***EXHIBIT 3 – CUSTOMER AND LOAD FORECAST***

***Interrogatory 3-Staff-52***

***Load Forecast***

***Ref: Exhibit 3, pages 5-15***

***Preamble:***

***Kingston Hydro states that "A time-series autoregressive model using the Prais-Winsten estimation was used for the Residential class to account for autocorrelation." OEB staff notes that Prais-Winsten estimation is indicated as having been used for all rate classes forecasted using regression methodologies.***

***Question(s):***

***a) Please confirm that Prais-Winsten was used for all rate classes, or explain which methodologies were used and for which customer class models?***
***b) Did Kingston Hydro test for autocorrelation, and if so, for which rate classes?***
***c) Can Kingston Hydro explain the negative sign on the constant in the residential and GS<50 regression model?***

**Response**

a) Confirmed.

b) One of the statistical measures included in regression outputs (Tables 7, 9, 11, and

13 of the Load Forecast Report) is the Durbin-Watson statistic which is a test for autocorrelation. The Durbin-Watson statistic for each class model is between 1.9 and 2.1, well within the acceptable range of 1.5 to 2.5 indicating no autocorrelation.

c) Constants often have negative signs when the model includes variables that are consistent positive values such as the number of days in a month, customer counts, GDP, and employment variables. The constant can be considered jointly with the lowest values of these variables, with incremental values causing an incremental impact on consumption. Please see the tables below with an 'Adjusted Constant' calculated which reflects a base value similar to a constant when none of these variables are used. Please note that the constants would be positive if these variables were not included in the regression (though the statistical results would be weaker).

| **Residential** | | | |
|---|---|---|---|
| **Variable** | **Coefficient** | **Min Value** | **Product** |
| Constant | -14,098,113 | 1 | -14,098,113 |
| ResCust | 628 | 22,994 | 14,429,749 |
| MonthDays | 275,609 | 28 | 7,717,060 |
| **"Adjusted Constant"** | | | **8,048,695** |

| **GS < 50 kW** | | | |
|---|---|---|---|
| **Variable** | **Coefficient** | **Min. Value** | **Product** |
| Constant | -1,901,110 | 1 | -1,901,110 |
| MonthDays | 145,945 | 28 | 4,086,467 |
| GDP | 5 | 643,937 | 3,071,122 |
| **"Adjusted Constant"** | | | **5,256,479** |

***EXHIBIT 3 – CUSTOMER AND LOAD FORECAST***

***Interrogatory 3-Staff-53***

***Load Forecast***
***Ref: Exhibit 3, page 20***

***Preamble:***

***GS < 50 kW customer counts have been declining and are forecast to continue to decrease in the 2023 Test Year. The GS > 50 kW customer count decreased from 371 in 2013 to 325 in 2014 (a loss of 12.5% in one year).***

***Question(s):***

***a) Can Kingston Hydro provide the reason for the loss of GS<50 kW customers?***
***b) Does Kingston Hydro know the reason for the loss of GS > 50 kW customers in 2014, and why this would be predictive of losses in 2022 and 2023?***

**Response**

a) Please see 3-SEC-19.

b) Yes, the main reason for the loss of GS > 50 kW customers in 2014, as noted in Kingston Hydro's Custom IR application, EB-2015-0083, Ex. 3 T.2 S.1 p.4, lines 21-23, "…a mass re-classification of 53 customers from the GS>50 rate class to the GS<50 rate class occurred in January 2014." There were also some

reclassifications to GS>50 from GS<50, with the net result being a GS>50 kW customer count decrease from 371 in 2013 to 325 in 2014.

Kingston Hydro's GS > 50 kW customers are regularly reclassified due to reduced monthly demands. Though the number of reclassifications was relatively high in 2014, this negative growth rate within the long-run average accurately reflects the declining trend in the GS > 50 kW customer count over time. The reclassifications in 2014 were not due to external circumstances that are not expected to occur again. KHC notes that the forecast 10-year average growth rate calculated with the 2014 growth rate included results in a forecast annual decline of 5 customers per year, which is consistent with the average number of GS > 50 kW customers lost per year since 2018.

***EXHIBIT 3 – CUSTOMER AND LOAD FORECAST***

***Interrogatory 3-Staff-54***

***Load Forecast, COVID Impact Ref: Exhibit 3, page 8***

***Preamble:***

***The COVID_AM variable has been included for this class. This variable is equal to 0 in each month prior to March 2020, 0.5 in March 2020, 1 in April 2020 and May 2020, and in each month from June 2020 to December 2021. This variable accounts for the impacts of COVID, while recognizing the impacts in April and May 2020 were more significant than any month thereafter. The value in March 2020 reflects that the impacts of the pandemic on energy consumption began about halfway through the month.***

***Question(s):***

***a) Can Kingston Hydro include a scenario where the COVID related variables for all rate classes take a value of 0 in 2022 and 2023?***

**Response**

a) This scenario is provided as 3-Staff-54 Attachment 1, spreadsheet in live excel format.

***EXHIBIT 3 – CUSTOMER AND LOAD FORECAST***

***Interrogatory 3-Staff-55***

***Load Growth***

***Ref: Load Forecast***

***Question(s):***

***a) How has EV penetration been factored into load growth expectation over the forecast period?***

***b) Has Kingston Hydro Electricity Distribution Ontario developed a load forecast specifically for EV growth?***

***c) Has Kingston Hydro considered the impact of Distributed Energy Resources or other emerging technologies on its load forecast? Please explain your response.***

**Response**

a) EV penetration has not been factored into load growth in the forecast period.

b) Kingston Hydro has not developed a load forecast specifically for EV growth. The main reason is that Kingston Hydro expects most EV charging in its distribution territory will be at home during off peak times. This will likely be further substantiated by the extra low off-peak rate that OEB plans to implement.

c) The impact of Distributed Energy Resources (DER) has not been considered in the

load forecast. Kingston Hydro is aware of potential DER projects in the Large Use rate class, however, the timing of these projects was uncertain when the load forecast was developed. The penetration of renewable DER is still relatively low for Kingston Hydro's system and there has not been any battery storage connected yet. There is a pending project expected to connect in 2024-2025 which is beyond the 2023 rate setting timeframe. At the time the Standby charge was developed, the impact of a large 15MW DER was considered. Since Kingston Hydro has Standby Charges for this class, and the GS < 50 kW, GS 50- 4,999 kW classes, DERs will generally not impact loads for the purposes of rate design.

***EXHIBIT 3 – CUSTOMER AND LOAD FORECAST***

***Interrogatory 3-Staff-56***

***CDM Adjustment***

***Ref : Exhibit 3, Tab 1, Schedule 1, Attachment 1, page 31***

***Preamble:***

***Elenchus describes the methodology for a manual CDM adjustment and provides the proposed CDM adjustments (Table 35) by customer class.***

***Question(s):***

***a) Please describe how the proposed CDM adjustments in Table 35 (shown in kWh) are converted into kW adjustments for the GS>50 kW and Large Use customer classes.***

**Response**

a) The proposed CDM adjustments in Table 35 are converted to kW adjustments using the same kW/kWh ratio used to convert kWh forecasts to kW forecasts. The GS>50 CDM adjustment is converted with the ratio provided in Table 23 and the Large Use ratio is converted with the ratio provided in Table 29.

***Interrogatory 3-SEC-19***

***[Ex.3, Appendix 2-IB] Customer numbers for both the GS < 50 kW and GS > 50 kW classes have declined since 2017. Please provide Kingston Hydro's analysis of why this has occurred and whether it expects this trend to continue.***

**Response**

Kingston Hydro cannot provide any analysis however offers the following observation that the customer numbers for both GS<50kW and GS>50kW have declined since 2017 due to many potential factors, including but not limited to, the ongoing COVID 19 pandemic, sub-meter retrofits to existing bulk-metered multi-unit buildings (especially apartments), CDM and energy efficiency, impact of residential intensification on lease/land costs in downtown and flight of commercial business to the suburbs.

***OPERATING REVENUE (EXHIBIT 3)***

***Interrogatory 3.0-VECC -12***

***Reference: Exhibit 3, page 31***
***Load Forecast Model, Historic CDM & CDM Adjustment Tabs***
***LRAMVA Workform, Tab 4 & 5***

***Preamble: It is noted that the LRAMVA Workform only includes CDM savings up to 2020 and the historical data used to estimate the Residential, GS<50 and GS>50 models does not include any adjustments to the 2021 data for the impact of CDM programs implemented in 2021.***

***It is noted that at page 31 the Application includes estimates as to the impact in 2021 of CDM programs implemented in 2021.***

***a) Please confirm that the 2012-2020 historic CDM data used in the Load Forecast Model (Historic CDM Tab) are based on the savings set out in the LRAMVA Workform (Tabs 4 & 5). If not, what is the basis for the CDM data in the Load Forecast Model?***

***b) What is the source for the savings from 2012-2014 CDM programs as set out in the LRAMVA Workform (Tab 4) and the Load Forecast Model (Historic CDM Tab)? Please provide copies of any reference documents that have not already been filed.***

***c) It is noted that in the LRAMVA Workform (Tab 4) the CDM 2012 persisting CDM savings are only reported out to 2021. What is the basis for the 2022 and 2023 persisting saving from 2012 CDM programs as set out in the Load***

***Forecast Model (Historic CDM Tab)?***

***d) It is noted that in the LRAMVA Workform (Tab 4) the CDM 2013 persisting CDM savings are only reported out to 2022. What is the basis for the 2023 persisting saving from 2013 CDM programs as set out in the Load Forecast Model (Historic CDM Tab)?***

***e) Please re-do the regression models for the Residential, GS<50 and GS>50 classes using 2021 monthly consumption values adjusted for the 2021 CDM program savings set out on page 31. For each of the three classes please provide: i) the resulting models and their related statistics, ii) the forecast consumption for 2022 and 2023 (assuming no CDM) and iii) the forecast consumption for 2022 and 2023 (after removing persisting CDM). Note: The Load Forecast Model will need to be revised so as to include 2021 program savings in the CDM Tab and exclude them from the CDM Adjustment Tab.***

**Response**

a) Confirmed. Please see an excerpt of Tabs 4 and 5 of the LRAMVA workform filed as 3-VECC-12 Attachment 1. Please note the billing determinant is entered as kWh for all classes (including demand-billed classes) to produce kWh savings.

b) Kingston_Updated_CDM Model _IRR 3-Staff-54 Attach1_20150911, attached as 3-VECC-12 Attachment 2.

c) The basis for the 2012 and 2013 savings to 2023 is the same as the source of the 2012-2014 savings as provided in response to part b). The LRAMVA excerpt provided as 3-VECC-12 Attachment 1 includes this information, with additional columns as necessary to include data to 2023.

d) See response to part c).

e) Please see the scenario provided as 3-VECC-12 Attachment 3, with summary results provided below. Elenchus confirms the model regressions have been rerun. For consistency, the same methodology has been applied to the Large Use class.

**2022 kWh Forecast**

| kWh | 2022 No CDM Forecast | Persisting CDM | 2022 Forecast without Persisting CDM | CDM Adjustment | 2022 CDM Adjusted Forecast |
|---|---|---|---|---|---|
| **Residential** | 205,878,125 | 17,087,156 | 188,790,969 | 509,561 | 188,281,408 |
| **GS < 50** | 94,177,797 | 8,161,517 | 86,016,280 | 421,243 | 85,595,037 |
| **GS > 50** | 263,934,950 | 17,812,889 | 246,122,061 | 1,028,333 | 245,093,728 |
| **Large Use** | 161,707,974 | 6,289,747 | 155,418,227 | 475,180 | 154,943,047 |
| **Street Light** | 2,014,809 | | 2,014,809 | | 2,014,809 |
| **USL** | 1,229,039 | | 1,229,039 | | 1,229,039 |
| **Total** | 728,942,694 | 49,351,308 | 679,591,385 | 2,434,316 | 677,157,069 |

**2023 kWh Forecast**

| kWh | 2023 No CDM Forecast | Persisting CDM | 2023 Forecast without Persisting CDM | CDM Adjustment | 2023 CDM Adjusted Forecast |
|---|---|---|---|---|---|
| **Residential** | 204,651,758 | 16,972,503 | 187,679,254 | 1,043,585 | 186,635,669 |
| **GS < 50** | 97,020,365 | 8,060,203 | 88,960,162 | 905,846 | 88,054,317 |
| **GS > 50** | 269,533,002 | 17,471,203 | 252,061,799 | 2,380,247 | 249,681,552 |
| **Large Use** | 164,715,920 | 6,126,715 | 158,589,205 | 1,188,822 | 157,400,383 |
| **Street Light** | 2,023,697 | | 2,023,697 | | 2,023,697 |
| **USL** | 1,243,602 | | 1,243,602 | | 1,243,602 |
| **Total** | 739,188,344 | 48,630,624 | 690,557,720 | 5,518,500 | 685,039,220 |

***OPERATING REVENUE (EXHIBIT 3)***

***Interrogatory 3.0-VECC -13***

***Reference: Exhibit 3, Elenchus Report, page 2***
***Preamble: The Report states:***

***"A range of COVID variables were considered to account for the impacts of the ongoing COVID-19 pandemic. The extent to which consumption since March 2020 differed from typical consumption was found to be related to the weather variables in those months. A set of COVID/weather interaction variables were considered to capture the incremental consumption caused by people working from home and generally staying at home due to lockdowns. These variables, "HDD COVID" and "CDD COVID" are equal to the relevant HDD and CDD variables since March 2020, and 0 in all earlier months. The coefficients reflect incremental heating and cooling load consumed as people stayed home during the pandemic. These variables continue to December 2021 but are reduced to 75% of HDD and CDD in all months in 2022 and 50% in 2023."***

***a) Please confirm that the referenced paragraph deals with the Residential class.***
***b) Did Elenchus test alternative COVID flag variables for the Residential class? If yes, what variables were tested and did the results using the "HDD COVID" and "CDD COVID" variables provide the best statistical results?***
***c) What is the impact on the Residential forecast for 2023 of using a 100% reduction (i.e., the COVID flags are zero) as opposed to a 50% reduction?***

**Response**

a) Confirmed.

b) Yes, Elenchus tested the COVID and COVID_AM variables. The “HDD COVID” and “CDD COVID” variables provided the best statistical results. In addition to stronger overall model statistics, the statistical significance of most other variables is stronger.

c) The test year Residential consumption forecast is 181,949,892 when the COVID forecast value is set to 0. This scenario is provided in 3-Staff-54 Attachment 1.

***OPERATING REVENUE (EXHIBIT 3)***

***Interrogatory 3.0-VECC -14***

***Reference: Exhibit 3, Elenchus Report, page 2***

***Preamble: The Application states:***

***"COVID flag variables were tested and found to be statistically significant for the General Service < 50 kW and General Service > 50 kW, and Large Use classes. A "COVID" variable equal to 0 in all months prior to March 2020 and 1 in all months since March 2020 and a "COVID_AM" variable equal to 0 in all months prior to March 2020, equal to 1 in April and May 2020, and 0.5 in each month from June 2020 to December 2021 were tested. The "COVID_AM" variable considers the incremental impact in the first few months of the pandemic, with lower impacts after May 2020. The "COVID_AM" variable is used for each of the General Service < 50 kW and General Service > 50 kW, and Large Use classes."***

***a) For each of the three customer classes, did the COVID_AM variable result in a better model (i.e., better statistical results) than the COVID variable?***

***b) For each of the three customer classes, what is the impact on the 2023 load forecast of setting the COVID_AM variable at zero and opposed to 0.25?***

**Response**

a) Yes, for each of the three classes the COVID_AM variable had a higher t-statistic than the COVID variable. Furthermore, the overall models had higher R-squared

values when the COVID_AM variable is used than the COVID variable for each class.

b) The test year GS < 50 kW consumption forecast is 91,233,546 kWh, the GS > 50 kW demand forecast is 639,038 kW, and the Large Use demand forecast is 301,075 kW when the COVID forecast value is set to 0. This scenario is provided in 3-Staff-54 Attachment 1.

***OPERATING REVENUE (EXHIBIT 3)***

***Interrogatory 3.0-VECC -15***

***Reference: Exhibit 3, Elenchus Report, pages 5 and 19***

***Preamble: At page 5 the Report states:***

***"The number of Residential customers was found to be statistically significant and is used as an independent variable."***

***At page 19 the Report states:***
***"While Residential customer counts are not a component of the regression model, they are forecasted for the purpose of rate setting."***

***a) Please reconcile the two statements referenced in the Preamble.***

**Response**

a) The sentence on page 19 is not correct and should not be included in the paragraph. Residential customer counts are a variable used in the regression model.

***OPERATING REVENUE (EXHIBIT 3)***

***Interrogatory 3.0-VECC -16***

***Reference: Exhibit 3, Elenchus Report, pages 19, 21, 22, 24, 26, 27***

***a) Please provide the actual customer/connection counts for each customer class for the most recent month available.***

**Response**

a) The actual customer/connection counts for each customer class for August 2022, the most recent month available are as follows:

| Customer Classification | Customer/Connection Counts |
|---|---|
| Residential | 24,656 |
| GS < 50 kW | 2,938 |
| GS 50 to 4,999 kW | 323 |
| Large Use | 3 |
| Unmetered Scattered Load | 169 |
| Street Lighting | (connections) 5,690 |

***OPERATING REVENUE (EXHIBIT 3)***

***Interrogatory 3.0-VECC -17***

***Reference: Ex. 3, Elenchus Report, pg.18/Load Forecast Model, Economic Tab***

***a) The GDP forecast used in the Application is the average of the public forecasts from four major banks (BMO, TD, Scotiabank, and RBC, as of March 31, 2022). However, the Economic Tab in the Load Forecast model also includes a GDP forecast from CIBC. Why was CIBC excluded for purposes of the Application?***

**Response**

a) Unlike the four major banks included in the economic forecasts, CIBC does not regularly publish provincial forecast data. Each bank, except CIBC, had published a new forecast in the month of March 2022 so CIBC data was excluded because it was out of date. Elenchus does not necessarily consider economic forecasts that are 2.5 months old to be out of date, however, economic conditions were changing at a faster pace in this period due to the reduced impact of the Omicron variant (compared to mid-January) and increased inflation expectations.

***OPERATING REVENUE (EXHIBIT 3)***

***Interrogatory 3.0-VECC -18***

***Reference: Exhibit 3, pages 23 and 25***

***a) For each of the GS>50 and LU classes please provide the 2022 monthly kWh, kW for each of months where the actual results are available.***

**Response**

a) The following table provides 2022 monthly kWh, kW for GS > 50 and LU classes for each of the months where actual results available:

| 2022 | GS 50 to 4,999 kW | | Large Use | |
|---|---|---|---|---|
| | kWh | kW | kWh | kW |
| Jan | 24,851,328.7 | 61,034.9 | 12,126,587.08 | 21,330.8 |
| Feb | 22,142,485.1 | 47,191.4 | 12,132,188.84 | 21,530.6 |
| Mar | 22,730,150.0 | 62,489.6 | 13,465,753.71 | 21,939.8 |
| Apr | 19,333,580.3 | 44,938.8 | 12,401,870.05 | 20,812.6 |
| May | 18,987,202.6 | 52,760.3 | 12,560,041.42 | 22,738.1 |
| Jun | 19,458,725.6 | 47,016.8 | 13,093,415.84 | 23,889.1 |
| Jul | 22,090,088.9 | 48,096.1 | 14,933,301.50 | 26,869.1 |

***OPERATING REVENUE (EXHIBIT 3)***

***Interrogatory 3.0-VECC -19***

***Reference: Exhibit 3, Elenchus Report, page 28***

***a) Please explain why it is reasonable to use a kW/kWh ratio of 0.002739 for Street Lights when the actual ratio has exceeded this value in every year since 2014.***

**Response**

a) Elenchus typically uses the 10-year average unless ratios have materially changed over time. The 5-year average is within 2% of the 10-year average so the ratio was not adjusted to the 5-year average.

***OPERATING REVENUE (EXHIBIT 3)***

***Interrogatory 3.0-VECC -20***

***Reference: Exhibit 3, pages 29-31***

***a) Please provide versions of Table 33 that show: i) KHC's Residential kWh usage as a percentage of the total Provincial Residential kWh usage, ii) KHC's GS<50 kWh usage as a percentage of the total Provincial GS<50 kWh usage, iii) KHC's GS>50 kWh usage as a percentage of the total Provincial GS>50 kWh usage and iv) KHC's LU kWh usage as a percentage of the total Provincial LU kWh usage.***

***b) Are the 2021-2024 CDM Framework programs that target Commercial and Industrial Users just meant to apply to customers of LDCs or also to transmission-connected commercial and industrial customers that are not served by an LDC?***

***c) Is the KHC's Energy Affordability Program allocation based on the number of households in Kingston within the Low-Income Measure (after tax) as a share of: i) all Ontario households or ii) all Ontario households meeting the Low-Income Measure criteria?***

***d) Is Statistics Canada the source of the data for the number of households in Kingston within the Low-Income Measure (after tax)? If not, what is the source?***

***e) Please explain why the sum of the CDM class allocations in Table 35 does not equal the total CDM adjustment (6,292,485 kWh) in Table 34.***

**Response**

a) Tables for the Residential class, the GS < 50 kW class, and a joint table for GS>50 kW and Large Use are provided below. The annual OEB yearbooks include GS>50, Large Use, and ST volumes together so KHC is unable to provide separate tables for these two classes.

**i. Residential**

| Year | Provincial kWh | KHC kWh | KHC % Share |
|---|---|---|---|
| 2016 | 39,196,063,132 | 181,817,508 | 0.46% |
| 2017 | 38,088,034,111 | 176,056,575 | 0.46% |
| 2018 | 41,318,383,306 | 188,025,745 | 0.46% |
| 2019 | 40,381,980,426 | 186,981,944 | 0.46% |
| 2020 | 43,244,522,381 | 188,355,001 | 0.44% |
| **5-Year Avg.** | **40,445,796,671** | **184,247,354** | **0.46%** |

**ii. GS < 50 kW**

| Year | Provincial kWh | KHC kWh | KHC % Share |
|---|---|---|---|
| 2016 | 13,194,493,806 | 88,264,843 | 0.67% |
| 2017 | 13,005,545,376 | 87,047,731 | 0.67% |
| 2018 | 13,542,967,467 | 89,777,485 | 0.66% |
| 2019 | 13,351,192,367 | 88,540,325 | 0.66% |
| 2020 | 12,532,160,615 | 81,058,181 | 0.65% |
| **5-Year Avg.** | **13,125,271,926** | **86,937,713** | **0.66%** |

| iii. & iv. GS > 50 kW, Large User, & ST | | | |
|---|---|---|---|
| **Year** | **Provincial kWh** | **KHC kWh** | **KHC % Share** |
| 2016 | 63,716,850,210 | 421,854,909 | 0.66% |
| 2017 | 63,722,025,934 | 421,473,149 | 0.66% |
| 2018 | 65,275,749,273 | 424,404,716 | 0.65% |
| 2019 | 64,284,293,740 | 417,149,959 | 0.65% |
| 2020 | 60,782,716,311 | 387,213,055 | 0.64% |
| **5-Year Avg.** | **63,556,327,094** | **414,419,158** | **0.65%** |

b) Elenchus's understanding is that the programs are available to non-LDC customers.

c) The Energy Affordability allocation is based on the number of Kingston households in the Low Income measure as a share of (ii) all Ontario households meeting the Low Income measure criteria.

d) Confirmed.

e) The share of GS<50 kW programs are allocated based on the historic allocation of kWh savings, whereas the share of GS > 50 kW and Large Use programs are allocated based on historic allocations of kW savings. Historically, the Retrofit program kWh savings allocated to GS > 50 kW and Large Use were larger than the allocation of kWh savings.