 Actual versus 2012 Board-Approved billed consumption and customer count variance. The 2012 Actual consumption was higher by 25 GWh or 1.49% than Board-Approved and the number of customers was overestimated by 1,399 or 2.10%. Table 3-19 presents the Board-Approved to Actual usage per customer/connection variance per rate class. More detailed analysis of the variance is presented on page 19 of this section (Exhibit 3, Tab 2, Schedule 1, page 19)

On a rate class basis, actual and forecasted billed amount and number of customers are shown in Table 3-15; the Board-Approved versus Actual billed energy per customer class is shown in Table 3-16; the Board-Approved number of customers/connections is presented in Table 3-17; the annual consumption per customer/connection and the annual growth rate per customer class are shown in Table 3-18. In addition, Guelph Hydro has completed Appendix 2-IA of the Filing Requirements Appendices file (please see Table 3-36 of this Exhibit, Tab 2, Schedule 1).

Table 3-15
Billed Energy and Number of Customers by Rate Class

Year	Residential	General Service < 50 kW	General Service > 50 to 999 kW	General Service 1000 to 4999 kW	Large Use	Street Lighting	Sentinel Lighting	Unmetered Loads	Total
Energy (GWh)									
2003	325	135	418	371	224	8	0.1	3	1,485
2004	333	136	442	372	261	8	0.1	3	1,556
2005	357	144	428	425	253	9	0.1	3	1,619
2006	348	142	428	420	261	9	0.1	2	1,610
2007	357	146	448	390	258	9	0.1	2	1,610
2008	357	147	425	385	248	9	0.1	2	1,574
2009	353	141	369	374	237	9	0.1	2	1,486
2010	365	145	403	442	260	9	0.1	2	1,626
2011	365	146	412	477	260	10	0.1	2	1,673
2012 Board-Approved	379	149	400	465	271	10	0.1	2	1,676
2012	365	146	405	492	281	11	0.1	2	1,701
2013	371	143	398	483	304	10	0.1	2	1,710
2014	368	146	398	527	280	10	0.0	2	1,731
2015 (B) Adjusted for CDM savings	380	150	401	546	282	10	0.0	2	1,771
2016 (T) Adjusted for CDM savings	382	150	398	563	277	10	0.0	2	1,781
Number of Customers/Connections									
2003	38,064	3,249	461	37	4	10,876	30	588	53,309
2004	39,401	3,324	488	38	4	11,253	29	602	55,139
2005	40,692	3,422	498	39	4	11,838	31	595	57,118
2006	41,643	3,468	510	40	4	12,237	31	581	58,513
2007	42,728	3,534	521	41	4	12,574	29	579	60,010
2008	43,747	3,581	539	41	4	12,781	28	580	61,301
2009	44,584	3,624	538	41	4	12,860	28	582	62,260
2010	45,477	3,661	543	42	4	12,948	27	584	63,285
2011	46,260	3,691	554	41	4	13,125	26	572	64,273
2012 Board-Approved	47,848	3,788	569	44	4	13,609	26	583	66,470
2012	46,838	3,757	566	41	5	13,285	25	556	65,072
2013	47,495	3,845	552	42	5	13,423	15	548	65,924
2014	48,142	3,957	550	41	5	13,607	6	552	66,857
2015 (B) Adjusted for CDM savings	49,180	4,028	558	41	5	13,886	6	548	68,253
2016 (T) Adjusted for CDM savings	50,242	4,101	567	42	5	14,172	6	545	69,680

Note: The averages for the customer/connection counts are based on the average of the beginning and the end of the year.

Table 3-16 Board Approved vs. Actual - Billed Energy per Customer Class

Year	Residential	General Service < 50 kW	General Service > 50 to 999 kW	General Service 1000 to 4999 kW	Large Use	Street Lighting	Sentinel Lighting	Unmetered Loads	Total
Energy (GWh)									
2012 Board-Approved	379	149	400	465	271	10	0.1	2	1,676
2012 Actual	365	146	405	492	281	11	0.1	2	1,701
Actual vs Approved [GWh]	-14	-3	5	27	9	1	0	0	25
Actual vs Approved [%]	-3.75%	-1.93%	1.33%	5.75%	3.47%	9.35%	-15.68%	-14.81%	1.49%

Table 3-17 Board Approved vs. Actual - Number of Customers/Connections per Customer Class

Year	Residential	General Service < 50 kW	General Service > 50 to 999 kW	General Service 1000 to 4999 kW	Large Use	Street Lighting	Sentinel Lighting	Unmetered Loads	Total
Number of Customers/Connections									
2012 Board-Approved	47,848	3,788	569	44	4	13,609	25.8	583	66,470
2012 Actual	46,838	3,757	566	41	5	13,285	25.0	556	65,072
Actual vs Approved [accs/conn]	-1,010	-31	-3	-3	1	-324	-1	-27	-1,399
Actual vs Approved [%]	-2.11%	-0.83%	-0.57%	-5.97%	12.50%	-2.38%	-2.96%	-4.61%	-2.10%

Table 3-18
Annual Usage per Customer/Connection by Rate Class

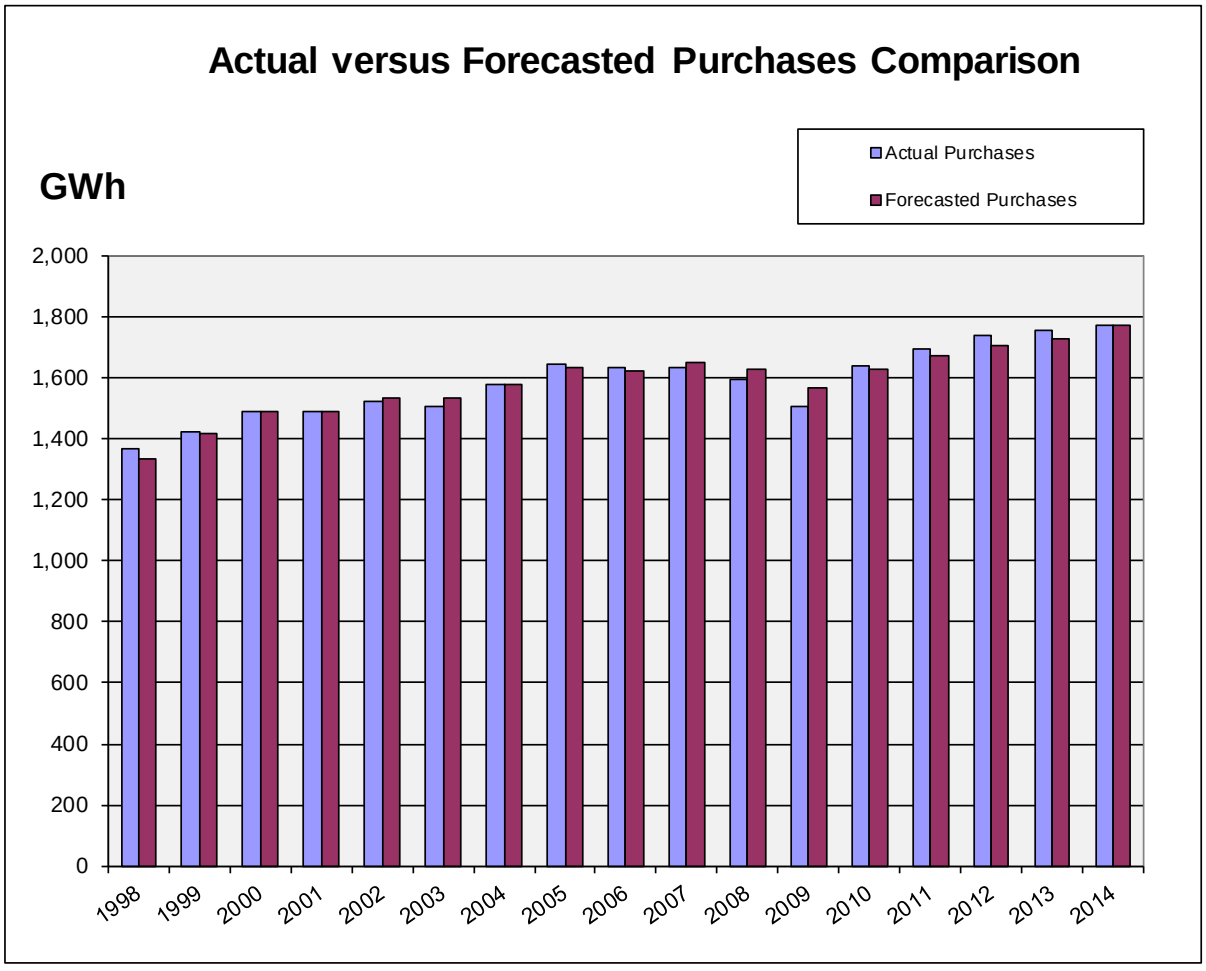
Year	Residential	General Service < 50 kW	General Service > 50 to 999 kW	General Service 1000 to 4999 kW	Large Use	Street Lighting	Sentinel Lighting	Unmetered Loads
Energy Usage per Customer/Connection (kWh per customer/connection)								
2003	8,541	41,518	907,247	10,070,767	56,087,970	749	4,347	5,551
2004	8,461	41,052	905,160	9,790,665	65,321,579	743	4,322	5,329
2005	8,771	42,166	860,078	10,979,832	63,362,104	720	4,126	5,276
2006	8,367	40,830	838,801	10,509,331	65,160,994	716	4,157	4,034
2007	8,346	41,194	859,721	9,549,527	64,603,895	697	4,136	4,263
2008	8,158	41,018	788,482	9,420,251	62,100,125	724	3,645	4,194
2009	7,911	39,046	686,131	9,109,829	59,295,996	725	3,614	4,166
2010	8,023	39,622	741,445	10,525,380	64,932,110	725	3,627	4,155
2011	7,899	39,509	743,866	11,546,225	64,924,539	759	3,455	3,420
2012 Board-Approved	7,881	39,097	699,902	10,658,998	67,706,136	718	3,445	3,825
2012	7,786	38,843	715,474	11,996,444	62,424,958	805	2,993	3,416
2013	7,804	37,101	720,443	11,645,388	60,815,735	730	3,543	3,496
2014	7,651	36,835	724,488	12,854,367	62,292,171	732	3,685	3,409
2015 (B)	7,575	36,437	709,823	13,142,742	62,889,136	730	3,630	3,262
2016 (T)	7,499	36,042	695,454	13,437,587	63,491,821	729	3,576	3,120
Annual Growth Rate in Usage per Customer/Connection								
2003								
2004	-0.94%	-1.12%	-0.23%	-2.78%	16.46%	-0.75%	-0.58%	-3.99%
2005	3.67%	2.71%	-4.98%	12.15%	-3.00%	-3.03%	-4.54%	-1.00%
2006	-4.61%	-3.17%	-2.47%	-4.29%	2.84%	-0.63%	0.76%	-23.54%
2007	-0.25%	0.89%	2.49%	-9.13%	-0.85%	-2.58%	-0.51%	5.67%
2008	-2.26%	-0.43%	-8.29%	-1.35%	-3.88%	3.87%	-11.86%	-1.63%
2009	-3.02%	-4.81%	-12.98%	-3.30%	-4.52%	0.07%	-0.85%	-0.67%
2010	1.42%	1.48%	8.06%	15.54%	9.51%	0.03%	0.36%	-0.26%
2011	-1.55%	-0.29%	0.33%	9.70%	-0.01%	4.67%	-4.74%	-17.68%
2012 Board-Approved	-0.23%	-1.04%	-5.91%	-7.68%	4.28%	-5.32%	-0.32%	11.84%
2012	-1.44%	-1.69%	-3.82%	3.90%	-3.85%	6.06%	-13.38%	-0.13%
2013	0.24%	-4.48%	0.69%	-2.93%	-2.58%	-9.28%	18.36%	2.35%
2014	-1.97%	-0.72%	0.56%	10.38%	2.43%	0.21%	4.02%	-2.47%
2015 (B)	-1.00%	-1.08%	-2.02%	2.24%	0.96%	-0.21%	-1.49%	-4.33%
2016 (T)	-1.00%	-1.08%	-2.02%	2.24%	0.96%	-0.21%	-1.49%	-4.33%

The customer class variances between Guelph Hydro's 2012 Board-Approved and 2012 actual energy usage per customer/connection are presented in Table 3-19 below.

Table 3-19 Board Approved vs. Actual - Annual Usage per Customer/Connection by Rate Class

Year	Residential	General Service < 50 kW	General Service > 50 to 999 kW	General Service 1000 to 4999 kW	Large Use	Street Lighting	Sentinel Lighting	Unmetered Loads
Energy Usage per Customer/Connection (kWh per customer/connection)								
2012 Board-Approved	7,881	39,097	699,902	10,658,998	67,706,136	718	3,444.5	3,825
2012 Actual	7,786	38,843	715,474	11,996,444	62,424,958	805	2,993.1	3,416
Actual vs Approved [accs/conn]	-96	-254	15,572	1,337,445	-5,281,178	86	-451	-409
Actual vs Approved [%]	-1.21%	-0.65%	2.22%	12.55%	-7.80%	12.02%	-13.11%	-10.70%

Chart 3-3



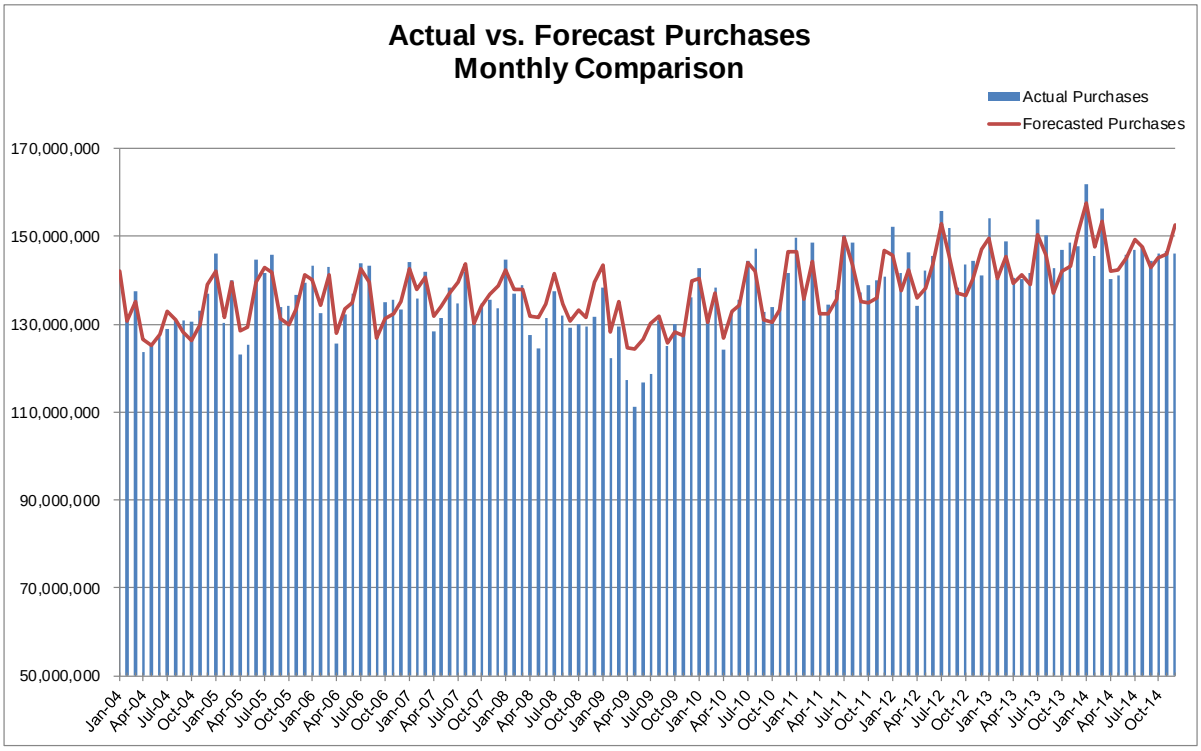
The following Table 3-20 outlines the data that supports the above Chart 3-3. In addition, the weather normalized forecast of total system purchases for Guelph Hydro is provided for 2015 and 2016.

Table 3-20
Guelph Hydro's Total System Purchases GWh

	Actual	Predicted Weather Normalized	% Difference
1998	1,368	1,334	-2.53%
1999	1,420	1,415	-0.34%
2000	1,492	1,491	-0.05%
2001	1,489	1,489	0.00%
2002	1,521	1,535	0.92%
2003	1,508	1,533	1.65%
2004	1,579	1,575	-0.23%
2005	1,641	1,632	-0.58%
2006	1,634	1,621	-0.79%
2007	1,632	1,648	0.99%
2008	1,594	1,628	2.11%
2009	1,504	1,566	4.12%
2010	1,641	1,630	-0.68%
2011	1,696	1,674	-1.29%
2012 Board-Approved (1)		1,698	-2.25%
2012	1,737	1,703	-1.95%
2013	1,756	1,725	-1.81%
2014	1,769	1,772	0.16%
2015 (B) (WN) adjusted for CDM savings		1,799	0.00%
2016 (T) (WN) adjusted for CDM savings		1,809	0.00%

In addition, Guelph Hydro has provided below in Chart 3-4 Actual versus Forecast monthly comparison:

Chart 3-4



The variance shown in the above chart reflects the economic recession experienced in 2008 (end year) to 2009; the multivariate regression model cannot forecast exceptional events as economic downturn, blackout days, or natural disasters.

Table 3-21 Board Approved vs. Actual - Guelph Hydro's Total System Purchases

	GWh
2012 Board-Approved	1,698
2012 Actual	1,737
Actual vs Approved [GWh]	39
Actual vs Approved [%]	2.25%

The forecasted weather-normalized amount for the 2015 Bridge Year and 2016 Test Year is determined by using a monthly forecast of the dependent variables in the prediction formula. In order to incorporate weather-normal conditions, average monthly

heating degree-days and cooling degree-days over January 1998 to December 2014 were applied to the prediction formula for the 2016 Test Year (17-year monthly average).

Billed kWh Load Forecast

To determine the total weather-normalized billed energy forecast, the total system weather-normalized purchases forecast is adjusted by an historical loss factor. As outlined in the table below, historically Guelph Hydro's loss factor on a 12-year average has been 1.59%. Guelph Hydro has used 12-year average (2003 to 2014) and not 17-year average (1998 to 2014) because it does not have accurate billed historical consumption for the years 1998 to 2002. Guelph Hydro's historical 2003 to 2014 losses appear in Table 3-22 below.

Table 3-22
Historical Loss Factor

(GWh)	Actual/Metered Purchases	Actual Billed	Losses [GWh]	Losses [%]
2003	1,508	1,485	23	1.55%
2004	1,579	1,556	22	1.43%
2005	1,641	1,619	22	1.38%
2006	1,634	1,610	24	1.48%
2007	1,632	1,610	22	1.37%
2008	1,594	1,574	20	1.25%
2009	1,504	1,486	19	1.26%
2010	1,641	1,626	15	0.90%
2011	1,696	1,673	23	1.39%
2012 Board-Approved	1,698	1,676	22	1.33%
2012	1,737	1,701	36	2.14%
2013	1,756	1,710	46	2.71%
2014	1,769	1,731	38	2.18%
Average				1.59%

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

Once the total weather-normalized billed energy amount is determined (please see Table 3-31 Alignment of Non-normal to Weather Normal Forecast), this amount needs to be distributed by rate class for rate design purposes taking into consideration the customer/connection forecast and expected usage per customer by rate class.

The next step in the forecasting process is to determine a customer/connection forecast. The customer/connection forecast is based on reviewing historical customer/connection data which is shown in the following Table 3-23.

Table 3-23

Historical Customer/Connection Data

	Residential	General Service < 50 kW	General Service > 50 to 999 kW	General Service 1000 to 4999 kW	Large Use	Street Lighting	Sentinel Lighting	Unmetered Loads	Total
Number of Customers/Connections									
2003	38,064	3,249	461	37	4	10,876	30	588	53,309
2004	39,401	3,324	488	38	4	11,253	29	602	55,139
2005	40,692	3,422	498	39	4	11,838	31	595	57,118
2006	41,643	3,468	510	40	4	12,237	31	581	58,513
2007	42,728	3,534	521	41	4	12,574	29	579	60,010
2008	43,747	3,581	539	41	4	12,781	28	580	61,301
2009	44,584	3,624	538	41	4	12,860	28	582	62,260
2010	45,477	3,661	543	42	4	12,948	27	584	63,285
2011	46,260	3,691	554	41	4	13,125	26	572	64,273
2012 Board-Approved	47,848	3,788	569	44	4	13,609	26	583	66,470
2012	46,838	3,757	566	41	5	13,285	25	556	65,072
2013	47,495	3,845	552	42	5	13,423	15	548	65,924
2014	48,142	3,957	550	41	5	13,607	6	552	66,857

The customer/connection count is shown in annual average format.

The historical growth rate in customers/connections is shown in the following Table 3-24. The table also shows the geometric mean growth rate in number of customers. The geometric mean approach provides the compound annual average growth rate.

Table 3-24
Growth Rate in Customer/Connections

	Residential	General Service < 50 kW	General Service > 50 to 999 kW	General Service 1000 to 4999 kW	Large Use	Street Lighting	Sentinel Lighting	Unmetered Loads
Growth Rate in Customer/Connection								
2003								
2004	3.51%	2.31%	5.82%	3.17%	0.00%	3.47%	-0.84%	2.38%
2005	3.28%	2.95%	2.02%	1.75%	0.00%	5.20%	5.38%	-1.16%
2006	2.34%	1.36%	2.44%	3.45%	0.00%	3.37%	-1.34%	-2.35%
2007	2.61%	1.89%	2.16%	2.08%	0.00%	2.75%	-5.18%	-0.34%
2008	2.38%	1.33%	3.50%	0.20%	0.00%	1.65%	-4.02%	0.17%
2009	1.91%	1.20%	-0.29%	0.20%	0.00%	0.62%	0.90%	0.34%
2010	2.00%	1.02%	1.05%	2.44%	0.00%	0.68%	-5.34%	0.34%
2011	1.72%	0.83%	2.06%	-1.59%	0.00%	1.37%	-4.08%	-2.05%
2012	1.25%	1.77%	2.10%	-0.81%	12.50%	1.22%	-1.96%	-2.80%
2013	1.40%	2.36%	-2.47%	1.22%	11.11%	1.04%	-40.00%	-1.53%
2014	1.36%	2.90%	-0.45%	-1.20%	-10.00%	1.37%	-60.00%	0.73%
Geometric Mean	2.16%	1.81%	1.61%	0.98%	1.08%	2.06%	-13.52%	-0.58%

The resulting geometric mean is applied to the 2014 customer/connection numbers to determine the forecast of customers/connections in 2015 and 2016. The customer/connection count is shown below in Table 3-25 in annual average format.

Table 3-25
Customer/Connection Forecast

	Residential	General Service < 50 kW	General Service > 50 to 999 kW	General Service 1000 to 4999 kW	Large Use	Street Lighting	Sentinel Lighting	Unmetered Loads	Total
Forecast number of Customers/Connections									
2015	49,180	4,028	558	41	5	13,886	6	548	68,253
2016	50,242	4,101	567	42	5	14,172	6	545	69,680

The next step in the process is to review the historical customer/connection usage and to reflect this usage per customer in the forecast. The following Table 3-26 provides the average annual usage per customer by rate class from 2003 to 2014.

Table 3-26

Historical Annual Usage per Customer

	Residential	General Service < 50 kW	General Service > 50 to 999 kW	General Service 1000 to 4999 kW	Large Use	Street Lighting	Sentinel Lighting	Unmetered Loads
Annual kWh Usage Per Customer/Connection								
2003	8,541	41,518	907,247	10,070,767	56,087,970	749	4,347	5,551
2004	8,461	41,052	905,160	9,790,665	65,321,579	743	4,322	5,329
2005	8,771	42,166	860,078	10,979,832	63,362,104	720	4,126	5,276
2006	8,367	40,830	838,801	10,509,331	65,160,994	716	4,157	4,034
2007	8,346	41,194	859,721	9,549,527	64,603,895	697	4,136	4,263
2008	8,158	41,018	788,482	9,420,251	62,100,125	724	3,645	4,194
2009	7,911	39,046	686,131	9,109,829	59,295,996	725	3,614	4,166
2010	8,023	39,622	741,445	10,525,380	64,932,110	725	3,627	4,155
2011	7,899	39,509	743,866	11,546,225	64,924,539	759	3,455	3,420
2012 Board-Approved	7,881	39,097	699,902	10,658,998	67,706,136	718	3,445	3,825
2012	7,786	38,843	715,474	11,996,444	62,424,958	805	2,993	3,416
2013	7,804	37,101	720,443	11,645,388	60,815,735	730	3,543	3,496
2014	7,651	36,835	724,488	12,854,367	62,292,171	732	3,685	3,409

Table 3-27 below shows the historical usage per customer/connection and also includes the geometric mean growth rate.

Table 3-27

Growth Rate in Usage Per Customer/Connection

	Residential	General Service < 50 kW	General Service > 50 to 999 kW	General Service 1000 to 4999 kW	Large Use	Street Lighting	Sentinel Lighting	Unmetered Loads
Growth Rate in Usage Per Customer/Connection								
2003								
2004	-0.94%	-1.12%	-0.23%	-2.78%	16.46%	-0.75%	-0.58%	-3.99%
2005	3.67%	2.71%	-4.98%	12.15%	-3.00%	-3.03%	-4.54%	-1.00%
2006	-4.61%	-3.17%	-2.47%	-4.29%	2.84%	-0.63%	0.76%	-23.54%
2007	-0.25%	0.89%	2.49%	-9.13%	-0.85%	-2.58%	-0.51%	5.67%
2008	-2.26%	-0.43%	-8.29%	-1.35%	-3.88%	3.87%	-11.86%	-1.63%
2009	-3.02%	-4.81%	-12.98%	-3.30%	-4.52%	0.07%	-0.85%	-0.67%
2010	1.42%	1.48%	8.06%	15.54%	9.51%	0.03%	0.36%	-0.26%
2011	-1.55%	-0.29%	0.33%	9.70%	-0.01%	4.67%	-4.74%	-17.68%
2012	-1.44%	-1.69%	-3.82%	3.90%	-3.85%	6.06%	-13.38%	-0.13%
2013	0.24%	-4.48%	0.69%	-2.93%	-2.58%	-9.28%	18.36%	2.35%
2014	-1.97%	-0.72%	0.56%	10.38%	2.43%	0.21%	4.02%	-2.47%
Geometric Mean	-1.00%	-1.08%	-2.02%	2.24%	0.96%	-0.21%	-1.49%	-4.33%

For the forecast of usage per customer/connection the historical geometric mean was applied to the 2014 value to determine the forecast for 2015 and 2016 as seen in Table 3-28 below.

Table 3-28
Forecast Annual kWh Usage per Customer/Connection

	Residential	General Service < 50 kW	General Service > 50 to 999 kW	General Service 1000 to 4999 kW	Large Use	Street Lighting	Sentinel Lighting	Unmetered Loads
Forecast Annual kWh Usage per Customers/Connection								
2015	7,575	36,437	709,823	13,142,742	62,889,136	730	3,630	3,262
2016	7,499	36,042	695,454	13,437,587	63,491,821	729	3,576	3,120

With the preceding information, the non-normalized weather billed energy forecast is determined by multiplying the forecast number of customers/connections from Table 3-25 by the forecasted annual usage per customer/connection from Table 3-28. The resulting non-normalized weather billed energy forecast is shown in the following Table 3-29.

Table 3-29
Non-normalized Weather Billed Energy Forecast
not adjusted for CDM savings

	Residential	General Service < 50 kW	General Service > 50 to 999 kW	General Service 1000 to 4999 kW	Large Use	Street Lighting	Sentinel Lighting	Unmetered Loads	Total
d Weather Billed Energy Forecast (GWh)									
2015	373	147	396	544	286	10	0	2	1,758
2016	377	148	395	562	292	10	0	2	1,785

The non-normalized weather billed energy forecast has been determined, but this needs to be adjusted in order to be aligned with the total weather normalized billed energy forecast. The difference between the non-normalized forecast and normalized forecast will be assigned to those rate classes that are weather sensitive. Based on the weather normalization work completed by Hydro One for Guelph Hydro for the Guelph Hydro cost allocation study, which has been used to support this Application, it was determined that the weather sensitivity by rate classes is as follows:

Table 3-30
Weather Sensitivity by Rate Class

Residential	General Service < 50 kW	General Service > 50 to 999 kW	General Service 1000 to 4999 kW	Large Use	Street Lighting	Sentinel Lighting	Unmetered Loads
Weather Sensitivity							
75%	75%	51%	12%	39%	0%	0%	0%

As a result, the difference between the non-normalized and normalized forecast has been assigned on a prorated basis to each rate class based on the above level of weather sensitivity. The following Table 3-31 outlines how the weather sensitive rate classes have been adjusted to align the non-normalized forecast with the normalized forecast, and also how the CDM savings has been applied to rate classes.

Table 3-31

Alignment of Non-normal to Weather Normal Forecast [GWh]

	Residential	General Service < 50 kW	General Service > 50 to 999 kW	General Service 1000 to 4999 kW	Large Use	Street Lighting	Sentinel Lighting	Unmetered Loads	Total
Non-normalized Weather Billed Energy Forecast not adjusted for CDM savings									
2015	373	147	396	544	286	10	0	2	1,758
2016	377	148	395	562	292	10	0	2	1,785
Plus Adjustment for Weather (GWh)									
2015	9	3	6	2	3	0	0	0	24
2016	8	3	6	2	3	0	0	0	23
Minus CDM Adjustment									
2015	1.43	0.37	1.11	0.24	7.37	0.28	0.00	0.00	10.79
2016	3.61	0.94	2.81	0.60	18.64	0.70	0.00	0.00	27.30
Weather Normalized Billed Energy Forecast (GWh)									
2015 adjusted for CDM savings	380	150	401	546	282	10	0	2	1,771
2016 adjusted for CDM savings	382	150	398	563	277	10	0	2	1,781

Billed kW Load Forecast

Five rate classes are charged volumetric rates on a per kW basis. These include General Service > 50 to 999 kW, General Service 1000 to 4999 kW, Large Use, Street Lighting and Sentinel Lighting. As a result, the energy forecast for these classes needs to be converted to a kW basis for rate setting purposes. The forecast of kW for these classes is based on a review of the historical ratio of kW to kWh and the average ratio is applied to the forecasted kWh to produce the required kW.

The following Table 3-32 outlines the annual demand units by applicable rate class for the years that data is available (i.e. 2003 to 2014).

Table 3-32
Historical Annual kW per Applicable Rate Class

	General Service 50 to 999 kW	General Service 1000 to 4999 kW	Large Use	Street Lighting	Sentinel Lighting	Total
2003	1,100,318	809,727	402,534	22,768	359	2,335,707
2004	1,152,315	799,328	467,895	23,322	439	2,443,299
2005	1,130,150	896,363	463,386	23,860	355	2,514,114
2006	1,098,433	893,595	474,726	24,507	346	2,491,607
2007	1,146,098	839,674	469,790	25,377	326	2,481,265
2008	1,096,291	869,193	450,555	25,810	281	2,442,130
2009	1,000,754	893,555	439,421	26,052	275	2,360,057
2010	1,029,320	924,830	450,708	26,260	258	2,431,376
2011	1,082,782	974,063	466,012	26,816	243	2,549,917
2012 Board-Approved	1,041,992	1,015,196	490,512	27,447	251	2,575,397
2012	1,073,481	1,009,650	502,795	27,123	205	2,613,255
2013	1,031,208	944,735	526,806	27,364	147	2,530,260
2014	1,024,584	1,022,992	492,109	27,791	62	2,567,537

The following Table 3-33 presents the 2012 historical versus 2012 Board -Approved billed demand. The total forecast billed demand was underestimated by 37.8 MW or 1.47%.

Table 3-33 Board Approved vs. Actual - Historical Annual kW per Applicable Rate Class

	General Service 50 to 999 kW	General Service 1000 to 4999 kW	Large Use	Street Lighting	Sentinel Lighting	Total
	kW	kW	kW	kW	kW	kW
2012 Board-Approved	1,041,992	1,015,196	490,512	27,447	251	2,575,397
2012	1,073,481	1,009,650	502,795	27,123	205	2,613,255
Actual vs Approved [kW]	31,489	-5,546	12,283	-323	-45	37,858
Actual vs Approved [%]	3.02%	-0.55%	2.50%	-1.18%	-18.07%	1.47%

The following Table 3-34 is the historical ratio of kW/kWh as well as the average ratio from 2003 to 2014:

Table 3-34
Historical kW/KWh Ratio per Applicable Rate Class

	General Service 50 to 999 kW	General Service 1000 to 4999 kW	Large Use	Street Lighting	Sentinel Lighting
2003	0.26%	0.22%	0.18%	0.28%	0.28%
2004	0.26%	0.21%	0.18%	0.28%	0.35%
2005	0.26%	0.21%	0.18%	0.28%	0.28%
2006	0.26%	0.21%	0.18%	0.28%	0.27%
2007	0.26%	0.22%	0.18%	0.29%	0.27%
2008	0.26%	0.23%	0.18%	0.28%	0.28%
2009	0.27%	0.24%	0.19%	0.28%	0.27%
2010	0.26%	0.21%	0.17%	0.28%	0.27%
2011	0.26%	0.20%	0.18%	0.27%	0.28%
2012	0.27%	0.21%	0.18%	0.25%	0.27%
2013	0.26%	0.20%	0.17%	0.28%	0.28%
2014	0.26%	0.19%	0.18%	0.28%	0.28%
Average	0.26%	0.21%	0.18%	0.28%	0.28%

The average ratio was applied to the weather normalized billed energy forecast in Table 3-31 to provide the forecast of kW by rate class as shown in Table 3-35 below.

Table 3-35
kW Forecast by Applicable Rate Class

	General Service 50 to 999 kW	General Service 1000 to 4999 kW	Large Use	Street Lighting	Sentinel Lighting	Total
2015	1,047,058	1,157,642	506,086	27,346	61	2,738,192
2016	1,037,307	1,194,282	496,250	26,693	60	2,754,592

Table 3-36 (Chapter 2 Appendix 2-IA) provides a summary of Guelph Hydro's actual and forecast Load Forecast data, as well as year over year variances for each of Guelph Hydro's rate classes.

Table 3-36

Appendix 2-IA
Summary and Variances of Actual and Forecast Data

Replace "Rate Class #" with the appropriate rate classification.

	2012 Board Approved	2012	2013	2014	2015 Bridge	2016 Test
Residential						
# of Customers	47,848	46,838	47,495	48,142	49,180	50,242
kWh	378,871,008	364,661,620	370,660,140	368,319,726	379,756,990	381,586,775
kW						
Variance Analysis						
# of Customers		-2.11%	-0.74%	0.61%	2.78%	5.00%
kWh		-3.75%	-2.17%	-2.78%	0.23%	0.72%
kW		0.00%	0.00%	0.00%	0.00%	0.00%
GS <50 kW						
# of Customers	3,788	3,757	3,845	3,957	4,028	4,101
kWh	148,787,703	145,914,309	142,654,551	145,738,547	149,811,070	150,174,015
kW						
Variance Analysis						
# of Customers		-0.83%	1.51%	4.45%	6.34%	8.26%
kWh		-1.93%	-4.12%	-2.05%	0.69%	0.93%
kW		0.00%	0.00%	0.00%	0.00%	0.00%
GS 50 to 999 kW						
# of Customers	569	566	552	550	558	567
kWh	399,661,950	404,958,100	397,684,372	398,106,073	401,416,721	397,678,750
kW	1,041,992	1,073,481	1,031,208	1,024,584	1,047,058	1,037,307
Variance Analysis						
# of Customers		-0.57%	-3.03%	-3.47%	-1.91%	-0.33%
kWh		1.33%	-0.49%	-0.39%	0.44%	-0.50%
kW		3.02%	-1.03%	-1.67%	0.49%	-0.45%
GS 1000 to 4999 kW						
# of Customers	44	41	42	41	41	42
kWh	465,120,498	491,854,193	483,283,609	527,029,066	545,824,692	563,100,354
kW	1,015,196	1,009,650	944,735	1,022,992	1,157,642	1,194,282
Variance Analysis						
# of Customers		-5.97%	-4.83%	-5.97%	-5.05%	-4.12%
kWh		5.75%	3.91%	13.31%	17.35%	21.07%
kW		-0.55%	-6.94%	0.77%	14.03%	17.64%
Large Use						
# of Customers	4	5	5	5	5	5
kWh	271,481,475	280,912,310	304,078,675	280,314,771	282,116,008	276,633,108
kW	490,512	502,795	526,806	492,109	506,086	496,250
Variance Analysis						
# of Customers		12.50%	25.00%	12.50%	13.71%	14.94%
kWh		3.47%	12.01%	3.25%	3.92%	1.90%
kW		2.50%	7.40%	0.33%	3.17%	1.17%
Unmetered Scattered Load						
# of Connections	583	556	548	552	548	545
kWh	2,229,301	1,899,072	1,914,008	1,880,319	1,788,381	1,700,939
kW						
Variance Analysis						
# of Connections		-4.61%	-6.06%	-5.38%	-5.93%	-6.47%
kWh		-14.81%	-14.14%	-15.65%	-19.78%	-23.70%
kW		0.00%	0.00%	0.00%	0.00%	0.00%
Sentinel Lighting						
# of Connections	26	25	15	6	6	6
kWh	88,740	74,827	53,141	22,111	21,782	21,457
kW	251	205	147	62	61	60
Variance Analysis						
# of Connections		-2.96%	-41.78%	-76.71%	-76.71%	-76.71%
kWh		-15.68%	-40.12%	-75.08%	-75.45%	-75.82%
kW		-18.07%	-41.29%	-75.42%	-75.62%	-75.99%
Street Lighting						
# of Connections	13,609	13,285	13,423	13,607	13,886	14,172
kWh	9,777,748	10,692,257	9,801,149	9,956,023	9,863,513	9,628,070
kW	27,447	27,123	27,364	27,791	27,346	26,693
Variance Analysis						
# of Connections		-2.38%	-1.37%	-0.02%	2.04%	4.14%
kWh		9.35%	0.24%	1.82%	0.88%	-1.53%
kW		-1.18%	-0.30%	1.25%	-0.37%	-2.75%

Explanation of the net change in average consumption from last Board-Approved and Actual for Historical, Bridge and Test Year:

2012 Actual versus 2012 Board-Approved variance

The main drivers for the variance in consumption from the 2012 Board-Approved compared to 2012 Actual load and customer forecasts are:

1. The annual usage of the GS 1000 to 4999 kW customers
2. The annual usage of the Large Use customers

Residential – explanation of the net change from the 2012 Board-Approved Load and Customer Forecast compared to 2012 Actual

Annual residential consumption was lower than forecast by 3.75%.

Annual consumption per residential customer was 3.75% lower than forecast due to a milder-than-normal winter in 2012. HDD and CDD results are summarized in Table 3-37 below.

Table 3-37

	Annual HDD	**Annual CDD**
2012 Actual	1,442	483
2012 Forecast	1850	398
Variance	**408**	**-85**

In addition, the number of residential customers was overestimated by 1,010 customers or 2.11%.

GS less than 50 kW– explanation of the net change from the 2012 Board-Approved Load Forecast compared to 2012 Actual

Billed consumption was lower by 1.93% than forecast. Similar to the residential class, the small commercial class is weather-sensitive and consumption reduction for this class also stemmed from the mild winter in 2012.

GS 50 to 999 kW – explanation of the net change from the 2012 Board-Approved Load Forecast compared to 2012 Actual

The City of Guelph's economic development strategy places a premium on creating a prosperous business environment in Guelph. The actual 2012 annual billed consumption was 1.33% higher than predicted while the billed demand was higher by 3.02%. The usage increase reflects the industry development in Guelph jurisdiction.

GS 1000 to 4999 kW – explanation of the net change from the 2012 Board-Approved Load Forecast compared to 2012 Actual

The actual annual consumption was higher by 5.75% while the demand was lower by 0.55%. The lower demand is due to CDM programs run by Guelph Hydro which resulted in load shifting and more efficient energy use.

Large Use above 5000 kW – explanation of the net change from the 2012 Board-Approved Load Forecast compared to 2012 Actual

Large Use customers consumed 3.47% more and their billed demand was higher than forecast by 2.50%. One existing customer added new production capacity and demand withdrawn from the system, and it was re-classified from GS 1000 to 4999 kW to Large Use class.

Unmetered Scattered Loads (USL) – explanation of the net change from the 2012 Board-Approved Load and Connection Forecast compared to 2012 Actual

The number of USL connections was overestimated by 4.61% which resulted in consumption being overestimated by 14.81%.

Sentinel Lights – explanation of the net change from the 2012 Board-Approved Connection Forecast compared to 2012 Actual

Guelph Hydro has been encouraging commercial customers to have sentinel lights connected behind the main load meter. The majority of these customers had the sentinel lights removed. Therefore the number of sentinel lighting connections dropped by 2.96% which resulted to a lower than forecast energy consumption.

Street Lighting– explanation of the net change from the 2012 Board-Approved Load and Connections Forecast compared to 2012 Actual

The number of street lighting connections was overestimated by 2.38% which resulted in a lower demand than was forecast (-1.18%).

Overall, for 2012, the actual consumption was 1.49% higher than forecasted consumption and the actual number of customers/connections was 2.10% lower than forecast (please see Table 3-14).

Revenues, provided on the basis of both existing and proposed rates:

Table 3-38 Forecast Class Billing Determinants for 2016 Test Year Based on Existing Class Revenue Proportions Revenue At Existing Rates

Class	Annual kWh	Annual kW For Dx	Annualized Customers	Annualized Connections	Fixed Distribution Revenue	Variable Distribution Revenue	Dist. Rev. Including Transformer	Transformer Allowance	Dist. Rev. Excluding Transformer	Dist Rev At Existing Rates %
Residential	381,586,775		602,902		8,736,047	6,715,927	15,451,974		15,451,974	55.13%
GS < 50 kW	150,174,015		49,210		766,206	1,967,280	2,733,486		2,733,486	9.75%
GS 50 to 999 kW	397,678,750	1,037,307	6,808		1,149,384	2,671,067	3,820,451	42,136	3,778,315	13.48%
GS 1000 to 4999 kW	563,100,354	1,194,282	502		322,982	4,110,958	4,433,940	0	4,433,940	15.82%
Large Use	276,633,108	496,250	55		51,988	1,168,569	1,220,558	0	1,220,558	4.35%
Sentinel Lights	21,457	60		72	508	470	977		977	0.00%
Street Lighting	9,628,070	26,693		170,065	68,026	255,393	323,419		323,419	1.15%
USL	1,700,939			6,541	38,725	45,925	84,650		84,650	0.30%
	1,780,523,469	**2,754,593**	**659,477**	**176,678**	**11,133,866**	**16,935,589**	**28,069,455**	**42,136**	**28,027,320**	**100%**

Table 3-39 Forecast Class Billing Determinants for 2016 Test Year Based on Existing Class Revenue Proportions Revenue At Proposed Rates

Class	Annual kWh	Annual kW For Dx	Annualized Customers	Annualized Connections	Fixed Distribution Revenue	Variable Distribution Revenue	Dist. Rev. Including Transformer	Transformer Allowance	Dist. Rev. Excluding Transformer	Dist Rev At Existing Rates %
Residential	381,586,775	0	602,902	0	10,009,337	7,694,783	17,704,120		17,704,120	55.13%
GS < 50 kW	150,174,015	0	49,210	0	824,270	2,116,361	2,940,631		2,940,631	9.16%
GS 50 to 999 kW	397,678,750	1,037,307	6,808	0	1,158,138	2,691,089	3,849,227	42,136	3,807,092	11.86%
GS > 1000 kW	563,100,354	1,194,282	502	0	422,125	5,372,861	5,794,986		5,794,986	18.05%
Large Use	276,633,108	496,250	55	0	59,566	1,338,885	1,398,451		1,398,451	4.35%
Sentinel Lights	21,457	60	0	72	571	529	1,100		1,100	0.00%
Street Lighting	9,628,070	26,693	0	170,065	82,661	310,340	393,001		393,001	1.22%
USL	1,700,939	0	0	6,541	33,325	39,522	72,846		72,846	0.23%
	1,780,523,469	**2,754,593**	**659,477**	**176,678**	**12,589,994**	**19,564,369**	**32,154,363**	**42,136**	**32,112,227**	**100.00%**

This Exhibit provides the details of Guelph Hydro's operating revenue for 2012 Board-Approved, 2012 Actual, 2013 Actual, 2014 Actual, the 2015 Bridge Year, and the 2016 Test Year. This Exhibit also provides a detailed variance analysis by rate class of the operating revenue components. Each variance that is above the materiality threshold is highlighted in yellow (decrease) and blue (increase) and a summary for this variance is provided below in Table 3-40.

Other revenues include, among others, Late Payment Charges, Specific Service Revenues and Retail Services Revenues. A summary of these operating revenues together with a materiality analysis of variances is presented in Table 3-41 in Exhibit 3, Tab 3, Schedule 1, 2.6.3 Other Revenue.

Revenues or costs (including interest) associated with deferral and variance accounts (including LRAMVA), and any revenues or costs associated with CDM programs are not included in Other Revenue.

Table 3-40 SUMMARY OF OPERATING REVENUE

SUMMARY OF BASE DISTRIBUTION REVENUE	2012 Board Approved ($'s)	2012 Actual ($'s)	Variance From 2012 Board Approved ($'s)	2013 Actual ($'s)	Variance from 2012 Actual ($'s)	2014 Actual ($'s)	Variance from 2013 Actual ($'s)	2015 Bridge ($'s)	Variance from 2014 Actual ($'s)	2016 Test ($'s)	Variance from 2015 Bridge ($'s)
Distribution revenue											
Residential	$14,475,924	$13,954,953.80	-$520,971	$14,342,642	$387,688	$15,577,013	$1,234,371	$15,235,219	-$341,794	$17,704,120	$2,468,901
GS<50 kW	$2,552,492	$2,727,662.61	$175,170	$2,646,645	-$81,018	$2,746,644	$99,999	$2,715,124	-$31,520	$2,940,631	$225,508
GS 50 to 999 kW	$3,473,895	$3,563,061.27	$89,166	$3,693,751.69	$130,690	$3,738,132	$44,380	$3,785,218	$47,086	$3,807,092	$21,873
GS 1000 to 4999 kW	$3,690,126	$3,755,109	$64,984	$3,888,488.83	$133,379	$3,970,809	$82,321	$4,304,686	$333,877	$5,794,986	$1,490,300
Large Use	$1,156,045	$1,191,812	$35,766	$1,287,602	$95,790	$1,243,978	-$43,624	$1,243,165	-$813	$1,398,451	$155,286
Unmetered Scattered Load	$97,865	$104,581	$6,716	$101,475	-$3,106	$105,309	$3,834	$87,237	-$18,072	$72,846	-$14,391
Sentinel Lighting	$3,983	$6,018	$2,035	$2,308	-$3,710	$4,286	$1,978	$984	-$3,302	$1,100	$116
Street Lighting	$314,980	$324,022	$9,041	$318,670	-$5,352	$338,939	$20,269	$328,292	-$10,647	$393,001	$64,709
Total	$25,765,312	$25,627,220	-$138,092	$26,281,582	$654,362	$27,725,111	$1,443,528	$27,699,926	-$25,185	$32,112,227	$4,412,301

SUMMARY OF OTHER DISTRIBUTION REVENUE	2012 Board Approved ($'s)	2012 Actual ($'s)	Variance From 2012 Board Approved ($'s)	2013 Actual ($'s)	Variance from 2012 Actual ($'s)	2014 Actual ($'s)	Variance from 2013 Actual ($'s)	2015 Bridge ($'s)	Variance from 2014 Actual ($'s)	2016 Test ($'s)	Variance from 2015 Bridge ($'s)
Other Distribution Revenue											
Late payment Charges	$127,572	$122,011	-$5,561	$125,076	$3,065	$115,604	-$9,472	$120,000	$4,396	$120,000	$0
Specific Service Charges	$420,904	$329,986	-$90,918	$304,338	-$25,648	$468,909	$164,570	$405,720	-$63,189	$426,370	$20,650
Other Distribution Revenue & Other Revenues	$542,120	$474,347	-$67,773	$511,226	$36,879	$576,428	$65,202	$600,630	$24,202	$610,833	$10,203
Other Income and Deductions	$1,116,404	$1,167,920	$51,516	$1,421,398	$253,478	$1,030,077	-$391,321	$1,007,789	-$22,288	$1,049,998	$42,208
Total Other Distrib. Revenue	$2,207,000	$2,094,265	-$112,735	$2,362,039	$267,774	$2,191,019	-$171,020	$2,134,139	-$56,879	$2,207,201	$73,061
TOTAL DISTRIBUTION REVENUE	$27,972,312	$27,721,484	-$250,827	$28,643,621	$922,136	$29,916,129	$1,272,508	$29,834,065	-$82,064	$34,319,428	$4,485,363

% Distrib.Revenue	92.11%	92.45%	91.75%	92.68%	92.85%	93.57%
% Other Distrib.Revenue	7.89%	7.55%	8.25%	7.32%	7.15%	6.43%

VARIANCE ANALYSIS ON OPERATING REVENUE:

Guelph Hydro's 2015 distribution revenue has been calculated using its most recently approved rates. In particular, 2015 distribution rates are based on the Board's decision on Guelph Hydro's 2015 IRM application EB-2014-0077 dated December 4, 2014.

The 2016 distribution revenue has been calculated using the 2016 proposed distribution rates as set in Exhibit 8, Tab 10, Schedule 1, 2.11.10 Tariff of Rates and Charges.

As noted above, distribution revenue does not include commodity-related revenue.

A summary of operating revenues is presented in the above Table 3-40. Please use Table 3-40 as reference for the below analysis.

2012 Board-Approved Operating Revenue:

Guelph Hydro's 2012 Board-Approved operating revenue was forecast to be $27,972,312. Base distribution revenue totalled $25,765,312 or 92.11% of total operating revenues and other distribution revenues (net) totalled $2,207,000 or 7.89% of the Board-Approved 2012 operating revenue.

2012 Actual Operating Revenue:

Guelph Hydro's operating revenue in fiscal 2012 was $27,721,484. Base distribution revenue totalled $25,627,220 or 92.45% of total operating revenues. Other distribution revenue (net) was $2,094,265 or 7.55% of Guelph Hydro's actual 2012 operating revenue.

Comparison 2012 Actual to 2012 Board-Approved:

As shown in Table 3-40 above, the total operating revenue was $250,827 lower than the 2012 Board-approved level forecasted.

The actual base distribution revenue was lower than the Board-approved amount due to lower than forecast residential consumption.

2013 Actual Operating Revenue

Guelph Hydro's operating revenue in fiscal 2013 was $28,643,621. Base distribution revenue totalled $26,281,582 or 91.75% of total operating revenues. Other distribution revenues (net) accounts for the remaining revenue of $2,362,039.

Comparison 2013 Actual to 2012 Actual:

The total 2013 operating revenue was $922,136 higher than the 2012 actual operating revenue largely due to an increase of $267,774 in Other Distribution Revenue. Other drivers of the variance were: increased residential and commercial consumption, and higher other income and deductions (further details are provided in Exhibit 3, Tab 3, Schedule 1, 2.6.3 Other Revenue).

2014 Actual Operating Revenue

Guelph Hydro's total operating revenue in fiscal 2014 was $29,916,129. Base distribution revenue totalled $27,725,111 or 92.68% of total revenues. (Net) Other distribution revenue was $2,191,019.

Comparison 2014 Actual to 2013 Actual:

The total 2014 operating revenue was $1,272,508 higher than the 2013 actual operating revenue. Base distribution revenue increased by $1,443,528 due mainly to increased revenue from the Residential and General Service classes. The increase in operating revenue was offset by lower Other distribution revenue of $171,020.

2015 Bridge Year Operating Revenue:

Guelph Hydro's operating revenue is forecast to be $29,834,065 in fiscal 2015. Base distribution revenue totals $27,699,926 or 92.85% of total revenues. Other distribution revenue (net) accounts for the remaining revenue amount of $2,134,139.

Comparison 2015 Bridge to 2014 Actual:

The total operating revenue is expected to be $82,064 lower than the actual year level in fiscal 2014. This decrease is the result of higher revenue forecast for the General Service above 1,000 kW classes. The higher revenues from the General Services above 1,000 kW classes are offset by lower forecast revenues from the other rate classes.

2016 Test Year:

Guelph Hydro's total operating revenue is forecast to be $34,319,428 in fiscal 2016. Base distribution Revenue totals $32,112,227 or 93.58% of total operating revenues. (Net) Other distribution revenue accounts for the remaining revenue amount of $2,207,201.

Comparison 2016 Test to 2015 Bridge Year:

Total operating revenue is expected to be $4,526,830 above the 2015 Bridge Year level in fiscal 2016. This increase is the result of an increase in revenue requirement for 2016. See Exhibit 6, Tab 6, 2.9.6 Summary of Drivers of Test Year Deficiency, for an explanation of the revenue increase for 2016 Test Year.

2.6.3 OTHER REVENUE

Preamble: To allow for a practical, yet detailed, review of Other Distribution Revenue, Guelph Hydro has selected a materiality threshold of $172,000 in its analysis (0.5% of the proposed distribution revenue requirement). Guelph Hydro has provided explanations for variances of other revenue that exceed this materiality threshold.

New Specific Service Charges

Guelph Hydro is applying for two new specific charges, Bond Connections – Underground and Overhead (for details please see Exhibit 8, Tab 7, Schedule 1, 2.11.7 Specific Service Charges). The revenue derived from these two new specific charges are included in the 2016 other distribution revenue.

All of Guelph Hydro's existing specific charges are the default charges specified in the 2006 EDR Handbook, and Guelph Hydro is applying to maintain its existing specific charges.

Revenues or costs (including interest) associated with deferral and variance accounts

Guelph Hydro has not included any revenues or costs (including interest) associated with deferral and variance accounts in Other Revenue.

Analysis of Other Distribution Revenues

Other Distribution revenue consists mainly of OEB-Specific Charges based on standardized rates. In addition, other distribution revenue includes interest and other miscellaneous charges.

A summary of Other Distribution Revenue is presented in Table 3-41 below:

Table 3-41 SUMMARY OF OTHER DISTRIBUTION REVENUE

SUMMARY OF OTHER DISTRIBUTION REVENUE	2012 Board Approved	2012 Actual	Variance From 2012 Board Approved	2013 Actual	Variance from 2012 Actual	2014 Actual	Variance from 2013 Actual	2015 Bridge	Variance from 2014 Actual	2016 Test	Variance from 2015 Bridge
Other Distribution Revenue	($'s)	($'s)	($'s)	($'s)	($'s)	($'s)	($'s)	($'s)	($'s)	($'s)	($'s)
Late payment Charges	$127,572	$122,011	-$5,561	$125,076	$3,065	$115,604	-$9,472	$120,000	$4,396	$120,000	$0
Specific Service Charges	$420,904	$329,986	-$90,918	$304,338	-$25,648	$468,909	$164,570	$405,720	-$63,189	$426,370	$20,650
Other Distribution Revenue & Other Revenues	$542,120	$474,347	-$67,773	$511,226	$36,879	$576,428	$65,202	$600,630	$24,202	$610,833	$10,203
Other Income and Deductions	$1,116,404	$1,167,920	$51,516	$1,421,398	$253,478	$1,030,077	-$391,321	$1,007,789	-$22,288	$1,049,998	$42,208
Total Other Distrib. Revenue	$2,207,000	$2,094,265	-$112,735	$2,362,039	$267,774	$2,191,019	-$171,020	$2,134,139	-$56,879	$2,207,201	$73,061
TOTAL DISTRIBUTION REVENUE	$27,972,312	$27,721,484	-$250,827	$28,643,621	$922,136	$29,916,129	$1,272,508	$29,834,065	-$82,064	$34,319,428	$4,485,363

Note: Please also see Appendix 2-H –Other Operating Revenue in Appendix 3-B.

YEAR OVER YEAR VARIANCE ANALYSIS OF OTHER DISTRIBUTION REVENUE

The following analysis is for account variances that either exceeds the materiality threshold of $172,000, or for where the total amounts in the USofA account is significant when compared to overall Other Revenues:

Account 4375 – Revenue from Non-Utility Operations — 2013 Actual to 2012 Actual

Account 4375 records revenue from Non-Utility operations, and for Guelph Hydro, the revenues in this account are dominated by water billing and collecting services provided to the City of Guelph. Revenues from water billing and collecting services account for approximately 50 per cent of total Other Revenues, and so year-over-year changes are material enough to warrant comment despite the change in the revenues recorded in this account being well below the materiality threshold. In 2013, all of the change in this account compared to 2012 stemmed from an increase in the amount charged to the City of Guelph for water billing and collecting services. The increase in water billing and collecting services was offset by lower revenues from services provided to the distribution companies for utility solution legend application services.

Account 4380 Expenses of Non-Utility Operations — 2013 Actual to 2012 Actual

Expenses from providing services to generate Non-Utility Operations revenues were below the materiality threshold in 2013 compared to 2012.

Account 4375 – Revenue from Non-Utility Operations — 2014 Actual versus 2013 Actual

An isolated examination of the revenues recorded in Account 4375 shows a significant increase of $847,000 in 2014 relative 2013. However, Guelph Hydro reviewed its practice of recording costs for providing Non-Utility services and adjusted Account 4380

— Expenses of Non-Utility Operations to better match the costs of providing Non-Utility services against the revenues received for these services. After effecting this change, there was a $353,000 reduction in the Revenue received from Non-Utility Operations in 2014 compared to 2013. For example, meter reading and employee costs of providing water billing and collecting services had been recorded in General Administration expenses prior to 2014, but these costs should appropriately be recorded in Account 4380 — Expenses of Non-Utility Operations.

Account 4380 Expenses of Non-Utility Operations — 2014 Actual versus 2013 Actual

In addition to the explanation above, the significant change in this Account reflects the recording of services purchased by Guelph Hydro from its affiliated company, Guelph Municipal Holdings Inc. A detailed explanation of these purchased services is provided in Exhibit 4, Tab 3, Schedule 2, 2.7.3.2 Shared Services and Corporate Cost Allocation.

Account 4375 – Revenue from Non-Utility Operations — 2015 Bridge Year versus 2014 Actual

The revenues from Non-Utility Operations are forecast to decrease by about $17,000 due mainly to the completion of an initiative to provide mapping services to the utilities at the end of 2014.

Account 4380 Expenses of Non-Utility Operations — 2015 Bridget Year versus 2014 Actual

With the completion of an initiative to provide mapping services to other utilities in 2014, Expenses from providing Non-Utility Operations are forecast to decline by about $11,000 in 2015 relative to 2014.

Account 4375 – Revenue from Non-Utility Operations — 2016 Test Year versus 2015 Bridge Year

The revenues from Non-Utility Operations are forecast to increase by just under $44,000 due mainly to a forecast inflationary increase in water billing and collecting revenues.

Account 4380 Expenses of Non-Utility Operations — 2016 Test Year versus 2015 Bridge Year

Expenses from providing Non-Utility Operations are forecast to increase by just under $12,000 in 2016 relative to 2015. The cost increase is indicative of general inflationary increases in the costs of providing water billing and collecting services to the City of Guelph.

Account 4235 – Specific Service Charges — 2013 Actual to 2012 Actual

Account 4235 records a host of specific charges for utility services, including microFIT and FIT service revenues, revenues from the sale of scrap metal, and miscellaneous reconnection and collection charges. The change in this account in 2013 over 2012 was immaterial.

Account 4235 – Specific Service Charges — 2014 Actual to 2013 Actual

Revenue from Specific Service Charges increased by $165,000 in 2014 compared to 2013. Most of the increase in this Account was due to two revenue categories: Miscellaneous /Collection revenue which accounted for $85,000 of the $165,000 increase. Revenues from this account relate primarily to the collection of NSF charges and collections from disconnection notices. In 2013, Guelph Hydro's Credit Department experienced a situation that saw all its employees going on extended periods of sick leave at different times of the year. This hampered the "normal"

collection cycle for much of 2013, and consequently resulted in lower revenues from collections. In late-2013 and 2014, management took steps to address staffing issues in the Credit Department, and collection activity and the attendant revenues from this activity in 2014 reflected a return to a normal collection effort as well as some catch up from 2013. Guelph Hydro believes that the lower forecast revenues from these specific service charges in 2015 and 2016 are reflective of a return to normal levels of collection activities without any "catch-up" from previous years.

The second revenue category contributing to the revenue increase was MicroFit/FIT service revenue which accounted for about $50,000 of the $165,000 increase. The increase in revenue from enabling MicroFit/FIT connections is primarily due to an increase in the monthly service charge rate for FIT customers. In December 2013, the OEB's Market Operations advised Guelph Hydro to treat FIT customers as a customer of the class that is most suitable for their size, generally as General Service below 50 kW or General Service 50 to 999 kW and charge the corresponding approved fixed monthly charge.

Account 4235 – Specific Service Charges — 2015 Bridge Year versus 2014 Actual

Guelph Hydro is continuing to forecast higher revenues from Specific Service Charges in 2015 relative to 2013, but not as high as in 2014, as revenues from the two largest sub-categories in this Account (Miscellaneous /Collection Charges and MicroFit/FIT Charges) are expected to moderate.

Account 4235 – Specific Service Charges — 2016 Test Year versus 2015 Bridge Year

Revenues from Specific Service charges are expected to increase by just under five percent, or about $20,000 in the 2016 Test Year relative to the 2015 Bridge Year.

Table 3-42 - Other Distribution Revenue Year-over-Year variances

2012 ACTUAL TO 2013 ACTUAL			
Account	**2012 Actual**	**2013 Actual**	**Variance**
SPECIFIC CHARGES			
4235-Miscellaneous Service Revenues	-$329,986	-$304,338	$25,648
LATE PAYMENT CHARGES			
4225-Late Payment Charges	-$122,011	-$125,076	-$3,065
OTHER DISTRIBUTION REVENUE			
4082-RS Rev	$0	-$5,518	-$5,518
4084-Serv Tx Requests	$0	-$4,854	-$4,854
4086-SSS Administration Charge	-$140,955	-$141,401	-$446
4090-Electric Services Incidental to Energy Sales	$0	$0	$0
4205-Interdepartmental Rents	$0	$0	$0
4210-Rent from Electric Property	-$333,392	-$359,453	-$26,061
4215-Other Utility Operating Income	$0	$0	$0
4220-Other Electric Revenues	$0	$0	$0
4240-Provision for Rate Refunds	$0	$0	$0
4245-Government Assistance Directly Credited to Income	$0	$0	$0

2013 ACTUAL TO 2014 ACTUAL			
Account	**2013 Actual**	**2014 Actual**	**Variance**
SPECIFIC CHARGES			
4235-Miscellaneous Service Revenues	-$304,338	-$468,909	-$164,570
LATE PAYMENT CHARGES			
4225-Late Payment Charges	-$125,076	-$115,604	$9,472
OTHER DISTRIBUTION REVENUE			
4082-RS Rev	-$5,518	-$42,689	-$37,171
4084-Serv Tx Requests	-$4,854	-$41,687	-$36,833
4086-SSS Administration Charge	-$141,401	-$151,131	-$9,730
4090-Electric Services Incidental to Energy Sales	$0	$0	$0
4205-Interdepartmental Rents	$0	$0	$0
4210-Rent from Electric Property	-$359,453	-$340,922	$18,531
4215-Other Utility Operating Income	$0	$0	$0
4220-Other Electric Revenues	$0	$0	$0
4240-Provision for Rate Refunds	$0	$0	$0
4245-Government Assistance Directly Credited to Income	$0	$0	$0

2012 ACTUAL TO 2013 ACTUAL			
Account	**2012 Actual**	**2013 Actual**	**Variance**
OTHER INCOME AND DEDUCTIONS			
4305-Regulatory Debits	$0	$0	$0
4310-Regulatory Credits	$0	$0	$0
4315-Revenues from Electric Plant Leased to Others	$0	$0	$0
4320-Expenses of Electric Plant Leased to Others	$0	$0	$0
4325-Revenues from Merchandise, Jobbing, Etc.	$0	$0	$0
4330-Costs and Expenses of Merchandising, Jobbing, Etc	$0	$0	$0
4335-Profits and Losses from Financial Instrument Hedges	$0	$0	$0
4340-Profits and Losses from Financial Instrument Investments	$0	$0	$0
4345-Gains from Disposition of Future Use Utility Plant	$0	$0	$0
4350-Losses from Disposition of Future Use Utility Plant	$0	$0	$0

2013 ACTUAL TO 2014 ACTUAL			
Account	**2013 Actual**	**2014 Actual**	**Variance**
OTHER INCOME AND DEDUCTIONS			
4305-Regulatory Debits	$0	$0	$0
4310-Regulatory Credits	$0	$0	$0
4315-Revenues from Electric Plant Leased to Others	$0	$0	$0
4320-Expenses of Electric Plant Leased to Others	$0	$0	$0
4325-Revenues from Merchandise, Jobbing, Etc.	$0	$0	$0
4330-Costs and Expenses of Merchandising, Jobbing, Etc	$0	$0	$0
4335-Profits and Losses from Financial Instrument Hedges	$0	$0	$0
4340-Profits and Losses from Financial Instrument Investments	$0	$0	$0
4345-Gains from Disposition of Future Use Utility Plant	$0	$0	$0
4350-Losses from Disposition of Future Use Utility Plant	$0	$0	$0

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2012 ACTUAL TO 2013 ACTUAL			
Account	**2012 Actual**	**2013 Actual**	**Variance**
4355-Gain on Disposition of Utility and Other Property	-$21,306	-$107,222	-$85,916
4360-Loss on Disposition of Utility and Other Property	$13,057	$51,903	$38,846
4365-Gains from Disposition of Allowances for Emission	$0	$0	$0
4370-Losses from Disposition of Allowances for Emission	$0	$0	$0
4375-Revenues from Non-Utility Operations	-$1,085,224	-$1,175,719	-$90,494
4380-Expenses of Non-Utility Operations	$28,235	-$7,467	-$35,702
4385-Non-Utility Rental Income	$0	$0	$0
4390-Miscellaneous Non-Operating Income	$0	$0	$0
4395-Rate-Payer Benefit Including Interest	$0	$0	$0
4398-Foreign Exchange Gains and Losses, Including Amortization	$0	-$15,683	-$15,683
INVESTMENT INCOME			
4405-Interest and Dividend Income	-$102,681	-$167,210	-$64,529
4415-Equity in Earnings of Subsidiary Companies	$0	$0	$0
Total	-$2,094,265	-$2,362,039	

2013 ACTUAL TO 2014 ACTUAL			
Account	**2013 Actual**	**2014 Actual**	**Variance**
4355-Gain on Disposition of Utility and Other Property	-$107,222	-$89,625	$17,597
4360-Loss on Disposition of Utility and Other Property	$51,903	$0	-$51,903
4365-Gains from Disposition of Allowances for Emission	$0	$0	$0
4370-Losses from Disposition of Allowances for Emission	$0	$0	$0
4375-Revenues from Non-Utility Operations	-$1,175,719	-$2,023,006	-$847,288
4380-Expenses of Non-Utility Operations	-$7,467	$1,192,755	$1,200,222
4385-Non-Utility Rental Income	$0	$0	$0
4390-Miscellaneous Non-Operating Income	$0	$0	$0
4395-Rate-Payer Benefit Including Interest	$0	$0	$0
4398-Foreign Exchange Gains and Losses, Including Amortization	-$15,683	$0	$15,683
INVESTMENT INCOME			
4405-Interest and Dividend Income	-$167,210	-$110,201	$57,009
4415-Equity in Earnings of Subsidiary Companies	$0	$0	$0
Total	-$2,362,039	-$2,191,019	

2014 ACTUAL TO 2015 BRIDGE YEAR			
Account	**2014 Actual**	**2015 Bridge**	**Variance**
SPECIFIC CHARGES			
4235-Miscellaneous Service Revenues	-$468,909	-$405,720	$63,189
LATE PAYMENT CHARGES			
4225-Late Payment Charges	-$115,604	-$120,000	-$4,396
OTHER DISTRIBUTION REVENUE			
4082-RS Rev	-$42,689	-$52,608	-$9,919
4084-Serv Tx Requests	-$41,687	-$46,279	-$4,592
4086-SSS Administration Charge	-$151,131	-$154,671	-$3,540
4090-Electric Services Incidental to Energy Sales	$0	$0	$0
4205-Interdepartmental Rents	$0	$0	$0
4210-Rent from Electric Property	-$340,922	-$347,072	-$6,150
4215-Other Utility Operating Income	$0	$0	$0
4220-Other Electric Revenues	$0	$0	$0
4240-Provision for Rate Refunds	$0	$0	$0
4245-Government Assistance Directly Credited to Income	$0	$0	$0

2015 BRIDGE YEAR TO 2016 TEST YEAR			
Account	**2015 Bridge**	**2016 Test**	**Variance**
SPECIFIC CHARGES			
4235-Miscellaneous Service Revenues	-$405,720	-$426,370	-$20,650
LATE PAYMENT CHARGES			
4225-Late Payment Charges	-$120,000	-$120,000	$0
OTHER DISTRIBUTION REVENUE			
4082-RS Rev	-$52,608	-$53,999	-$1,391
4084-Serv Tx Requests	-$46,279	-$47,503	-$1,224
4086-SSS Administration Charge	-$154,671	-$159,759	-$5,088
4090-Electric Services Incidental to Energy Sales	$0	$0	$0
4205-Interdepartmental Rents	$0	$0	$0
4210-Rent from Electric Property	-$347,072	-$349,572	-$2,500
4215-Other Utility Operating Income	$0	$0	$0
4220-Other Electric Revenues	$0	$0	$0
4240-Provision for Rate Refunds	$0	$0	$0
4245-Government Assistance Directly Credited to Income	$0	$0	$0

2014 ACTUAL TO 2015 BRIDGE YEAR			
Account	**2014 Actual**	**2015 Bridge**	**Variance**
OTHER INCOME AND DEDUCTIONS			
4305-Regulatory Debits	$0	$0	$0
4310-Regulatory Credits	$0	$0	$0
4315-Revenues from Electric Plant Leased to Others	$0	$0	$0
4320-Expenses of Electric Plant Leased to Others	$0	$0	$0
4325-Revenues from Merchandise, Jobbing, Etc.	$0	$0	$0
4330-Costs and Expenses of Merchandising, Jobbing, Etc	$0	$0	$0
4335-Profits and Losses from Financial Instrument Hedges	$0	$0	$0
4340-Profits and Losses from Financial Instrument Investments	$0	$0	$0
4345-Gains from Disposition of Future Use Utility Plant	$0	$0	$0
4350-Losses from Disposition of Future Use Utility Plant	$0	$0	$0

2015 BRIDGE YEAR TO 2016 TEST YEAR			
Account	**2015 Bridge**	**2016 Test**	**Variance**
OTHER INCOME AND DEDUCTIONS			
4305-Regulatory Debits	$0	$0	$0
4310-Regulatory Credits	$0	$0	$0
4315-Revenues from Electric Plant Leased to Others	$0	$0	$0
4320-Expenses of Electric Plant Leased to Others	$0	$0	$0
4325-Revenues from Merchandise, Jobbing, Etc.	$0	$0	$0
4330-Costs and Expenses of Merchandising, Jobbing, Etc	$0	$0	$0
4335-Profits and Losses from Financial Instrument Hedges	$0	$0	$0
4340-Profits and Losses from Financial Instrument Investments	$0	$0	$0
4345-Gains from Disposition of Future Use Utility Plant	$0	$0	$0
4350-Losses from Disposition of Future Use Utility Plant	$0	$0	$0

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2014 ACTUAL TO 2015 BRIDGE YEAR			
Account	**2014 Actual**	**2015 Bridge**	**Variance**
4355-Gain on Disposition of Utility and Other Property	-$89,625	-$110,000	-$20,375
4360-Loss on Disposition of Utility and Other Property	$0	$0	$0
4365-Gains from Disposition of Allowances for Emission	$0	$0	$0
4370-Losses from Disposition of Allowances for Emission	$0	$0	$0
4375-Revenues from Non-Utility Operations	-$2,023,006	-$1,993,852	$29,154
4380-Expenses of Non-Utility Operations	$1,192,755	$1,181,036	-$11,719
4385-Non-Utility Rental Income	$0	$0	$0
4390-Miscellaneous Non-Operating Income	$0	$0	$0
4395-Rate-Payer Benefit Including Interest	$0	$0	$0
4398-Foreign Exchange Gains and Losses, Including Amortization	$0	$0	$0
INVESTMENT INCOME			
4405-Interest and Dividend Income	-$110,201	-$84,973	$25,228
4415-Equity in Earnings of Subsidiary Companies	$0	$0	$0
Total	-$2,191,019	-$2,134,139	

2015 BRIDGE YEAR TO 2016 TEST YEAR			
Account	**2015 Bridge**	**2016 Test**	**Variance**
4355-Gain on Disposition of Utility and Other Property	-$110,000	-$125,000	-$15,000
4360-Loss on Disposition of Utility and Other Property	$0	$0	$0
4365-Gains from Disposition of Allowances for Emission	$0	$0	$0
4370-Losses from Disposition of Allowances for Emission	$0	$0	$0
4375-Revenues from Non-Utility Operations	-$1,993,852	-$2,038,137	-$44,285
4380-Expenses of Non-Utility Operations	$1,181,036	$1,192,735	$11,699
4385-Non-Utility Rental Income	$0	$0	$0
4390-Miscellaneous Non-Operating Income	$0	$0	$0
4395-Rate-Payer Benefit Including Interest	$0	$0	$0
4398-Foreign Exchange Gains and Losses, Including Amortization	$0	$0	$0
INVESTMENT INCOME			
4405-Interest and Dividend Income	-$84,973	-$79,596	$5,377
4415-Equity in Earnings of Subsidiary Companies	$0	$0	$0
Total	-$2,134,139	-$2,207,201	

Table 3-43 Other Operating Revenue -Variances Actual Historical Years to Forecast for Bridge and Test Years						
Account	**Variance from 2012 to 2015**	**Variance from 2013 to 2015**	**Variance from 2014 to 2015**	**Variance from 2012 to 2016**	**Variance from 2013 to 2016**	**Variance from 2014 to 2016**
SPECIFIC CHARGES						
4235-Miscellaneous Service Revenues	$75,734	$101,382	-$63,189	$96,384	$122,032	-$42,539
LATE PAYMENT CHARGES						
4225-Late Payment Charges	-$2,011	-$5,076	$4,396	-$2,011	-$5,076	$4,396
OTHER DISTRIBUTION REVENUE						
4082-RS Rev	$52,608	$47,090	$9,919	$53,999	$48,481	$11,311
4084-Serv Tx Requests	$46,279	$41,425	$4,592	$47,503	$42,649	$5,816
4086-SSS Administration Charge	$13,716	$13,270	$3,540	$18,804	$18,358	$8,628
4090-Electric Services Incidental to Energy Sales	$0	$0	$0	$0	$0	$0
4205-Interdepartmental Rents	$0	$0	$0	$0	$0	$0
4210-Rent from Electric Property	$13,680	-$12,381	$6,150	$16,180	-$9,881	$8,650
4215-Other Utility Operating Income	$0	$0	$0	$0	$0	$0
4220-Other Electric Revenues	$0	$0	$0	$0	$0	$0
4240-Provision for Rate Refunds	$0	$0	$0	$0	$0	$0
4245-Government Assistance Directly Credited to Income	$0	$0	$0	$0	$0	$0

Table 3-43 Other Operating Revenue -Variances Actual Historical Years to Forecast for Bridge and Test Years						
Account	Variance from 2012 to 2015	Variance from 2013 to 2015	Variance from 2014 to 2015	Variance from 2012 to 2016	Variance from 2013 to 2016	Variance from 2014 to 2016
OTHER INCOME AND DEDUCTIONS						
4305-Regulatory Debits	$0	$0	$0	$0	$0	$0
4310-Regulatory Credits	$0	$0	$0	$0	$0	$0
4315-Revenues from Electric Plant Leased to Others	$0	$0	$0	$0	$0	$0
4320-Expenses of Electric Plant Leased to Others	$0	$0	$0	$0	$0	$0
4325-Revenues from Merchandise, Jobbing, Etc.	$0	$0	$0	$0	$0	$0
4330-Costs and Expenses of Merchandising, Jobbing, Etc	$0	$0	$0	$0	$0	$0
4335-Profits and Losses from Financial Instrument Hedges	$0	$0	$0	$0	$0	$0
4340-Profits and Losses from Financial Instrument Investments	$0	$0	$0	$0	$0	$0
4345-Gains from Disposition of Future Use Utility Plant	$0	$0	$0	$0	$0	$0
4350-Losses from Disposition of Future Use Utility Plant	$0	$0	$0	$0	$0	$0

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Table 3-43 Other Operating Revenue -Variances Actual Historical Years to Forecast for Bridge and Test Years						
Account	**Variance from 2012 to 2015**	**Variance from 2013 to 2015**	**Variance from 2014 to 2015**	**Variance from 2012 to 2016**	**Variance from 2013 to 2016**	**Variance from 2014 to 2016**
4355-Gain on Disposition of Utility and Other Property	$88,694	$2,778	$20,375	$103,694	$17,778	$35,375
4360-Loss on Disposition of Utility and Other Property	$13,057	$51,903	$0	$13,057	$51,903	$0
4365-Gains from Disposition of Allowances for Emission	$0	$0	$0	$0	$0	$0
4370-Losses from Disposition of Allowances for Emission	$0	$0	$0	$0	$0	$0
4375-Revenues from Non-Utility Operations	$908,628	$818,133	-$29,154	$952,912	$862,418	$15,130
4380-Expenses of Non-Utility Operations	-$1,152,801	-$1,188,503	$11,719	-$1,164,500	-$1,200,202	$20
4385-Non-Utility Rental Income	$0	$0	$0	$0	$0	$0
4390-Miscellaneous Non-Operating Income	$0	$0	$0	$0	$0	$0
4395-Rate-Payer Benefit Including Interest	$0	$0	$0	$0	$0	$0
4398-Foreign Exchange Gains and Losses, Including Amortization	$0	-$15,683	$0	$0	-$15,683	$0
INVESTMENT INCOME						
4405-Interest and Dividend Income	-$17,708	-$82,237	-$25,228	-$23,086	-$87,615	-$30,606
4415-Equity in Earnings of Subsidiary Companies	$0	$0	$0	$0	$0	$0
Total	$39,875	-$227,899	-$56,879	$112,936	-$154,838	$16,182

APPENDIX 3-A: Explanation of Results Returned by the Regression tool and the Monthly Data Used for Regression Analysis

Explanation of results returned by the Regression tool:

Multiple R: The Coefficient of Correlation estimates the strength of the relationship between actual load and the explanatory variables. The load forecast model shows a multiple R of 0.95, which is indicative of a strong relationship between actual purchases and the independent (or explanatory) variables used in the regression model.

R Squared: Square of Multiple R (also termed the coefficient of determination): The percentage of the variation in load that is explained by the variables. The model resulted in an R^2 of 0.91; meaning that the independent variables explain the variation of the dependent variable (purchases) quite well.

Adjusted R Squared: Adding more variables to a model increases the value of R-squared. The Adjusted R-Squared provides a relative measure of fit adjusted for number of variables (degrees of freedom). The model resulted in an Adjusted R-Squared of 0.90 which indicates a good fit.

Standard Error: Typical deviation of the data points about the sample regression line. Useful when compared to the mean to calculate the percent error.

Observations: Number of observations in the sample.

Anova Table: Measure of Fit for the Entire Model.

Degrees of freedom (df): the number of elements (of a set) that can be chosen feely, or the number of variable that can vary freely.

Regressors: Number of independent variables in the model.

Residual: The number of observations – less the number of independent variables in the model – 1

Sum of Squares (SS): Provides the individual components of the sum of squares.

Mean Square (MS): Sum of squares divided by the degrees of freedom.

F-Test (F): The average explained variation in relationship to the explained variation.

Significance F: The probability that the model does NOT explain the variation in load.

Coefficients: Values that yield the greatest correlation coefficient squared (R-Square).

Standard Error: Typical deviation of the points about the sample regression line.

T-Stat: Measures the statistical significance of each independent variable.

P-value: The probability that the variable does NOT explain the variation in load.

	Purchased wo Losses	Heating Degree Days 10 =V1	Cooling Degree Days=V2	Number of Days in Month=V3	Number of Peak Hours=V4	Blackout Flag=V5	Manufacturing GDP chained in Jan 2007= V6	Trend variable "Dummy" = V7	Predicted Purchases	Mean absolute error (MAPE)
Jan-98	120,876,076	377	0	31	336	0	86.05	1	115,377,301	4.55%
Feb-98	109,647,813	288	0	28	320	0	87.36	2	105,803,418	3.51%
Mar-98	119,394,242	277	0	31	352	0	88.02	3	114,940,789	3.73%
Apr-98	107,194,793	56	0	30	336	0	88.19	4	105,318,592	1.75%
May-98	110,274,560	0	29	31	320	0	87.71	5	106,924,929	3.04%
Jun-98	113,606,458	1	82	30	352	0	87.09	6	111,485,640	1.87%
Jul-98	113,134,831	0	101	31	352	0	85.37	7	114,509,205	1.21%
Aug-98	117,588,202	0	118	31	320	0	87.45	8	114,681,914	2.47%
Sep-98	110,772,099	0	45	30	336	0	88.90	9	108,615,923	1.95%
Oct-98	112,709,426	24	0	31	336	0	89.76	10	108,401,674	3.82%
Nov-98	115,634,976	156	0	30	336	0	89.70	11	110,244,771	4.66%
Dec-98	117,508,359	289	0	31	336	0	91.34	12	117,355,416	0.13%
Jan-99	125,917,994	502	0	31	320	0	91.56	13	122,682,194	2.57%
Feb-99	112,419,044	324	0	28	320	0	92.00	14	111,269,573	1.02%
Mar-99	122,572,432	307	0	31	368	0	91.85	15	121,057,627	1.24%
Apr-99	109,359,554	67	0	30	336	0	93.03	16	110,161,067	0.73%
May-99	111,042,968	1	19	31	320	0	92.75	17	110,798,577	0.22%
Jun-99	120,634,269	0	96	30	352	0	94.64	18	118,486,909	1.78%
Jul-99	123,553,938	0	197	31	336	0	95.18	19	128,244,753	3.80%
Aug-99	118,485,727	0	79	31	336	0	96.66	20	119,450,770	0.81%
Sep-99	116,087,486	0	49	30	336	0	97.54	21	115,384,346	0.61%
Oct-99	116,530,754	54	0	31	320	0	97.12	22	113,843,256	2.31%
Nov-99	120,137,006	138	0	30	352	0	99.19	23	117,779,942	1.96%
Dec-99	123,120,873	332	0	31	336	0	101.54	24	125,856,748	2.22%
Jan-00	132,482,862	491	0	31	320	0	101.45	25	129,438,247	2.30%
Feb-00	124,296,760	381	0	29	336	0	101.09	26	123,027,675	1.02%
Mar-00	126,391,412	177	0	31	368	0	103.67	27	125,294,883	0.87%
Apr-00	115,650,049	111	0	30	304	0	102.88	28	116,083,442	0.37%
May-00	120,319,665	4	24	31	352	0	104.69	29	121,770,388	1.21%
Jun-00	122,092,714	0	41	30	352	0	105.25	30	121,382,181	0.58%
Jul-00	118,226,163	0	72	31	320	0	105.56	31	124,017,209	4.90%
Aug-00	128,441,396	0	93	31	352	0	106.65	32	128,867,720	0.33%
Sep-00	121,012,286	7	35	30	320	0	106.70	33	119,914,624	0.91%
Oct-00	123,847,689	38	1	31	336	0	106.98	34	121,759,040	1.69%
Nov-00	127,767,371	200	0	30	352	0	106.91	35	125,565,637	1.72%
Dec-00	131,012,367	532	0	31	304	0	105.99	36	133,668,068	2.03%
Jan-01	135,846,054	437	0	31	352	0	104.00	37	133,606,164	1.65%
Feb-01	121,722,007	364	0	28	320	0	103.11	38	122,187,432	0.38%
Mar-01	131,118,906	319	0	31	352	0	102.19	39	129,537,765	1.21%
Apr-01	116,834,346	90	1	30	320	0	101.75	40	118,242,777	1.21%
May-01	119,625,195	0	12	31	352	0	102.19	41	121,504,300	1.57%
Jun-01	124,543,674	0	80	30	336	0	101.42	42	123,494,756	0.84%
Jul-01	121,840,585	0	101	31	336	0	100.07	43	126,926,761	4.17%
Aug-01	132,701,947	0	160	31	352	0	99.85	44	133,056,376	0.27%
Sep-01	117,876,415	3	36	30	304	0	98.07	45	116,302,887	1.33%
Oct-01	123,985,757	54	2	31	352	0	98.35	46	121,160,507	2.28%
Nov-01	122,675,409	100	0	30	352	0	98.67	47	120,489,108	1.78%
Dec-01	120,522,977	261	0	31	304	0	96.38	48	122,843,674	1.93%
Jan-02	132,472,741	324	0	31	352	0	100.62	49	130,620,977	1.40%
Feb-02	120,584,948	316	0	28	320	0	101.90	50	122,231,708	1.37%
Mar-02	128,573,487	298	0	31	320	0	100.74	51	127,829,308	0.58%
Apr-02	122,493,739	129	8	30	352	0	102.03	52	124,619,598	1.74%
May-02	120,901,842	49	8	31	352	0	102.97	53	125,027,983	3.41%
Jun-02	123,228,452	0	70	30	320	0	101.84	54	123,712,798	0.39%
Jul-02	135,146,133	0	192	31	352	0	102.60	55	139,016,937	2.86%
Aug-02	132,810,002	0	143	31	336	0	102.81	56	134,003,590	0.90%
Sep-02	125,737,406	0	88	30	320	0	100.76	57	125,136,791	0.48%
Oct-02	126,538,624	92	10	31	352	0	101.43	58	126,546,281	0.01%
Nov-02	126,350,234	214	0	30	336	0	100.89	59	125,857,686	0.39%
Dec-02	126,660,477	371	0	31	320	0	99.37	60	130,848,955	3.31%

Jan-03	138,020,012	567	0	31	352	0	99.86	61	139,437,688	1.03%
Feb-03	125,285,750	475	0	28	320	0	99.95	62	127,978,496	2.15%
Mar-03	130,708,315	335	0	31	336	0	100.27	63	131,967,333	0.96%
Apr-03	120,954,881	160	2	30	336	0	99.84	64	124,791,964	3.17%
May-03	119,050,807	5	0	31	336	0	100.24	65	122,580,281	2.96%
Jun-03	121,559,458	0	53	30	336	0	99.39	66	124,354,602	2.30%
Jul-03	127,839,234	0	118	31	352	0	100.60	67	133,925,344	4.76%
Aug-03	116,632,060	0	128	31	320	1	98.62	68	116,632,060	0.00%
Sep-03	122,466,795	1	24	30	336	0	101.34	69	123,498,535	0.84%
Oct-03	127,606,742	70	0	31	352	0	102.67	70	127,760,840	0.12%
Nov-03	127,568,437	161	0	30	320	0	102.68	71	125,990,185	1.24%
Dec-03	130,452,311	314	0	31	336	0	102.70	72	134,122,421	2.81%
Jan-04	142,514,375	601	0	31	336	0	101.13	73	141,980,036	0.37%
Feb-04	131,014,897	400	0	29	320	0	101.12	74	130,613,295	0.31%
Mar-04	137,456,784	245	0	31	368	0	103.12	75	135,238,841	1.61%
Apr-04	123,653,700	116	0	30	336	0	102.38	76	126,640,752	2.42%
May-04	125,173,525	19	9	31	320	0	101.40	77	125,107,297	0.05%
Jun-04	127,179,406	0	32	30	352	0	103.08	78	127,717,312	0.42%
Jul-04	128,976,196	0	86	31	336	0	102.40	79	133,077,105	3.18%
Aug-04	130,854,610	0	60	31	336	0	102.67	80	131,162,601	0.24%
Sep-04	131,024,581	0	41	30	336	0	103.74	81	128,167,701	2.18%
Oct-04	130,716,810	26	2	31	320	0	103.06	82	126,420,169	3.29%
Nov-04	133,082,346	140	0	30	352	0	102.93	83	130,011,658	2.31%
Dec-04	136,991,696	395	0	31	336	0	103.35	84	138,920,561	1.41%
Jan-05	145,994,607	522	0	31	320	0	104.48	85	142,166,096	2.62%
Feb-05	130,269,323	392	0	28	320	0	104.00	86	131,710,311	1.11%
Mar-05	140,140,933	361	0	31	352	0	103.27	87	139,561,326	0.41%
Apr-05	123,036,658	83	0	30	336	0	103.97	88	128,523,805	4.46%
May-05	125,247,527	29	1	31	336	0	104.20	89	129,461,698	3.36%
Jun-05	144,685,267	0	146	30	352	0	103.79	90	139,624,255	3.50%
Jul-05	141,797,468	0	189	31	320	0	103.70	91	143,025,744	0.87%
Aug-05	145,925,490	0	141	31	352	0	104.29	92	141,935,379	2.73%
Sep-05	133,831,086	0	52	30	336	0	103.96	93	131,235,735	1.94%
Oct-05	134,338,667	41	8	31	320	0	104.06	94	129,946,020	3.27%
Nov-05	136,612,176	161	0	30	352	0	104.39	95	133,432,136	2.33%
Dec-05	139,563,134	417	0	31	320	0	105.30	96	141,379,100	1.30%
Jan-06	143,350,840	304	0	31	336	0	106.59	97	140,092,423	2.27%
Feb-06	132,539,698	380	0	28	320	0	105.79	98	134,314,462	1.34%
Mar-06	142,937,971	269	0	31	368	0	105.50	99	141,258,150	1.18%
Apr-06	125,688,890	78	0	30	304	0	104.23	100	128,099,620	1.92%
May-06	132,368,029	10	26	31	352	0	102.85	101	133,533,125	0.88%
Jun-06	137,004,145	0	74	30	352	0	102.49	102	135,006,539	1.46%
Jul-06	143,859,116	0	167	31	320	0	102.49	103	142,692,471	0.81%
Aug-06	143,299,190	0	102	31	352	0	102.02	104	139,597,967	2.58%
Sep-06	128,579,498	2	13	30	320	0	100.35	105	127,007,577	1.22%
Oct-06	135,073,908	75	1	31	336	0	99.63	106	131,442,520	2.69%
Nov-06	135,688,463	143	0	30	352	0	99.59	107	132,524,057	2.33%
Dec-06	133,398,425	253	0	31	304	0	101.20	108	135,314,877	1.44%
Jan-07	144,060,767	399	0	31	352	0	100.00	109	142,791,250	0.88%
Feb-07	135,868,564	516	0	28	320	0	100.99	110	137,939,807	1.52%
Mar-07	142,052,853	303	0	31	352	0	101.02	111	140,813,125	0.87%
Apr-07	128,480,658	146	0	30	320	0	101.25	112	131,851,708	2.62%
May-07	131,342,094	6	22	31	352	0	100.45	113	133,961,928	1.99%
Jun-07	138,449,693	0	99	30	336	0	100.62	114	137,034,265	1.02%
Jul-07	134,837,492	0	106	31	336	0	99.72	115	139,510,187	3.47%
Aug-07	141,992,903	0	141	31	352	0	99.71	116	143,742,561	1.23%
Sep-07	130,837,138	0	48	30	304	0	99.38	117	130,207,416	0.48%
Oct-07	134,638,758	15	20	31	352	0	99.13	118	134,203,876	0.32%
Nov-07	135,533,304	223	0	30	352	0	99.42	119	136,841,880	0.97%
Dec-07	133,602,881	383	0	31	304	0	96.61	120	138,882,057	3.95%

Jan-08	144,861,994	380	0	31	352	0	96.16	121	142,335,007	1.74%
Feb-08	137,054,946	443	0	29	320	0	96.75	122	137,873,600	0.60%
Mar-08	138,804,604	362	0	31	304	0	94.89	123	137,894,547	0.66%
Apr-08	127,497,951	78	0	30	352	0	96.20	124	131,779,529	3.36%
May-08	124,504,898	14	3	31	336	0	96.81	125	131,557,441	5.66%
Jun-08	131,553,397	0	72	30	336	0	96.43	126	134,649,953	2.35%
Jul-08	137,523,955	0	111	31	352	0	96.67	127	141,609,359	2.97%
Aug-08	131,880,827	0	64	31	320	0	94.96	128	134,609,113	2.07%
Sep-08	129,230,670	0	27	30	336	0	95.06	129	130,763,988	1.19%
Oct-08	130,054,392	62	0	31	352	0	93.94	130	133,374,512	2.55%
Nov-08	129,509,182	219	0	30	304	0	92.40	131	131,599,878	1.61%
Dec-08	131,612,522	407	0	31	336	0	88.06	132	139,690,610	6.14%
Jan-09	138,327,763	582	0	31	336	0	84.98	133	143,477,167	3.72%
Feb-09	122,210,837	382	0	28	304	0	84.22	134	128,397,717	5.06%
Mar-09	129,587,427	286	0	31	352	0	82.74	135	135,149,967	4.29%
Apr-09	117,245,108	96	1	30	320	0	81.85	136	124,765,843	6.41%
May-09	111,133,472	13	7	31	320	0	80.60	137	124,506,289	12.03%
Jun-09	116,699,841	0	34	30	352	0	80.28	138	126,629,431	8.51%
Jul-09	118,779,479	0	44	31	352	0	81.09	139	130,185,114	9.60%
Aug-09	130,895,153	0	91	31	320	0	81.08	140	131,850,772	0.73%
Sep-09	125,105,609	1	21	30	336	0	82.09	141	125,790,972	0.55%
Oct-09	130,037,167	61	0	31	336	0	82.26	142	128,262,422	1.36%
Nov-09	128,105,079	124	0	30	320	0	83.06	143	127,320,374	0.61%
Dec-09	136,061,860	383	0	31	352	0	83.13	144	139,763,461	2.72%
Jan-10	142,782,177	472	0	31	320	0	83.85	145	140,502,226	1.60%
Feb-10	131,951,027	374	0	28	304	0	84.76	146	130,486,065	1.11%
Mar-10	138,355,825	178	0	31	368	0	86.48	147	137,114,072	0.90%
Apr-10	124,320,860	30	0	30	320	0	86.06	148	126,922,828	2.09%
May-10	132,274,639	18	46	31	320	0	86.59	149	132,973,357	0.53%
Jun-10	135,599,383	0	59	30	352	0	87.48	150	134,366,649	0.91%
Jul-10	144,428,841	0	165	31	336	0	86.85	151	143,986,874	0.31%
Aug-10	147,162,743	0	139	31	336	0	87.27	152	142,212,800	3.36%
Sep-10	132,802,703	0	32	30	336	0	86.46	153	130,903,775	1.43%
Oct-10	133,889,543	36	0	31	320	0	86.58	154	130,562,667	2.48%
Nov-10	135,693,512	168	0	30	336	0	85.75	155	133,218,345	1.82%
Dec-10	141,736,142	428	0	31	368	0	87.40	156	146,517,892	3.37%
Jan-11	149,811,624	527	0	31	320	0	88.22	157	146,404,945	2.27%
Feb-11	136,202,447	430	0	28	304	0	87.59	158	135,628,423	0.42%
Mar-11	148,720,601	325	0	31	368	0	88.30	159	144,438,534	2.88%
Apr-11	132,916,807	107	0	30	320	0	88.24	160	132,337,909	0.44%
May-11	134,397,190	7	13	31	320	0	87.30	161	132,359,519	1.52%
Jun-11	137,829,535	0	52	30	352	0	87.40	162	135,843,044	1.44%
Jul-11	150,255,256	0	199	31	336	0	89.05	163	149,940,353	0.21%
Aug-11	148,599,993	0	122	31	336	0	88.67	164	143,607,000	3.36%
Sep-11	137,157,537	0	40	30	336	0	89.70	165	135,281,019	1.37%
Oct-11	139,009,474	50	2	31	320	0	90.11	166	135,029,422	2.86%
Nov-11	140,043,105	116	0	30	336	0	90.38	167	136,101,569	2.81%
Dec-11	140,846,536	286	0	31	368	0	92.35	168	146,889,467	4.29%
Jan-12	152,272,450	363	0	31	320	0	92.05	169	145,565,803	4.40%
Feb-12	141,603,607	300	0	29	304	0	90.79	170	137,646,163	2.79%
Mar-12	146,284,662	145	0	31	368	0	90.83	171	142,471,793	2.61%
Apr-12	134,306,766	101	0	30	320	0	91.68	172	135,971,524	1.24%
May-12	142,171,035	0	37	31	320	0	91.29	173	138,193,959	2.80%
Jun-12	145,468,890	0	102	30	352	0	90.70	174	143,664,353	1.24%
Jul-12	155,825,114	0	195	31	336	0	91.26	175	152,860,365	1.90%
Aug-12	151,831,875	0	112	31	336	0	91.06	176	146,039,336	3.82%
Sep-12	138,355,656	1	36	30	336	0	89.94	177	137,135,250	0.88%
Oct-12	143,598,378	49	1	31	320	0	89.21	178	136,488,050	4.95%
Nov-12	144,555,068	198	0	30	336	0	89.86	179	140,304,596	2.94%
Dec-12	141,080,120	286	0	31	368	0	88.76	180	147,123,187	4.28%

Jan-13	154,058,910	376	0	31	352	0	90.29	181	149,530,051	2.94%	
Feb-13	140,386,710	408	0	28	304	0	90.23	182	140,410,807	0.02%	
Mar-13	148,828,978	307	0	31	320	0	90.42	183	145,473,990	2.25%	
Apr-13	140,582,842	135	0	30	336	0	90.02	184	139,398,306	0.84%	
May-13	140,291,014	14	23	31	352	0	89.96	185	141,285,973	0.71%	
Jun-13	141,716,138	0	58	30	320	0	89.60	186	139,118,102	1.83%	
Jul-13	153,970,567	0	134	31	352	0	89.92	187	150,338,818	2.36%	
Aug-13	150,328,527	0	94	31	336	0	89.59	188	145,829,267	2.99%	
Sep-13	142,744,765	1	18	30	320	0	90.77	189	136,983,291	4.04%	
Oct-13	146,981,629	49	0	31	352	0	91.65	190	142,126,253	3.30%	
Nov-13	148,611,958	244	0	30	320	0	91.33	191	143,253,170	3.61%	
Dec-13	147,906,502	440	0	31	320	0	90.14	192	150,804,306	1.96%	
Jan-14	161,780,927	578	0	31	352	0	90.38	193	157,572,002	2.60%	
Feb-14	145,637,498	513	0	28	320	0	91.84	194	147,601,274	1.35%	
Mar-14	156,320,260	443	0	31	336	0	91.73	195	153,405,376	1.86%	
Apr-14	140,429,677	127	0	30	336	0	91.62	196	142,010,439	1.13%	
May-14	141,095,677	7	12	31	336	0	92.95	197	142,510,216	1.00%	
Jun-14	145,752,690	0	68	30	336	0	93.40	198	145,164,139	0.40%	
Jul-14	146,848,815	0	71	31	352	0	94.32	199	149,434,570	1.76%	
Aug-14	147,739,301	0	82	31	320	0	93.24	200	147,541,290	0.13%	
Sep-14	144,572,507	1	30	30	336	0	93.98	201	142,851,770	1.19%	
Oct-14	145,991,835	36	1	31	352	0	94.07	202	145,116,251	0.60%	
Nov-14	146,662,892	244	0	30	320	0	92.57	203	145,955,226	0.48%	
Dec-14	146,201,424	309	0	31	336	0	94.92	204	152,635,393	4.40%	
Jan-15		459	0	31	336	0	95.39	205	157,459,306	**Mean absolute error (MAPE)**	
Feb-15		393	0	28	304	0	95.50	206	146,776,345	**2.06%**	
Mar-15		290	0	31	352	0	95.59	207	154,131,882		
Apr-15		101	1	30	336	0	95.60	208	145,388,339		
May-15		11	17	31	320	0	95.58	209	145,248,185		
Jun-15		0	72	30	352	0	95.58	210	149,822,418		
Jul-15		0	132	31	352	0	95.70	211	157,258,247		
Aug-15		0	110	31	336	0	95.68	212	154,359,006		
Sep-15		1	37	30	336	0	95.81	213	146,429,048		
Oct-15		49	3	31	336	0	95.88	214	147,392,493		
Nov-15		173	0	30	336	0	95.87	215	148,805,004		**20 year HDD CDD average**
Dec-15		358	0	31	336	0	95.80	216	156,572,527	20 year HDD CDD trend	20 year HDD CDD trend
Jan-16		459	0	31	320	0	95.39	217	158,308,231	158,455,288	158,455,288
Feb-16		393	0	29	320	0	95.50	218	152,224,923	153,016,367	153,016,367
Mar-16		290	0	31	352	0	95.59	219	156,187,146	156,224,809	156,224,809
Apr-16		101	1	30	336	0	95.60	220	147,443,603	147,069,065	147,069,065
May-16		11	17	31	336	0	95.58	221	148,509,789	148,959,277	148,959,277
Jun-16		0	72	30	352	0	95.58	222	151,877,682	151,807,869	151,807,869
Jul-16		0	132	31	320	0	95.70	223	156,900,832	157,824,594	157,824,594
Aug-16		0	110	31	368	0	95.68	224	158,826,949	158,502,741	158,502,741
Sep-16		1	37	30	336	0	95.81	225	148,484,312	148,074,935	148,074,935
Oct-16		49	3	31	320	0	95.88	226	148,241,418	148,137,096	148,137,096
Nov-16		173	0	30	352	0	95.87	227	152,066,608	152,045,859	152,045,859
Dec-16		358	0	31	320	0	95.80	228	157,421,452	157,186,296	157,186,296
Jan-17		459	0	31	336	0	95.39	229	161,569,835		
Feb-17		393	0	28	304	0	95.50	230	150,886,874		**10 year HDD CDD average**
Mar-17		290	0	31	368	0	95.59	231	159,448,750	10 year HDD CDD average	10 year HDD CDD average
Apr-17		101	1	30	304	0	95.60	232	147,086,189	158,055,504	158,055,504
May-17		11	17	31	352	0	95.58	233	151,771,393	156,979,351	156,979,351
Jun-17		0	72	30	352	0	95.58	234	153,932,947	153,554,771	153,554,771
Jul-17		0	132	31	320	0	95.70	235	158,956,097	147,673,435	147,673,435
Aug-17		0	110	31	368	0	95.68	236	160,882,214	146,683,982	146,683,982
Sep-17		1	37	30	320	0	95.81	237	149,333,238	151,090,540	151,090,540
Oct-17		49	3	31	336	0	95.88	238	151,503,022	156,198,966	156,198,966
Nov-17		173	0	30	352	0	95.87	239	154,121,872	153,771,191	153,771,191
Dec-17		358	0	31	304	0	95.80	240	158,270,377	147,398,878	147,398,878
										146,448,106	146,448,106
										150,200,086	150,200,086
										155,367,038	155,367,038

Forecast

APPENDIX 3-B: Chapter 2 Appendix 2-H Other Operating Revenue

Appendix 2-H
Other Operating Revenue

USoA #	USoA Description	2012 Actual	2013 Actual	2014 Actual	Bridge Year[2]	Test Year
					2015	2016
	Reporting Basis	MIFRS	MIFRS	MIFRS	MIFRS	MIFRS
4235	**Specific Service Charges**	($329,986.07)	($304,338.32)	($468,908.61)	($405,720.00)	($426,370.00)
4225	**Late Payment Charges**	($122,011.10)	($125,076.02)	($115,604.40)	($120,000.00)	($120,000.00)
4082	**Retail Services Revenues**	$0.00	($5,517.99)	($42,688.59)	($52,607.77)	($53,999.09)
4084	Serv Tx Requests	$0.00	($4,854.18)	($41,686.76)	($46,279.08)	($47,503.03)
4086	SSS Administration Charge	($140,955.37)	($141,401.18)	($151,130.91)	($154,671.36)	($159,759.13)
4090	Electric Services Incidental to Energy Sales	$0.00	$0.00	$0.00	$0.00	$0.00
4205	Interdepartmental Rents	$0.00	$0.00	$0.00	$0.00	$0.00
4210	Rent from Electric Property	($333,392.02)	($359,453.09)	($340,921.92)	($347,072.00)	($349,572.00)
4215	Other Utility Operating Income	$0.00	$0.00	$0.00	$0.00	$0.00
4220	Other Electric Revenues	$0.00	$0.00	$0.00	$0.00	$0.00
4240	Provision for Rate Refunds	$0.00	$0.00	$0.00	$0.00	$0.00
4245	Government Assistance Directly Credited to Income	$0.00	$0.00	$0.00	$0.00	$0.00
4305	Regulatory Debits	$0.00	$0.00	$0.00	$0.00	$0.00
4310	Regulatory Credits	$0.00	$0.00	$0.00	$0.00	$0.00
4315	Revenues from Electric Plant Leased to Others	$0.00	$0.00	$0.00	$0.00	$0.00
4320	Expenses of Electric Plant Leased to Others	$0.00	$0.00	$0.00	$0.00	$0.00
4325	Revenues from Merchandise, Jobbing, Etc.	$0.00	$0.00	$0.00	$0.00	$0.00
4330	Costs and Expenses of Merchandising, Jobbing, Etc.	$0.00	$0.00	$0.00	$0.00	$0.00
4335	Profits and Losses from Financial Instrument Hedges	$0.00	$0.00	$0.00	$0.00	$0.00
4340	Profits and Losses from Financial Instrument Investments	$0.00	$0.00	$0.00	$0.00	$0.00
4345	Gains from Disposition of Future Use Utility Plant	$0.00	$0.00	$0.00	$0.00	$0.00
4350	Losses from Disposition of Future Use Utility Plant	$0.00	$0.00	$0.00	$0.00	$0.00
4355	Gain on Disposition of Utility and Other Property	($21,306.04)	($107,221.84)	($89,625.00)	($110,000.00)	($125,000.00)
4360	Loss on Disposition of Utility and Other Property	$13,056.81	$51,903.16	$0.00	$0.00	$0.00
4365	Gains from Disposition of Allowances for Emission	$0.00	$0.00	$0.00	$0.00	$0.00
4370	Losses from Disposition of Allowances for Emission	$0.00	$0.00	$0.00	$0.00	$0.00
4375	Revenues from Non-Utility Operations	($1,085,224.41)	($1,175,718.75)	($2,023,006.25)	($1,993,851.98)	($2,038,136.66)
4380	Expenses of Non-Utility Operations	$28,234.59	($7,467.25)	$1,192,754.99	$1,181,035.82	$1,192,734.62
4385	Non-Utility Rental Income	$0.00	$0.00	$0.00	$0.00	$0.00
4390	Miscellaneous Non-Operating Income	$0.00	$0.00	$0.00	$0.00	$0.00
4395	Rate-Payer Benefit Including Interest	$0.00	$0.00	$0.00	$0.00	$0.00
4398	Foreign Exchange Gains and Losses, Including Amortization	$0.00	($15,683.05)	$0.00	$0.00	$0.00
4405	Interest and Dividend Income	($102,681.05)	($167,210.16)	($110,201.13)	($84,973.00)	($79,595.55)
4415	Equity in Earnings of Subsidiary Companies	$0.00	$0.00	$0.00	$0.00	$0.00
Specific Service Charges		-$ 329,986	-$ 304,338	-$ 468,909	-$ 405,720	-$ 426,370
Late Payment Charges		-$ 122,011	-$ 125,076	-$ 115,604	-$ 120,000	-$ 120,000
Other Operating Revenues		($474,347.39)	($511,226.44)	($576,428.18)	($600,630.21)	($610,833.25)
Other Income or Deductions		($1,167,920.10)	($1,421,397.89)	($1,030,077.39)	($1,007,789.16)	($1,049,997.59)
Total		-$ 2,094,265	-$ 2,362,039	-$ 2,191,019	-$ 2,134,139	-$ 2,207,201

Description	**Account(s)**
Specific Service Charges:	4235
Late Payment Charges:	4225
Other Distribution Revenues:	4080, 4082, 4084, 4090, 4205, 4210, 4215, 4220, 4240, 4245
Other Income and Expenses:	4305, 4310, 4315, 4320, 4325, 4330, 4335, 4340, 4345, 4350, 4355, 4360, 4365, 4370, 4375, 4380, 4385, 4390, 4395, 4398, 4405, 4415

Note: Add all applicable accounts listed above to the table and include all relevant information.

Account Breakdown Details

Account 4405 - Interest and Dividend Income

	2012 Actual	2013 Actual	2014 Actual	Bridge Year[2]	Test Year
				2015	2016
Reporting Basis	MIFRS	MIFRS	MIFRS	MIFRS	MIFRS
Short-term Investment Interest	$ -	$ -	$ -	$ -	$ -
Bank Deposit Interest	-$ 94,436	-$ 62,064	-$ 18,501	-$ 40,000	-$ 40,000
Miscellaneous Interest Revenue	-$ 8,246	-$ 105,146	-$ 91,700	-$ 44,973	-$ 39,596
etc.[1]					
Total	-$ 102,681	-$ 167,210	-$ 110,201	-$ 84,973	-$ 79,596

Account 4235 - Specific Service Charges

		2012 Actual	2013 Actual	2014 Actual	Bridge Year[2]	Test Year
					2015	2016
Reporting Basis		MIFRS	MIFRS	MIFRS	MIFRS	MIFRS
	MISCELLANEOUS / CHANGE OF OCCUPANCY CHG	($71,647)	($63,900.14)	($81,936.66)	($72,500.00)	($75,000.00)
	MISCELLANEOUS / COLLECTION CHARGES	($165,641)	($152,335.30)	($237,296.92)	($200,000.00)	($214,170.00)
	MISCELLANEOUS / RECONNECTION CHARGES	($3,160)	($2,610.00)	($3,320.00)	($3,500.00)	($3,750.00)
	MISCELLANEOUS / DISPUTE METER TEST CHARGE	$0	$0.00	($130.00)		
	RECONNECTION CHARGES / RESTORATION CHARGES	($31,281)	($9,923.59)	$0.00	($12,500.00)	($15,000.00)
	MISCELLANEOUS / SALE OF SCRAP METAL	($60,318)	($47,253.59)	($56,278.30)	($50,000.00)	($50,000.00)
	MISCELLANEOUS / MISCELLANEOUS	($17,645)	($21,074.29)	($12,612.15)	($1,000.00)	($1,000.00)
	MISCELLANEOUS / RIMS SUB-BILLING	($4,620)	($4,620.00)	($4,620.00)	($4,620.00)	($4,620.00)
	MISCELLANEOUS / ARREARS CERTIFICATES	($546)	($497.66)	($721.77)	($1,000.00)	($1,000.00)
	CONTRIBUTED CAPITAL / AMORT OF CONTRIB CAPITAL					
	MISCELLANEOUS / CX SHOULD NOT BE USED	$24,871	$15,599.00			
	MICROFIT/FIT SERVICE REVENUES		($15,463.26)	($66,131.86)	($55,000.00)	($55,000.00)
	MISCELLANEOUS / ARLEN TS SOLAR ENERGY		($2,259.49)	($5,860.95)	($5,600.00)	($6,000.00)
	MISCELLANEOUS / BOND CONNECTION					($830.00)
Total		($329,986.07)	($304,338.32)	($468,908.61)	($405,720.00)	($426,370.00)

Account 4225 - Late Payment Charges $0.00 $0.00

		2012 Actual	2013 Actual	2014 Actual	Bridge Year[2]	Test Year
					2015	2016
Reporting Basis		MIFRS	MIFRS	MIFRS	MIFRS	MIFRS
	MISCELLANEOUS / LATE CHARGES	($122,011.10)	($125,076.02)	($115,604.40)	($120,000.00)	($120,000.00)
Total		($122,011.10)	($125,076.02)	($115,604.40)	($120,000.00)	($120,000.00)

Account 4082 - Retail Services Revenue

		2012 Actual	2013 Actual	2014 Actual	Bridge Year[2]	Test Year
					2015	2016
Reporting Basis		MIFRS	MIFRS	MIFRS	MIFRS	MIFRS
	RETAIL SERVICES REVENUES	$0.00	($5,517.99)	($42,688.59)	($52,607.77)	($53,999.09)
Total		$0.00	($5,517.99)	($42,688.59)	($52,607.77)	($53,999.09)

Account 4084 - Serv Tx Requests

		2012 Actual	2013 Actual	2014 Actual	Bridge Year[2]	Test Year
					2015	2016
Reporting Basis		MIFRS	MIFRS	MIFRS	MIFRS	MIFRS
	RETAIL SERVICES REVENUES	$0.00	($4,854.18)	($41,686.76)	($46,279.08)	($47,503.03)
Total		$0.00	($4,854.18)	($41,686.76)	($46,279.08)	($47,503.03)

Account 4086 - SSS Administration Charge

		2012 Actual	2013 Actual	2014 Actual	Bridge Year²	Test Year
					2015	2016
Reporting Basis		MIFRS	MIFRS	MIFRS	MIFRS	MIFRS
	Residential	($129,563.65)	($129,807.65)	($138,568.51)	($141,814.70)	($146,479.53)
	GS<50kW	($9,937.10)	($10,183.44)	($11,139.05)	($11,400.00)	($11,774.99)
	GS 50kW to 999kW	($1,132.86)	($1,137.95)	($1,119.06)	($1,145.27)	($1,182.95)
	GS 1000kW to 4999kW	($123.00)	($102.05)	($111.33)	($113.94)	($117.69)
	Large Use	($13.28)	($11.92)	($9.15)	($9.36)	($9.67)
	Unmetered Scattered Load	($105.00)	($105.25)	($165.58)	($169.45)	($175.03)
	Sentinel Lighting	($77.42)	($50.12)	($15.18)	($15.53)	($16.05)
	Street Lighting	($3.06)	($2.80)	($3.05)	($3.11)	($3.22)
Total		($140,955.37)	($141,401.18)	($151,130.91)	($154,671.36)	($159,759.13)

Account 4210 - Rent from Electric Property

		2012 Actual	2013 Actual	2014 Actual	Bridge Year²	Test Year
					2015	2016
Reporting Basis		MIFRS	MIFRS	MIFRS	MIFRS	MIFRS
	MISCELLANEOUS / SENTINEL LIGHT RENTAL	($414.99)	$414.99			
	MISCELLANEOUS / POLE RENTAL	($249,839.80)	($256,750.99)	($247,154.76)	($250,000.00)	($250,000.00)
	MISCELLANEOUS / DUCT RENTAL	($61,137.23)	($72,253.09)	($66,695.16)	($70,000.00)	($72,500.00)
	MISCELLANEOUS / SOUTHGATE POP	($22,000.00)	($26,000.00)	($24,000.00)	($24,000.00)	($24,000.00)
	MISCELLANEOUS / ROOFTOP SOLAR RENTAL		($4,864.00)	($3,072.00)	($3,072.00)	($3,072.00)
Total		($333,392.02)	($359,453.09)	($340,921.92)	($347,072.00)	($349,572.00)

Account 4220 - Other Electric Revenue

		2012 Actual	2013 Actual	2014 Actual	Bridge Year²	Test Year
					2015	2016
Reporting Basis		MIFRS	MIFRS	MIFRS	MIFRS	MIFRS
	FIXED ASSET DISPOSAL - PROCEEDS	$0.00	$0.00	$0.00	$0.00	$0.00
Total		$0.00	$0.00	$0.00	$0.00	$0.00

Account 4355 - Gains from Disposition of Future Use Utility Plant

		2012 Actual	2013 Actual	2014 Actual	Bridge Year²	Test Year
					2015	2016
Reporting Basis		MIFRS	MIFRS	MIFRS	MIFRS	MIFRS
	FIXED ASSET DISPOSALS / PROCEEDS	($21,306.04)	($107,221.84)	($89,625.00)	($110,000.00)	($125,000.00)
Total		($21,306.04)	($107,221.84)	($89,625.00)	($110,000.00)	($125,000.00)

Account 4360 - Loss on Disposition of Utility and Other Property

		2012 Actual	2013 Actual	2014 Actual	Bridge Year²	Test Year
					2015	2016
Reporting Basis		MIFRS	MIFRS	MIFRS	MIFRS	MIFRS
	FIXED ASSET DISPOSALS / NET BOOK VALUE	$13,056.81	$51,903.16	$0.00	$0.00	$0.00
Total		$13,056.81	$51,903.16	$0.00	$0.00	$0.00

Account 4375 - Revenues from Non-Utility Operations

		2012 Actual	2013 Actual	2014 Actual	Bridge Year²	Test Year
					2015	2016
Reporting Basis		MIFRS	MIFRS	MIFRS	MIFRS	MIFRS
	MISCELLANEOUS / BILL/COLL WATERWORKS REV	($1,045,109.41)	($1,155,808.75)	($1,171,873.56)	($1,244,741.98)	($1,294,531.66)
	UTILITY SOLUTIONS / MAP CONVERSION SERVICES	($18,115.00)	($19,910.00)	($64,375.00)	$0.00	$0.00
	UTILITY SOLUTIONS / LEGEND APPLICATIONS	($22,000.00)	$0.00	($21,500.00)	$0.00	$0.00
	UTILITY SOLUTIONS ENGINEERING SERVICES	$0.00	$0.00	($23,120.00)	$0.00	$0.00
	UTILITY SOLUTIONS CONTROL ROOM SETUP & FEE	$0.00	$0.00	($7,979.45)		
	INTERCOMPANY SERVICES -- GHESI			($734,158.24)	($749,110.00)	($743,605.00)
Total		($1,085,224.41)	($1,175,718.75)	($2,023,006.25)	($1,993,851.98)	($2,038,136.66)

Account 4380 - Expenses of Non-Utility Operations

		2012 Actual	2013 Actual	2014 Actual	Bridge Year²	Test Year
					2015	2016
Reporting Basis		MIFRS	MIFRS	MIFRS	MIFRS	MIFRS
	WORK ORDER CHARGES / REBILLED CHARGES	($225.48)	($167.25)	($100.35)		
	ELECTRICITY RETROFIT INC / ERIP CUSTOMER INCENTIVE	1,146,525.30				
	ELECTRICITY RETROFIT INC / OPA INCENTIVE CREDIT	($3,799,866.87)				
	ELECTRICITY RETROFIT INC / ALLOCATION OF COSTS	2,653,341.57				
	PEAKSAVER PROGRAM / $25 CUSTOMER INCENTIVE	25.00	($3,650.00)			
	PEAKSAVER PROGRAM / 2008 MAINTENANCE FEE	2,722.50	($910.00)			
	PEAKSAVER PROGRAM / ALLOCATION OF COSTS	($2,747.50)	($14,547.60)			
	LDC COMMUNITY FUND / SMART WASH - 2009	29,220.00				
	LDC COMMUNITY FUND / ALLOCATION OF CIF FUNDS	($759.93)				
	PEAKSAVER PROGRAM / MARKETING / PROMOTION		$5,625.00			
	PEAKSAVER PROGRAM / THERMOSTAT HARDWARE		$72,282.60			
	PEAKSAVER PROGRAM / D2 PERFORMANCE PAYMENT		($7,300.00)			
	PEAKSAVER PROGRAM / 2008 VARIABLE FUNDING		($58,800.00)			
	CDM PROGRAM COSTS / PAB COSTS PAID BY GHESI		$306,257.47	$319,557.15		
	CDM PROGRAM COSTS / PARTICIPANT COST BY GHESI		$19,380.00	$71,070.00		
	CDM PROGRAM COSTS / CUST INCENT COST BY GHESI		$1,094,214.78	$1,397,552.39		
	CDM PROGRAM COSTS / CAPABIL BDG COST BY GHESI		$34,272.00	$40,728.00		
	CDM PROGRAM COSTS / SWITCH / STAT / IHD MAINT		$840.00	$699.00		
	CDM PROGRAM COSTS / SMART WASH COST BY GHESI		$10,640.00	$4,140.00		
	CDM PROGRAM COSTS / ALLOCATION OF COSTS		$1,192,174.60	$127,529.25		
	CDM PROGRAM FUNDING / PAB FUNDING TO GHESI		($687,124.56)	($462,554.74)		
	CDM PROGRAM FUNDING / PARTICPANT FUND TO GHESI		($115,976.17)	($40,490.00)		
	CDM PROGRAM FUNDING / CUST INCENTIVE TO GHESI		($1,711,220.56)	($1,458,232.05)		
	CDM PROGRAM FUNDING / 80% TARGET PERF TO GHESI			($21,083.66)		
	CDM PROGRAM FUNDING / CAPABILITY BLDG TO GHESI		($85,650.00)			
	CDM PROGRAM FUNDING / SMART WASH TO GHESI		($57,807.56)			
	WATERBILLING SERVICES		$0.00	$487,887.00	$487,081.28	$503,534.00
	UTILITY SOLUTIONS		$0.00	$58,595.00	$9,496.54	$9,748.62
	INTERCOMPANY SHARED SERVICES		$0.00	$667,458.00	$684,458.00	$679,452.00
Total		$28,234.59	($7,467.25)	$1,192,754.99	$1,181,035.82	$1,192,734.62

Account 4405 - Interest and Dividend Income

		2012 Actual	2013 Actual	2014 Actual	Bridge Year²	Test Year
					2015	2016
Reporting Basis		MIFRS	MIFRS	MIFRS	MIFRS	MIFRS
	REVENUE / INVESTMENTS & BANK ACCT	($102,681.05)	($167,210.16)	($110,201.13)	($84,973.00)	($79,595.55)
Total		($102,681.05)	($167,210.16)	($110,201.13)	($84,973.00)	($79,595.55)