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July 8, 2019

Via RESS

Ms. Kirsten Walli
Board Secretary
Ontario Energy Board
PO Box 2319
2300 Yonge Street, 27th floor
Toronto, ON M4P 1E4

Dear Ms. Walli:

Re: EB File No. EB-2018-0165, Toronto Hydro-Electric System Limited ("Toronto Hydro") Custom Incentive Rate-setting ("Custom IR") Application for 2020-2024 Electricity Distribution Rates and Charges – Evidence Correction

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Toronto Hydro is filing a correction to previously filed evidence, specifically Table 8, "Forecast versus Actual Purchased Energy", in Exhibit 3, Tab 1, Schedule 1. Pursuant to the OEB's Rules of Practice and Procedure, the revised documents are provided in blue paper, and marked by /C to indicate the parts revised. Toronto Hydro will update the concordance of evidence table at the time the record of evidence closes through its response to undertaking J1.1.

Please contact me directly if you have any questions or concerns.

Respectfully,

Daliana Coban
Manager, Regulatory Law
Toronto Hydro-Electric System Limited

cc: Lawrie Gluck, OEB Case Manager
Michael Miller, OEB Counsel
Parties of Record
Amanda Klein, Toronto Hydro
Andrew Sasso, Toronto Hydro
Charles Keizer, Torys LLP

LOAD, CUSTOMERS, AND REVENUE

Toronto Hydro's total load, customer, and distribution revenue forecast is summarized in Table 1. The revenue forecast is calculated based on proposed distribution rates, excluding commodity, rate riders, and all other non-distribution rates.

Table 1: Total Load, Revenues, and Customers

Year		Total Normalized GWh	Total Normalized MVA	Total Distribution Revenue ($M)	Total Customers
2013	Actual	25,245.1	42,737.5	531.9	724,144
2014	Actual	25,132.0	41,866.4	536.6	735,262
2015	Actual	25,031.1	41,320.7	628.0	747,811
2016	Actual	24,909.3	41,335.6	661.4	759,031
2017	Actual	24,427.6	40,731.3	693.6	765,559
2018	Bridge	24,378.2	40,925.0	740.7	771,079
2019	Bridge	24,123.8	40,761.1	771.5	776,786
2020	Forecast	24,036.0	40,408.1	796.9	784,330
2021	Forecast	23,818.0	40,275.5	824.2	790,944
2022	Forecast	23,651.8	40,200.6	846.8	798,591
2023	Forecast	23,475.3	40,104.6	885.2	806,238
2024	Forecast	23,396.7	40,166.6	924.2	813,886

Notes:

1. Total Normalized GWh are purchased GWh (before losses), and are weather normalized to the Test Year heating and cooling degree day assumptions.
2. Total Normalized MVA are weather normalized MVA.
3. Total Distribution Revenue is weather normalized and includes an adjustment for the Transformer Allowance.
4. Total Customers are as of mid-year and exclude street lighting devices and unmetered load connections.

Toronto Hydro's detailed load forecasts by rate class, customer forecast by rate class and forecast of distribution revenues by rate class (OEB Appendix 2-IB) are shown in Exhibit 3, Tab 1, Schedule 2.

The information provided for the Load, Customers, and Revenue exhibit has been prepared according to the Board's Filing Requirements for Electricity Distribution Rate Applications (July 12, 2018).

1. HISTORICAL LOADS

Toronto Hydro's historical total system load (actual and weather-normalized) is illustrated in Figure 1 below.

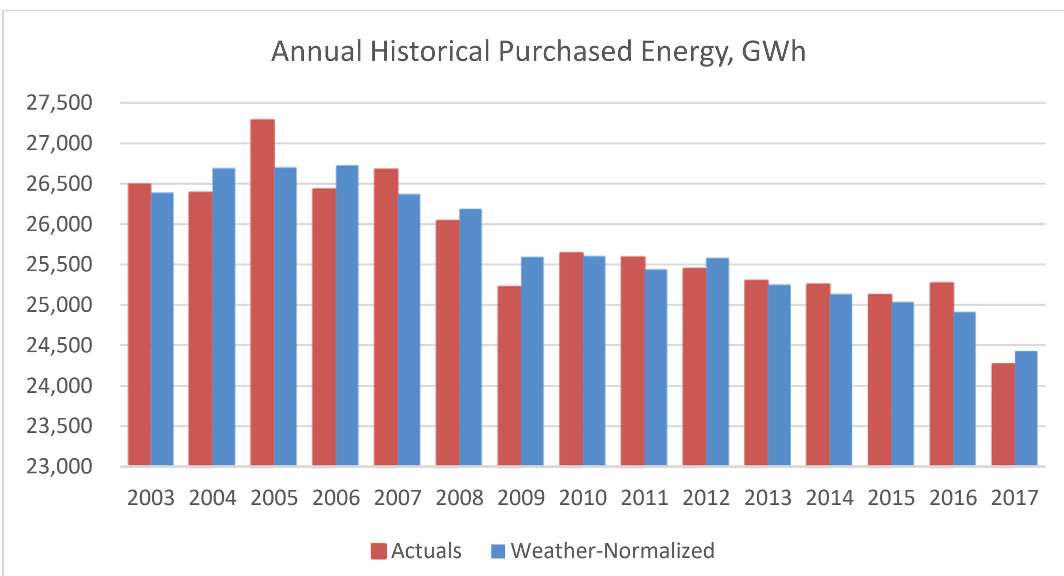

Figure 1: Historical Purchased Energy

Since 2006, Toronto Hydro has experienced a significant decrease in total energy consumption. Essentially flat growth over the 2004-2006 period has been replaced by declining loads over the 2007-2017 period. The utility believes that conservation activities – both program driven and naturally occurring – continue to have a significant impact on the overall load change. Table 2, below, shows a summary of the total historical normalized annual loads and growth.

Table 2: Historical Annual Load

Year	Total Normalized GWh	Growth GWh	Percentage Change (%)
2003	26,383.5		
2004	26,686.7	303	1.1%
2005	26,697.1	10	0.0%
2006	26,721.5	24	0.1%
2007	26,368.4	(353)	-1.3%
2008	26,186.4	(182)	-0.7%
2009	25,587.8	(599)	-2.3%
2010	25,599.2	11	0.0%
2011	25,435.4	(164)	-0.6%
2012	25,578.6	143	0.6%
2013	25,245.1	(334)	-1.3%
2014	25,132.0	(113)	-0.4%
2015	25,031.1	(101)	-0.4%
2016	24,909.3	(122)	-0.5%
2017	24,427.6	(482)	-1.9%

2. LOAD AND CUSTOMER FORECAST METHODOLOGY

Toronto Hydro's load and customer forecast methodologies are unchanged from those approved by the OEB in the utility's 2015-2019 Rate Application.[1] Forecasting models have been updated to reflect the most recently available information.

1 EB-2014-0116, Toronto Hydro-Electric System Limited Decision and Order (December 29, 2015).

Toronto Hydro's load forecast methodology consists of a three-step process which explicitly takes into account historical and forecast Conservation and Demand Management ("CDM") impacts. First, the actual historical cumulative CDM impacts are added to metered loads. Second, the load (gross of CDM) is forecasted based on multifactor regression techniques. Third, the cumulative forecast CDM impacts are deducted from the gross load forecast to derive the load forecast (net of CDM).

Toronto hydro has developed separate energy forecasts for each rate class; total system load is a summation of the individual rate class loads. For rate classes whose billing units are monthly peak demand, the forecasted monthly non-coincident peak by class is forecast based on historical relationships between energy and demand. The forecast of customers by rate class is determined using time-series econometric methodologies. Revenues are determined by applying the proposed distribution rates to the rate class billing determinants for the forecast period.

3. kWh LOAD FORECAST

3.1 Multivariate Regression Model

Toronto Hydro's process of developing a model of energy usage for each rate class involves estimating multifactor models using different input variables to determine the best fit. Different models were fit based on *a priori* assumptions about which input variables impact energy use. Using stepwise regression techniques, numerous explanatory variables were tested with the ultimate model being determined based on model statistics and judgment.

Models are developed separately for each rate class; this methodology allows for greater detail in modelling loads and allows for the different interactions to be modelled independently. All of Toronto Hydro's regression models use monthly kWh per day as the dependent variable and monthly values of independent variables from July, 2002 through to the latest actual values (December 2017) to determine the monthly regression coefficients.

The main drivers of energy consumption over time are weather and energy conservation activities – both program and naturally occurring, as well as calendar, economic, and demographic conditions. While load impacts related to the CDM program activities are explicitly taken into account prior to and after the modelling (see section below on CDM forecast), the remainder of the effects are captured through the multivariate regression model.

The primary driver of consumption variance between years is weather. 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 ("HDD" – a measure of coldness in winter) and Cooling Degree Days ("CDD" – a measure of summer heat) are captured in the multifactor regression model. In previous rate filings, Toronto Hydro had indicated that the standard definition of HDD, which uses 18 degrees Celsius as the point at which loads start to be impacted by temperature, was not as effective as a measure which uses 10 degrees Celsius as the "balance point" for the HDD measure. Figure 2, below, shows the relationship between temperatures and loads for the period of July 2002 to December 2017. It is clear that the relationship between heating loads and temperature changes at 10 degrees Celsius. Toronto Hydro uses this 10 degrees Celsius "balance point" for construction of its HDD measure.

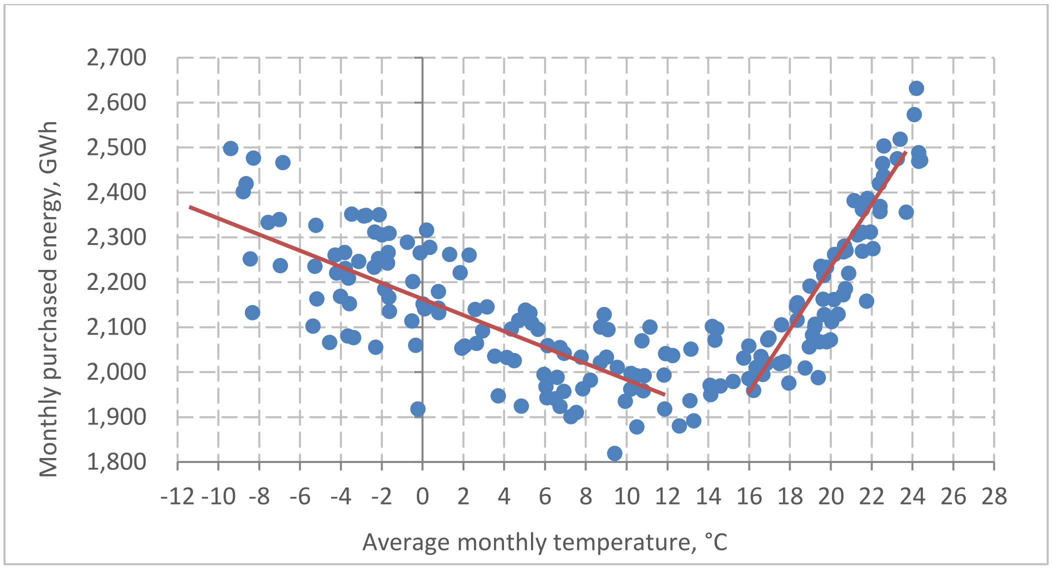

Figure 2: Purchased Energy versus Average Temperature

Dew point temperature is another type of weather factor, included as an explanatory variable for the Competitive Sector Multi-unit Residential ("CSMUR"), General Service ("GS") 50-999 kW, GS 1000-4999 kW, and Large Use customer classes. This variable captures the impact of humidity on consumption and shows the positive impact of temperature on loads during summer months and negative impact during winter months.

Demographic, economic conditions, and naturally occurring conservation activities are captured within the model by customer, Toronto Gross Domestic Product ("GDP"), and Toronto unemployment rate and time trend variables. The Toronto unemployment rate and Toronto GDP reflect the level of economic fluctuations, and were found to be statistically significant in the GS <50 kW, GS 50-999 kW, GS 1000-4999 kW, and Large Use class models. Customer variables capture overall levels of demographic fluctuations, and were found to be statistically significant in the CSMUR, GS <50 kW, GS 50-999 kW, and Large Use class models.

The time trend variables used in the models are intended to capture trends which are not otherwise explained by the other driver variables. The Residential model uses a simple time trend variable which captures an increase in downward trend in consumption over the historical period from 2008 onward. The model is based on consumption with approved CDM loads “added back” to loads. Approved CDM activities alone do not account for additional natural conservation which seems most apparent in 2008 and onward. The GS<50 kW and GS 50-999 kW models use simple time trends over historical 2002 to 2017 in order to help account for trending that other driver variables and CDM adjustments do not fully speak to, as well as to improve overall model fit over the period.

For the Large Use customers, a clear change in trend has occurred. For this class, Toronto Hydro has incorporated a linear spline time trend. Consumption for this class displays a change in trend in the 2010 to 2017 period, which is captured by this type of time trend.

One additional factor determining energy use in the monthly model can be classified as “calendar factors.” For example, the number of business days in a month will impact total monthly load. To capture the different number of days in the calendar months, the modelling of purchased energy was performed on a per-day basis. To reflect different numbers of business days in the month and, consequently, different number of peak hours, business day percentage was used in those class models. A dummy variable was also included to reflect the impact of the 2003 August blackout on energy use in that month. Lastly, in several models a variable has been used to indicate shoulder months where electricity usage is typically the lowest and most difficult to forecast using other variables alone.

Exhibit 3, Tab 1, Schedule 1, Appendix A-1 contains the historical and forecast load and input variable details. The model statistics for each class model are shown in Exhibit 3, Tab 1, Schedule 1, Appendix A-2.

From the regression models, the forecast of energy usage is determined by applying the model coefficients to forecasts of the input variables.

The forecast for heating and cooling degree-days, and dew-point temperature inputs is based on a ten-year historical average of HDD, CDD, and Dew. A ten-year average was chosen over the 20-year average based on analysis of the annual HDD and CDD data that shows a definite trend in HDD and CDD (see Figure 3, below). Using an average over the longer time period would therefore be less reflective of the most recent data and an inferior forecast of HDD and CDD. Toronto Pearson International Airport station was used as the climatological measurement point for establishing monthly HDD and CDD.

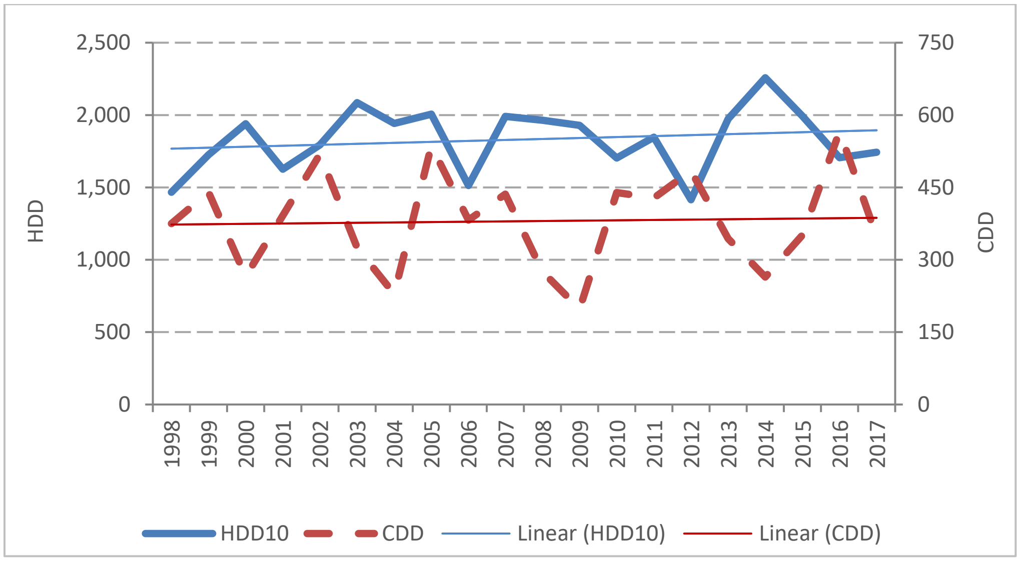

Figure 3: Historical CDD and HDD

As per The OEB Filing Requirements, a comparison of load forecasts based on ten-year average and 20-year trends in HDD and CDD can be found in Exhibit 3, Tab 1, Schedule 1, Appendix B.

The forecast of the City of Toronto's unemployment rate and population was derived based on the Conference Board of Canada forecast of the Toronto Census Metropolitan Area ("CMA") unemployment rate and population using a pair regression model.

Table 3 summarizes the variables included in each of the rate class energy models.

Table 3: Regression Variables by Rate Class

Residential	**Competitive Sector Multi-unit Residential**	**General Service <50 kW**	**General Service 50-999 kW**	**General Service 1,000-4,999 kW**	**Large Use**	**Street Lighting**	**Unmetered Load**
HDD 10 per day	HDD 10 per day	HDD 10 per day	HDD 10 per day	HDD 10 per day	HDD 10 per day	Average use per device	Simple extrapolation
CDD per day	CDD per day	CDD per day	CDD per day	CDD per day	CDD per day		
Blackout dummy	Dew point temp.	Business days percent	Dew point temp.	Dew point temp.	Dew point temp.		
Time trend	Number of CSMUR customers	GDP	Business days percent	Business days percent	Business days percent		
Shoulder month	Intercept term	Black out dummy	GDP	GDP	GDP		
Intercept term		Time trend	Black out dummy	Toronto Unemployment Rate	Black out dummy		
		Shoulder month	Shoulder month	Black out dummy	Time trend		
		Number of GS<50 kW customers	Number of GS 50-999 kW customers	Time trend	Numbers of LU customers		
		Intercept term	Intercept term	Intercept term	Intercept term		

3.2 Electric Vehicles and Distributed Generation

The markets for Electric Vehicles (“EVs”) and widespread Distributed Generation (“DG”) are fairly new in Ontario. To date, any impacts on overall loads and demands on the Toronto Hydro system have not been determined to be material. Government policy in these areas has the potential to increase the amounts of loads associated with EVs and DG, including over the 2020-2024 forecast period.

Toronto Hydro does not have enough information about these markets to be able to confidently include any impacts on loads or demands at the time of filing. There has been no explicit incorporation of the potential load impacts into the load forecast, other than trends that would be part of measured loads to date, and would be captured in the multivariate regression models.

4. CLASS DEMAND (kVA) FORECAST

Toronto Hydro's forecast of monthly peak demand by customer class, which is used to determine revenue for those customers billed on a demand basis (GS 50-999 kW, GS 1000-4999 kW, Large User, and Street Lighting), is established using historical relationships between energy and demand. The utility uses the latest three-year average of this relationship for forecasting purposes. The resulting kW demand forecast is explicitly adjusted to reflect the impacts from the cumulative estimated CDM activities and subsequently converted based on the latest three-year average power factors to the peak kVA demand forecast (net of CDM). The cumulative CDM demand forecast consists of the incremental CDM forecast as well as persistence of historical CDM demand savings.

5. CDM FORECAST

Toronto Hydro confirms that it has explicitly included the impacts of CDM into its load forecast, consistent with the Board's CDM Guidelines (EB-2012-0003). The cumulative CDM forecast deducted from the gross load (step three of the three-step process described previously) includes the CDM savings for programs delivered in each year.

Toronto Hydro's actual and forecasted CDM savings for the 2006 to 2024 period can be separated into three separate components:

1) 2006 to 2016 verified historical savings;

2) 2017 to 2020 forecast savings under the existing Conservation First Framework ("CFF"); and
3) 2021 to 2024 forecast savings beyond the CFF.

5.1 2006 to 2016 Verified Historical Savings

Toronto Hydro's CDM forecast includes the impacts of historical CDM achievement. The annual impacts of CDM completed between 2006 and 2016 have been verified by the Independent Electricity System Operator ("IESO"), and represent the full suite of energy efficiency and demand response programs offered to Toronto Hydro's residential and business customer segments. For each year, and for each program, impacts are allocated to the appropriate rate classes. Where program-level data is available, rate class allocations are estimated based on best available knowledge of the program participant profile. Where project-level detail is available, rate class allocation estimates improve based on the ability to assign a rate class to each contribution of program savings.

5.2 2017 to 2020 Forecasted Savings

The second component of Toronto Hydro's CDM forecast includes unverified 2017 and 2018 achievement as well as the remaining forecasted savings through 2020. This contribution toward the load forecast is consistent with the utility's recently approved 2015 to 2020 CDM Plan and represents the full suite of energy efficiency programs, both local and provincial, currently being offered to Toronto Hydro customers, as well as planned program offerings.

The 2017 and 2018 savings are based on completed projects, where the savings remain subject to third-party evaluation and subsequent IESO verification. The forecasted portion of 2018 savings, as well as the 2019 and 2020 forecasted impacts are based on a combination of projects already pre-approved and scheduled for completion within this timeframe as well as the application of historical trends and anticipated future penetration for programs without natural funnels. At this time, Toronto Hydro forecasts a moderate reduction in annual savings in future years to account for common measure saturation, such as LED lighting. However, the total forecast currently surpasses Toronto Hydro's 2015 to 2020 CFF-assigned target of 1,556 GWh.

The 2017 to 2020 forecasted savings include a higher degree of accuracy with respect to rate class allocation as rate class forecasting has been integrated within internal CDM reporting. Each month, project-level detail is matched against billing system data to ensure all savings are allocated correctly.

5.3 2021 to 2024 Forecasted Savings

Toronto Hydro's annual forecasted savings for 2021 to 2024 were developed based on the assumption that there will be a continuation of CDM programs. However, in the absence of a new framework, the projected impact is based on the anticipated "status quo" CDM delivery objectives and expectations assigned for the post 2020 conservation planning period. In terms of estimating impact, the effects of the 2011 to 2020 program build-up and the expected market saturation determined the basic assignment of annual savings. This is demonstrated by the fact that 2020 forecast CDM savings, and the subsequent consistent application of the same level of annual savings beyond 2020, are lower than current realized savings. Due to the absence of conservation planning detail, Toronto Hydro has determined this to be the best estimate at this time given the absence of conservation planning detail for this period; this method is consistent with other CDM forecasts used internally and externally for other planning objectives.

Historical and estimated CDM savings used in Toronto Hydro's load forecast are "gross" numbers and hence, include "free riders". Toronto Hydro believes that "gross" CDM savings are the correct values to apply to the load forecast used to determine billing units. The OEB approved this treatment in its EB-2011-0116 decision. In regard to the Future Lost Revenue Adjustment Mechanism Variance Account ("LRAMVA") however, Toronto Hydro agrees that the CDM applied in this forecast will be the basis for the LRAMVA, and Toronto Hydro's LRAMVA balance will reflect the difference between estimated and actual CDM savings on a net basis. Exhibit 3, Tab1, Schedule 1, Appendix C has been created as an alternative to the OEB's Appendix 2-I, and provides a reconciliation between gross CDM used for load forecast purposes and net CDM used for LRAMVA proposes.

Tables 4 and 5 represent the summaries of the cumulative forecast CDM consumption and demand impacts by class used for establishing the load forecast (net of CDM).

Table 4: Cumulative Forecast CDM Consumption Impacts, MWh (Gross)

MWh	Residential	CSMUR	GS <50 kW	GS 50-999 kW	GS 1000-4999 kW	Large Use	Total
2017	596,898	6,010	438,492	923,127	553,270	451,787	**2,969,583**
2018	638,045	10,300	460,258	1,114,418	632,036	499,874	**3,354,930**
2019	659,746	16,846	482,220	1,260,549	719,557	565,421	**3,704,337**
2020	670,817	23,205	502,468	1,383,783	790,685	624,077	**3,995,036**
2021	680,526	29,504	521,954	1,504,060	859,429	654,166	**4,249,639**
2022	690,234	35,804	541,440	1,624,336	928,173	684,255	**4,504,242**
2023	699,943	42,103	560,926	1,744,613	996,916	714,344	**4,758,845**
2024	709,651	48,403	580,411	1,864,890	1,065,660	744,433	**5,013,449**

Table 5: Cumulative Forecast CDM Demand Impacts, MW (Gross)

MW	GS 50-999 kW	GS 1000-4999 kW	Large Use	Total
2017	1,879	1,132	1,096	**4,107**
2018	2,178	1,212	1,159	**4,549**
2019	2,402	1,306	1,263	**4,971**
2020	2,594	1,379	1,354	**5,328**
2021	2,781	1,451	1,404	**5,636**
2022	2,969	1,523	1,454	**5,945**
2023	3,156	1,595	1,503	**6,254**
2024	3,344	1,666	1,553	**6,563**

Tables 6 and 7 include the 2020-2024 total net forecast CDM consumption and demand impacts per year with no prior persistence, which correspond to the gross cumulative numbers above, and will be used for future LRAMVA filings. Please refer to Exhibit 3, Tab 1, Schedule 1, Appendix C for a breakdown by class.

Table 6: 2020-2024 Total Net Forecast CDM Consumption Impact, MWh

CDM Forecast Year	2020	2021	2022	2023	2024	*Total*
2020	144,167					**144,167**
2021	140,936	144,167				**285,104**
2022	140,833	140,936	144,167			**425,936**
2023	140,564	140,833	140,936	144,167		**566,500**
2024	140,046	140,564	140,833	140,936	144,167	**706,547**

Table 7: 2020-2024 Total Net Forecast CDM Demand Impact, MW

CDM Forecast Year	2020	2021	2022	2023	2024	Total
2020	233.58					**233.58**
2021	229.17	233.58				**462.76**
2022	229.03	229.17	233.58			**691.78**
2023	228.93	229.03	229.17	233.58		**920.72**
2024	228.89	228.93	229.03	229.17	233.58	**1,149.61**

6. CUSTOMER FORECAST

Customer additions in Toronto Hydro's service territory have been fairly steady over the recent period, driven mainly by Residential and CSMUR customer additions, while General Service classes remain more flat year over year. The utility's forecast of new customers is primarily based on extrapolation models for each rate class with the exception of the CSMUR rate class (implemented on June 1, 2013), whose forecast customer additions are based on market knowledge of suite metering and multi-unit dwelling construction in Toronto Hydro's service area, as well as an application of expert judgement.

Toronto Hydro's detailed forecast of customers by rate class is found in Exhibit 3, Tab 1, Schedule 2 (OEB Appendix 2-IB).

7. ACCURACY OF LOAD FORECAST AND VARIANCE ANALYSES

Table 8 summarizes the variances between Toronto Hydro's actual loads and the last OEB-approved loads (filed in Toronto Hydro's EB-2014-0116 rate filing).

Table 8: Forecast versus Actual Purchased Energy

Year	Board-Approved Load Forecast	Actual Load		Weather Normalized Actual		
	GWh	GWh	Variance	GWh	Variance	
2015	24,993.28	25,122.15	0.52%	25,031.07	0.15%	/C
2016	25,027.38	25,265.00	0.95%	24,909.27	-0.47%	/C
2017	24,841.64	24,268.56	-2.31%	24,427.62	-1.67%	/C
2018	24,696.94	25,065.39	1.49%	24,620.32	-0.31%	

Year to year variances in Toronto Hydro's historical loads reflect the impacts of weather, economic conditions, CDM, and normal customer growth. For the forecast periods, year to year variances in loads reflect the impact of model driver variables and CDM assumptions.

Tables showing Toronto Hydro's year-over-year actual versus Board-approved loads and customers can be found in Exhibit 3, Tab 1, Schedule 2 (OEB Appendix 2-IB).