COMMONWEALTH EDISON COMPANY

Load Forecast for Five-Year Planning Period
June 2018 – May 2023

July 14, 2017

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I. INTRODUCTION AND SUMMARY

The Public Utilities Act ("PUA") provides that beginning in 2008 electric utilities in Illinois shall provide a range of load forecasts to the Illinois Power Agency ("IPA") by July 15th of each year. The PUA further provides that these load forecasts shall cover the 5-year planning period for the next procurement plan and shall include hourly data representing high-load, low-load and expected-load scenarios for the load of eligible retail customers ("Eligible Retail Customers"). The electric utility is also to provide supporting data and assumptions (220 ILCS 5/16-111.5(d)(2)). This document presents Commonwealth Edison Company's ("ComEd") load forecast for the planning period of June 2018 through May 2023.

ComEd's 5-year hourly load forecast ("Forecast") is based on the PUA's definition of Eligible Retail Customers. Eligible Retail Customers include residential and non-residential customers who purchase power and energy from ComEd under fixed-price bundled service ("Blended Service") tariffs, other than those customers whose service has been declared competitive. Because service to certain classes of customers has been declared competitive either by statute or by the Illinois Commerce Commission ("ICC"), only residential and non-residential customers below 100 kW in size are eligible for Blended Service.[1]

The Forecast includes the effects of energy efficiency, demand response and renewable energy resources programs. The Forecast anticipates that these programs will be observed in full compliance with the PUA's requirements, subject to the defined rate impact test.

II. LOAD FORECAST

A. Purpose and Summary

This section of the Forecast provides forecasted energy usage for the Eligible Retail Customers within ComEd's service territory for the 5-year procurement planning period beginning on June 1, 2018. In accordance with Section 16-111.5(b) of the PUA, the Forecast includes a multi-year historical analysis of hourly loads, a review of switching trends and competitive retail market development, a discussion of known and projected changes to future loads and growth forecasts by customer classes. The Forecast also addresses the impacts of demand response and energy efficiency programs on the forecast. Lastly, this Forecast discusses any supply side needs that are projected to be offset by the purchase of renewable energy resources.

[1] There is one exception to this statement. The common area accounts for the condominium associations are exempted from this competitive declaration (see Section 16-103.1 of the PUA).

B. Development of the Five-Year Load Forecast (June 1, 2018 – May 31, 2023)

The hourly load analysis provides the means to determine the on-peak and off-peak quantities needed in the procurement process. In presenting the Forecast, this document focuses on average usage or load during the 12 monthly on-peak and off-peak periods during a year. For the purposes of this Forecast, the definitions of the on-peak and off-peak periods are consistent with those commonly used in the wholesale power markets, and on trading platforms such as the New York Mercantile Exchange ("NYMEX") and the Intercontinental Exchange, Inc. ("ICE"). The on-peak period consists of the week day period from 6 a.m. to 10 p.m. CPT excluding NERC holidays (this is referred to as the 5X16 peak period). The off-peak period consists of all other hours (this is referred to as the off-peak "wrap" period). The Forecast therefore has been summarized as load requirements using the 24 different time periods covered by these standard products. This is the same approach that was presented in past forecasts and approved by the ICC. The hourly load data is being supplied with the supporting data and assumptions materials.

1. Hourly Load Analysis

a. Multi-year historical analysis of hourly load

The 2017 multi-year historical analysis of hourly load is very similar to the approach used in past procurement filings. The expanding deployment of Advanced Metering Infrastructure ("AMI") within ComEd's service territory has provided the Company with the ability to enhance its standard hourly load profiles. Data from AMI meters were utilized to develop delivery class hourly load profiles for 2015 and 2016. This data was used in the typical hourly models that have been developed and refined over the past few years. These models continue to perform well.

The 2017 multi-year historical analysis of load during the 24 monthly on-peak and off-peak periods is based on hourly profile data for the period from January 2015 to December 2016. These are the same profiles used in ComEd's cost of service studies. As discussed in greater detail below, the profiles show distinct and stable weather-related usage patterns that are indicative of how residential and small non-residential customers use electricity. The customer load profiles provide reliable information on the historical hourly usage of customers.

Using the hourly load profiles and actual customer aggregate usage, Table II-1 depicts the historical on-peak and off-peak hourly usage of the major customer groups within the Eligible Retail Customers for the period from January 2014 to December 2016.

Table II-1
Load Forecast Table (Historical Detail 2014-2016)

ComEd Historical Actual Usage

Historical Energy Usage in MWh for Eligible Retail Customers (Line Loss Adjusted)

		Residential Load		Watthour		Small Load (0 to 100kW)		Street Lighting Load		Total Load (MWh)	
Year	Month	On-Peak	Off-Peak	On-Peak	Off-Peak	On-Peak	Off-Peak	On-Peak	Off-Peak	On-Peak	Off-Peak
2014	1	472,529	469,785	5,695	4,803	244,024	198,856	2,089	4,900	724,337	678,345
2014	2	408,966	422,851	5,542	4,726	212,965	173,018	1,577	3,696	629,051	604,291
2014	3	335,205	392,328	5,078	4,725	218,180	197,294	1,699	4,808	560,163	599,155
2014	4	303,227	280,120	4,664	3,617	201,577	146,047	1,472	5,496	510,941	435,279
2014	5	309,228	326,447	3,927	3,365	200,794	162,828	611	3,344	514,560	495,984
2014	6	448,593	439,373	4,700	3,752	226,571	171,759	744	4,582	680,608	619,466
2014	7	464,601	464,645	5,191	3,909	244,749	181,444	692	4,072	715,233	654,070
2014	8	524,114	553,617	5,286	4,361	241,702	195,592	810	3,977	771,912	757,547
2014	9	385,897	378,771	4,541	3,613	214,543	161,050	1,428	4,974	606,409	548,408
2014	10	373,954	346,352	4,580	3,378	210,659	144,084	1,683	4,353	590,876	498,167
2014	11	400,930	485,673	4,820	4,913	192,799	186,043	1,765	4,019	600,314	680,648
2014	12	482,856	466,095	6,155	5,151	235,197	187,914	2,344	4,489	726,551	663,649
	Totals	**4,910,102**	**5,026,057**	**60,179**	**50,314**	**2,643,760**	**2,105,929**	**16,914**	**52,710**	**7,630,955**	**7,235,010**
2015	1	476,714	538,625	5,863	5,335	214,141	190,941	589	1,257	697,308	736,157
2015	2	476,714	484,624	6,645	5,567	207,164	169,191	490	1,091	691,014	660,473
2015	3	427,317	467,237	5,275	4,394	212,538	172,854	465	1,225	645,594	645,711
2015	4	310,909	309,919	4,378	3,317	184,811	134,831	413	1,382	500,511	449,448
2015	5	337,101	416,319	4,376	4,035	183,401	164,164	269	1,368	525,147	585,886
2015	6	527,083	481,903	5,315	3,685	214,500	148,479	249	1,316	747,146	635,384
2015	7	668,905	613,692	5,892	3,915	237,741	165,813	282	1,401	912,820	784,821
2015	8	686,980	783,783	5,786	4,771	225,439	189,435	280	1,260	918,485	979,247
2015	9	655,298	669,285	8,687	6,431	221,562	166,578	373	1,172	885,920	843,466
2015	10	493,319	503,808	6,774	4,926	199,321	141,220	442	1,180	699,855	651,134
2015	11	502,636	616,626	7,400	6,441	185,017	163,033	45	526	695,097	786,625
2015	12	647,226	661,219	7,577	6,007	203,756	163,479	546	1,080	859,105	831,786
	Totals	**6,210,203**	**6,547,038**	**73,968**	**58,824**	**2,489,390**	**1,970,019**	**4,442**	**14,257**	**8,778,002**	**8,590,138**
2016	1	453,112	976,868	7,255	8,328	220,874	204,614	495	1,081	681,736	1,190,891
2016	2	627,933	635,511	7,703	7,236	220,211	163,133	496	1,128	856,344	807,008
2016	3	534,941	531,580	7,095	6,392	217,087	150,014	509	1,355	759,632	689,341
2016	4	478,231	530,677	6,296	6,346	200,235	151,849	364	1,259	685,126	690,131
2016	5	508,244	595,179	5,875	6,084	198,148	153,478	253	1,329	712,519	756,070
2016	6	865,614	822,519	7,121	6,003	250,652	164,150	251	1,353	1,123,638	994,024
2016	7	997,940	995,444	7,003	7,214	243,993	206,988	257	1,393	1,249,194	1,211,039
2016	8	1,147,073	928,465	8,581	6,961	297,408	190,783	285	1,310	1,453,346	1,127,519
2016	9	750,147	766,686	6,937	6,570	228,916	167,874	405	1,309	986,404	942,439
2016	10	531,146	588,979	5,668	5,929	190,527	151,083	463	1,150	727,804	747,141
2016	11	554,704	614,507	6,087	6,056	192,297	145,239	480	1,049	753,567	766,851
2016	12	738,393	849,970	7,712	8,106	224,813	188,010	612	1,151	971,530	1,047,236
	Totals	**8,187,476**	**8,836,385**	**83,332**	**81,225**	**2,685,162**	**2,037,214**	**4,869**	**14,865**	**10,960,840**	**10,969,690**

Table II-2 carries forward the total load in MWh from Table II-1 and then provides the average load for each period in MW, which is useful in determining the required volume of standard wholesale energy products.

Table II-2

Load Forecast Table (Historical Summary 2014-2016)

ComEd Historical Actual Usage
Historical Energy Usage for Eligible Retail Customers
(Line Loss Adjusted)

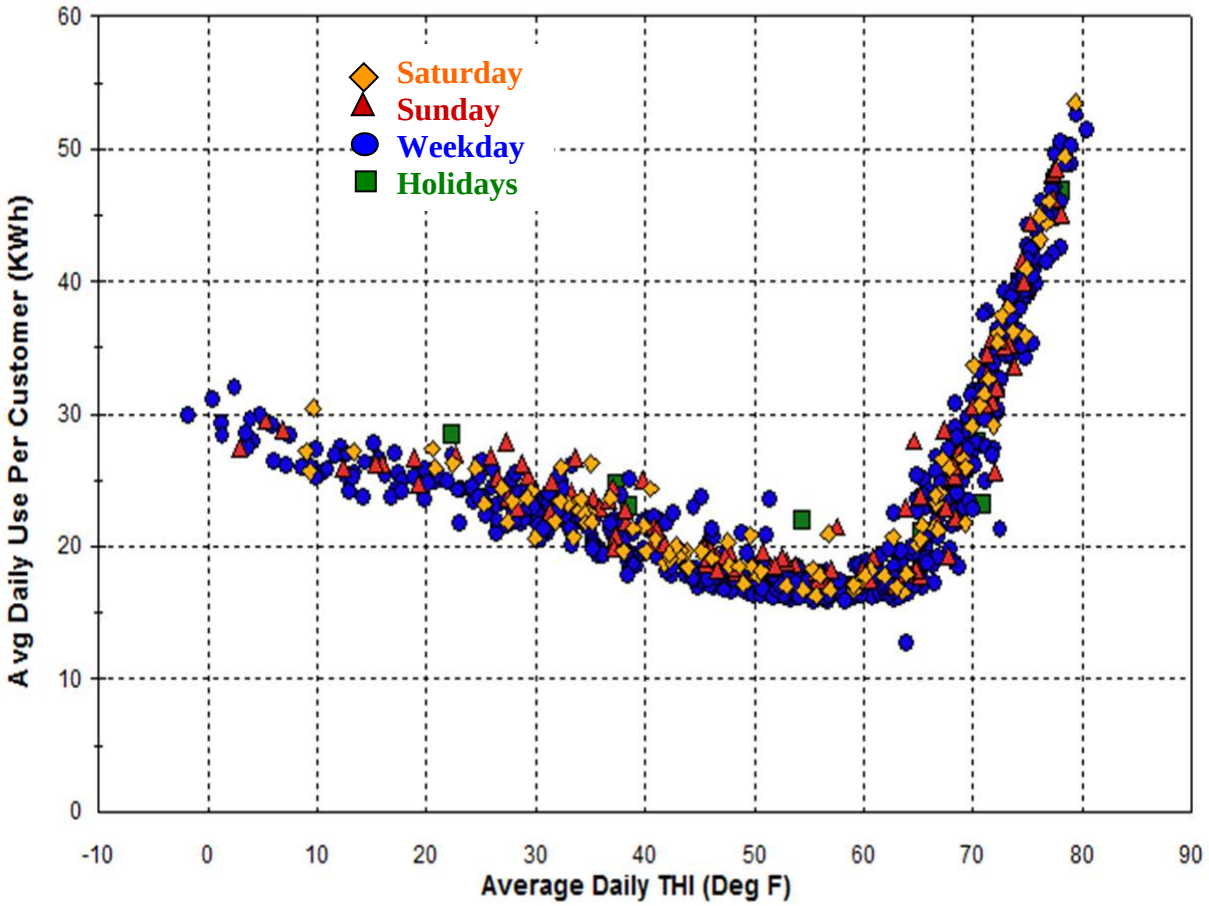
Year	Month	Total Load (MWh)		Average Load (MW)	
		On-Peak	Off-Peak	On-Peak	Off-Peak
2014	1	724,337	678,345	2,058	1,730
2014	2	629,051	604,291	1,966	1,717
2014	3	560,163	599,155	1,667	1,469
2014	4	510,941	435,279	1,452	1,183
2014	5	514,560	495,984	1,531	1,216
2014	6	680,608	619,466	2,026	1,613
2014	7	715,233	654,070	2,032	1,669
2014	8	771,912	757,547	2,297	1,857
2014	9	606,409	548,408	1,805	1,428
2014	10	590,876	498,167	1,606	1,325
2014	11	600,314	680,648	1,975	1,636
2014	12	726,551	663,649	2,064	1,693
Totals		**7,630,955**	**7,235,010**		
2015	1	697,308	736,157	2,075	1,804
2015	2	691,014	660,473	2,159	1,876
2015	3	645,594	645,711	1,834	1,647
2015	4	500,511	449,448	1,422	1,221
2015	5	525,147	585,886	1,641	1,382
2015	6	747,146	635,384	2,123	1,727
2015	7	912,820	784,821	2,480	2,087
2015	8	918,485	979,247	2,734	2,400
2015	9	885,920	843,466	2,637	2,197
2015	10	699,855	651,134	1,988	1,661
2015	11	695,097	786,625	2,172	1,967
2015	12	859,105	831,786	2,441	2,122
Totals		**8,778,002**	**8,590,138**		
2016	1	681,736	1,190,891	2,130	2,809
2016	2	856,344	807,008	2,549	2,242
2016	3	759,632	689,341	2,064	1,833
2016	4	685,126	690,131	2,039	1,797
2016	5	712,519	756,070	2,121	1,853
2016	6	1,123,638	994,024	3,192	2,701
2016	7	1,249,194	1,211,039	3,904	2,856
2016	8	1,453,346	1,127,519	3,949	2,999
2016	9	986,404	942,439	2,936	2,454
2016	10	727,804	747,141	2,166	1,831
2016	11	753,567	766,851	2,243	1,997
2016	12	971,530	1,047,236	2,891	2,567
Totals		**10,960,840**	**10,969,690**		

ComEd analyzed the hourly load profiles for all the major customer groups within the Eligible Retail Customers. As a result of that analysis, ComEd developed hourly load models for those major customer groups that determined the average percentage of monthly usage that each customer group used in each hour of that month. Those hourly models were then used to develop the monthly on-peak and off-peak usage percentages for the planning periods. These percentages were applied to ComEd's forecasted monthly usage to obtain the forecasted procurement quantities. In the following section, the hourly analysis of the residential single-family non-space heating customer segment is described. This class represents approximately half of the annual usage of the Eligible Retail Customer segment and provides a good example of how the hourly load profile data were analyzed and modeled.

(i) Residential Single-Family Hourly Load Profile Analysis

One of the most significant and easily understood determinants of residential energy usage is weather. The "scatter plot" shown below (Chart II-1) demonstrates the significant relationship that exists between weather and usage for the single-family non-space heating residential customer segment.

Chart II-1
Single Family Non-Space Heating Daily Usage vs. Temperature/Humidity



A scatter plot shows the relationship between two variables. Each point represents a single observation (a day in this case). In this chart, the values shown on the vertical

or Y-axis are daily usage per customer ("UPC"). The values shown on the horizontal or X-axis are the daily average temperature-humidity index ("THI"). The graph shows daily UPC based on observations from January 2015 to December 2016 and the average THI on those days. THI, rather than temperature alone, is used because residential usage is sensitive to humidity. Different geometric shapes are used to distinguish points representing weekdays from those depicting Saturday, Sunday or holiday usage.

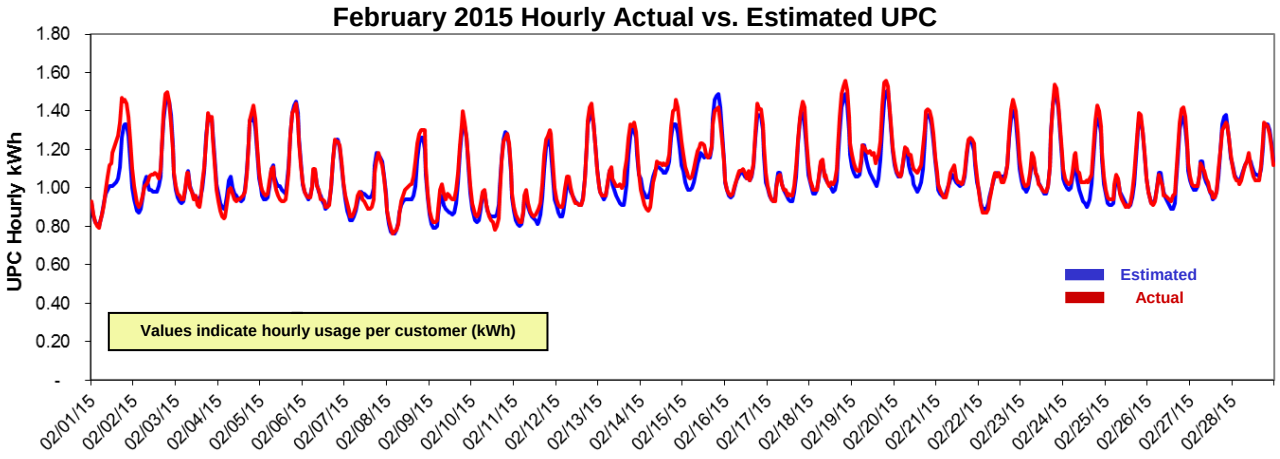
The scatter plot is very useful in understanding the relationship between customer usage and weather. If a relationship between usage and weather did not exist then the graph would not display a clear pattern. However, it is apparent that there is a clear pattern. The right side of the graph at the high end of the horizontal axis shows the days on which THI was the highest. The points at that end of the graph indicate that the highest UPC occurred when THI levels were at their peak or 75 plus degrees. Moving to the left, the points show UPC declining rapidly as the THI decreases until the 60 degree level is reached at which a base usage level appears. From that base level, UPC gradually increases as colder temperatures are experienced.

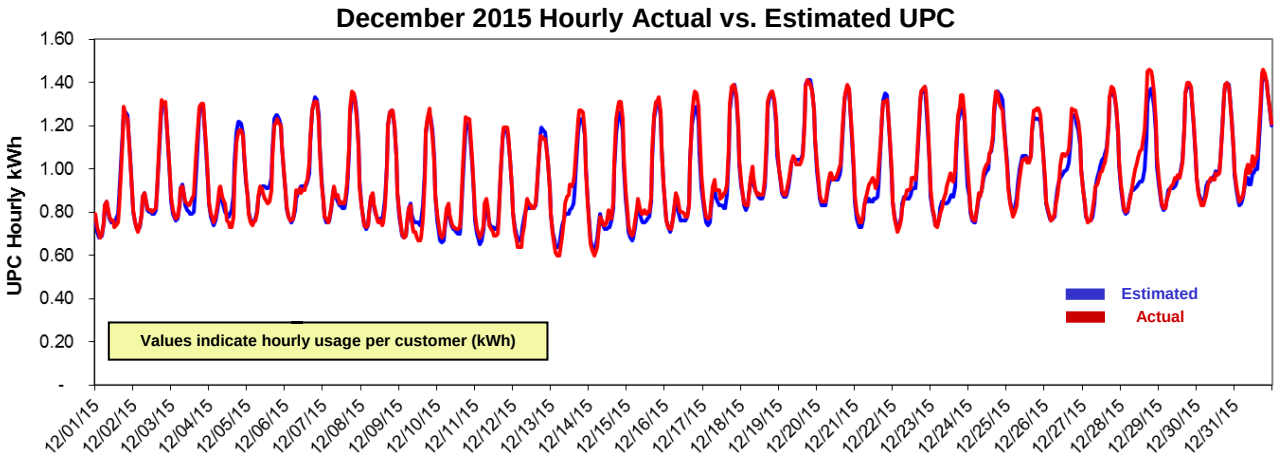
Hourly models were developed to account for the strong weather relationship shown in the graph and to account for numerous other factors that influence residential usage. The models explicitly account for the differing effects of energy use at various temperatures. Variables are included to allow for seasonal usage patterns in water heating, refrigeration and other seasonal uses. Weekend and holiday variables are included to allow for behavioral differences on those days relative to weekdays. Weather variables for prior days are included in the model to account for the dynamic effects of temperature buildup. The full list of variables included in the residential single-family model is shown in Appendix A-1.

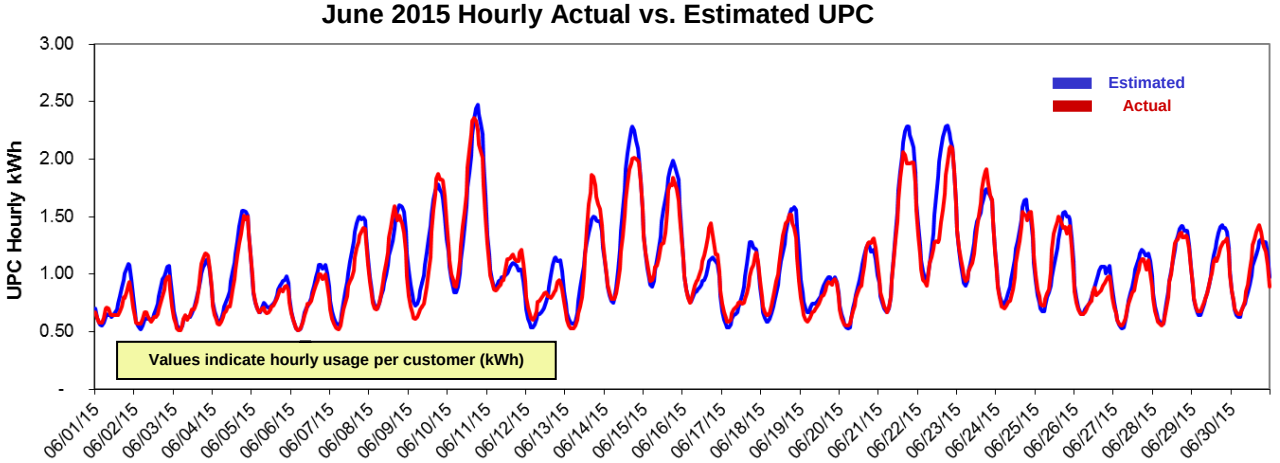
One way to visualize the model's performance is to look at plots of actual and estimated[2] values for the historical estimation period. The following charts demonstrate the performance of the model over four time periods at the hourly level during winter and summer months with warmer or colder than normal weather conditions. The four months are February 2015 (cold winter); December 2015 (warm winter); June 2015 (cool summer) and August 2016 (warm summer). The charts illustrate the model's ability to accurately estimate under varying weather conditions. The heating degree days ("HDD") in February 2015 were 1,405 (above the normal HDD of 1,056) and December 2015 was 800 (below the normal HDD of 1,107). The cooling degree days ("CDD") in June 2015 were 118 (below the normal CDD of 180) and August 2016 was 343 (above the normal CDD of 247).

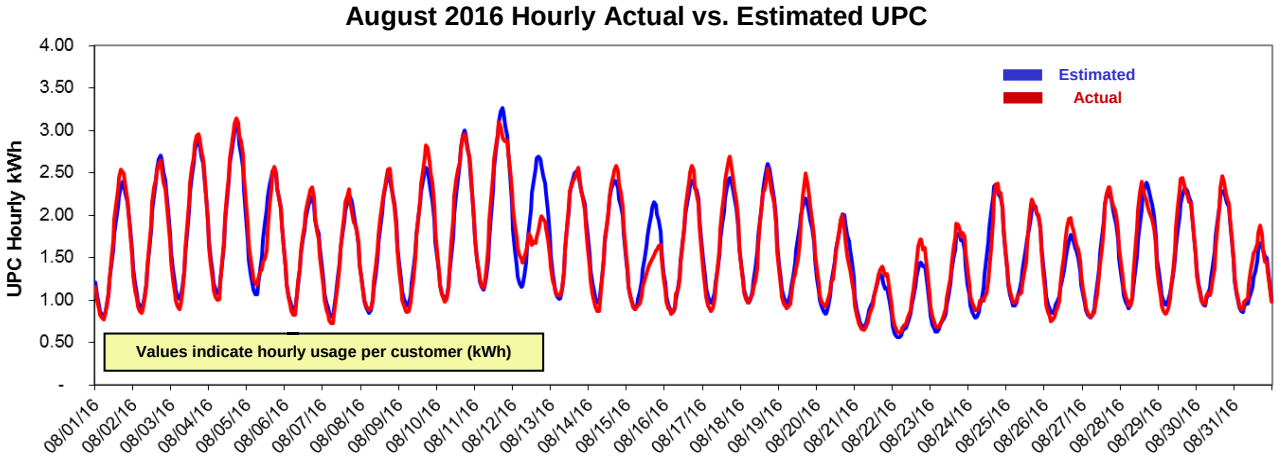
[2] The estimated data in Chart II-2 is based on the actual weather experienced over the relevant period.

Chart II-2
ComEd Single Family Profile: Estimated vs. Actual









In all of the graphs above in Chart II-2, the red line indicates the "actual" load data and the blue line indicates the model's estimated values, adjusted for actual weather. The charts demonstrate that the model's estimated usage closely mirrors the actual usage and the model is effective in estimating variations in electrical usage patterns that are significantly influenced by weather conditions.

b. Switching Trends and Competitive Retail Market Analysis

In determining the expected load requirements for which standard wholesale products will be procured, it is important to provide the best possible estimate of the number of Eligible Retail Customers that are likely to be served by Retail Electric Suppliers ("RES"). That issue is considered in the following discussion, which reviews retail development in ComEd's service territory, the entry of RES, the rate of customer switching in the past, future trends affecting customer choice and ComEd's 5-year forecast of the percentage of load from various customer segments that will continue to be served with supply procured by ComEd.

(i) Introduction and Brief Overview of Retail Development

Retail choice is very active within ComEd's service territory as demonstrated in several ways:

1. A very large number of residential customers have participated in customer choice over the past few years. Approximately 1.2 million residential customers in the ComEd service territory were taking RES supply as of May 2017. The RES numbers were even higher in early 2014 with approximately 2.4 million residential customers taking RES supply. Thus, millions of residential customers have participated in customer choice over the past several years. This high level of engagement denotes healthy customer choice in the ComEd service territory.

2. Municipal Aggregation ("Muni Agg") has been a major factor in the expansion of residential RES supply over time. In total there are

approximately 358 governmental entities (i.e., municipalities, townships or counties, hereinafter jointly referred to as "Communities") within the ComEd service territory that had approved a Muni Agg referendum as of April 2017. Approximately 261 of those Communities (or 73% of the total) were being served under a Muni Agg contract as of April 2017. The large number of on-going Muni Agg Communities highlights the viability of customer choice in the service territory.

3. As noted below, there are a very large number of residential retailers in the ComEd service territory.

4. Non-residential customers are actively participating in customer choice including smaller sized customers. Approximately 92% of ComEd's entire non-residential usage is supplied through either RES or Hourly service as of May 2017. There is also meaningful participation by the smaller sized non-residential customers as 64% of the 0 to 100 kW non-residential delivery class was taking RES and Hourly supply in May 2017. These large percentages illustrate that customer choice is very active among a variety of non-residential customers within the ComEd service territory.

In summary, customers are actively engaged in retail choice within the ComEd service territory.

(ii) RES Development

There continues to be growth in the number of RESs within the ComEd service territory. This growth is shown in the table below:

Table II-3
RES Development in the ComEd Service Territory

RES Category	May 2011	May 2012	May 2013	May 2014	May 2015	May 2016	May 2017
Number of Active RESs[3]	31	48	66	70	71	74	81
Number of RESs approved to serve Residential customers	16	32	49	55	56	63	64
Number of entities in the RES certification process as of May 2017	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0

From May 2011 to May 2017 there has been an approximately 160% increase in the number of active RES in the ComEd service territory. The increase in RES approved to serve residential customers is even greater. The number of RES approved to serve residential

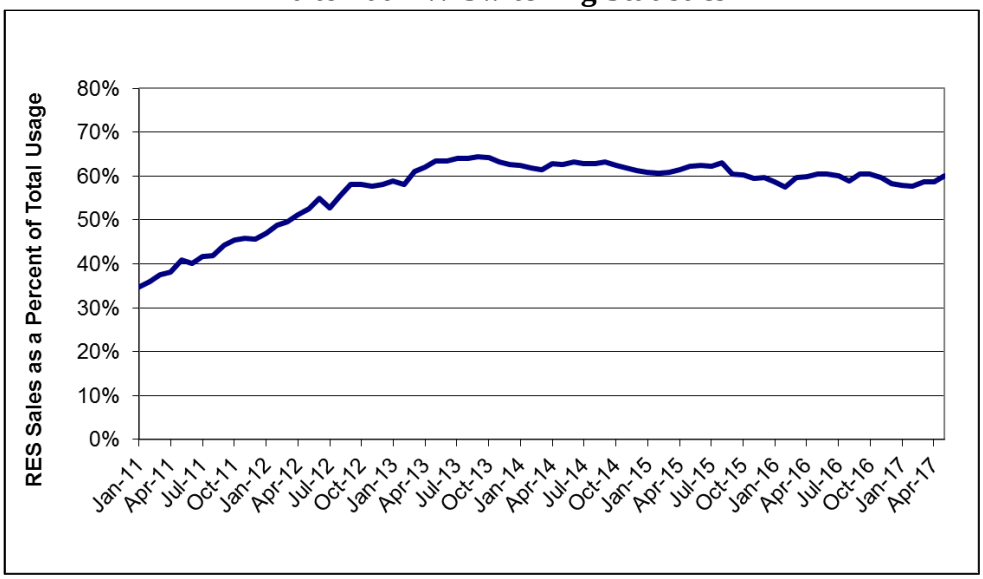
[3] An "Active RES" is defined as an ICC-approved RES that has passed ComEd's certification process.

customers has increased by 300% since 2011. This growth in the number of RES highlights the active retail market in ComEd's service territory.

(iii) Future Trends

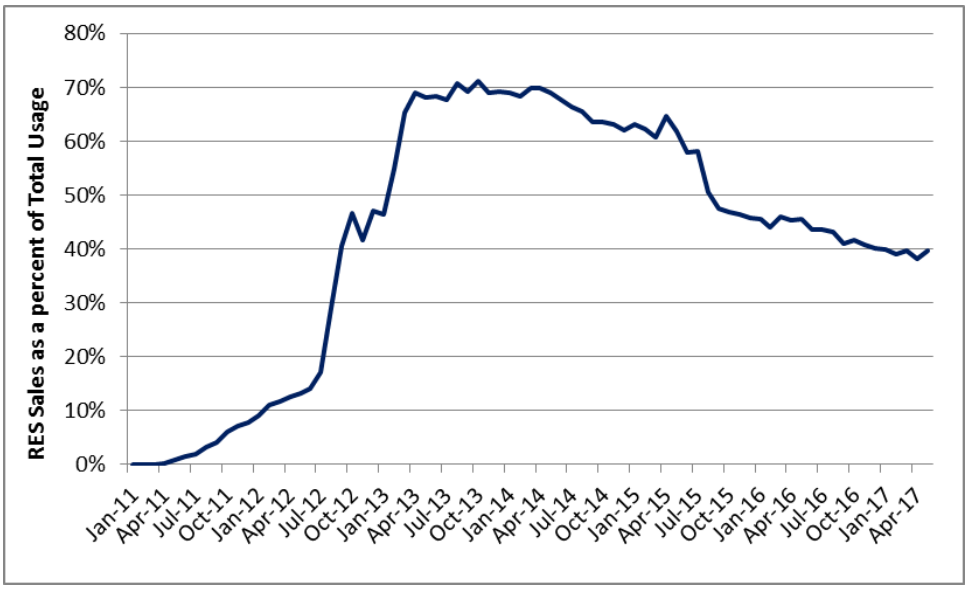
The future trends reflect an active retail market for several reasons. First, RES supply to customers in the 0 to 100 kW class continues to be very significant. Chart II-3 contains the monthly percentage of usage by RES customers from January 2011 through May 2017. RES usage was increasing prior to mid-2013 and has been relatively steady since mid-2013. The group has averaged approximately 60% from January 2015 to May 2017.

Chart II-3
0 to 100 kW Switching Statistics



Second, the retail market for residential customers has found wide-spread acceptance over the past few years. Chart II-4 contains the monthly percentage of usage by RES customers from January 2011 to May 2017. In just over four years, residential RES usage went from essentially zero usage in May 2011 to approximately 70% of total residential usage by late 2013. Currently it is just below 40% as various Muni Agg Communities have suspended their programs. However, for the purposes of judging the acceptance and engagement in retail choice by residential customers, Chart II-4 highlights that customers have been very active in the retail markets.

Chart II-4
Residential Switching Statistics



Third, as previously noted, Muni Agg is very active within the ComEd service territory with approximately 358 Communities passing a Muni Agg referendum. Muni Agg by its very nature requires engagement not only by public officials within each community, but also by the citizens of the community that approve the Muni Agg referendums. This large number of Communities is another indicator of an engaged customer base that is active in retail choice.

For these reasons, we expect retail markets to continue to reflect a significant level of engagement during the Forecast period.

(iv) Forecasted Retail Usage

The forecast percentages of Blended Service usage are shown below, along with some historical perspective.

Table II-4
Percentage of Blended Service Usage

Month	Residential	Watthour	0-100 kW
Jun-08	99.8%	98.1%	75.5%
Jun-09	99.7%	96.7%	70.4%
Jun-10	99.6%	95.0%	64.9%
Jun-11	98.1%	92.3%	57.8%
Jun-12	85.6%	76.0%	43.2%
Jun-13	31.3%	20.8%	34.1%
Jun-14	31.8%	24.9%	33.9%
Jun-15	41.6%	27.0%	34.4%
Jun-16	55.9%	38.8%	36.6%
Apr-17	61.3%	40.6%	37.5%
Jun-18	66.8%	47.7%	39.4%
Jun-19	68.7%	49.9%	39.7%
Jun-20	68.7%	49.9%	39.7%
Jun-21	68.7%	49.9%	39.7%
Jun-22	68.7%	49.9%	39.7%

The main drivers of this forecast are:

1. Residential Blended supply is expected to increase from the approximately 61.3% as of April 2017 to approximately 66.5% by the end of 2017. The increase reflects the actual decisions from numerous Muni Agg contract renewals in the first several months of 2017 and an estimate for the remaining Muni Agg communities with contract expirations in 2017. Muni Agg is a viable option as demonstrated by the majority of Muni Agg Communities (based on kWh usage) renewing their contracts (be it with the incumbent supplier or a new supplier) during 2017. The following information pertains to 2017 Muni Agg activity as of mid-June 2017:

    - ❖ Almost two-thirds of the 2017 Muni Agg communities have made a decision.

- ❖ Approximately 35% of those making a decision have opted for Blended supply – in other words, approximately 65% are renewing.

See the spreadsheet entitled "2017-18 Muni Ag Renewal Tracking.xlsx" for additional details. For the remainder of 2017 it is assumed that 25% will opt for Blended supply. The remaining year percentage is a little lower than the year-to-date percentage to reflect more recent results. Approximately 25% (based on usage) of the approximately 70 Muni Agg Communities that have made a decision since late February 2017 have opted for Blended supply.

There are four additional items (and related assumptions) that are used in preparing the 2017 forecast. Those items are as follows and noted herein as those same assumptions are used in future years:

a. The City of Chicago is assumed to continue to take ComEd supply during 2017, and for that matter, the remainder of this forecast period. ComEd has not received any information from the City of Chicago that would indicate a desire to resume its Muni Agg program.

b. No communities are anticipated to resume their Muni Agg programs during the remainder of 2017 as no community has restarted its suspended Muni Agg program in 2017 and only one community did restart its program in 2016. A meaningful impact to future switching is not expected from a restart of suspended Muni Agg programs.

c. Not all of the customers within a Muni Agg Community opting for ComEd supply will be taking ComEd supply as some customers prefer RES supply. Based on past data, approximately 15% of the usage within a Muni Agg community continues to take RES supply after it has suspended its program. This assumption is used for 2017 and the following years.

d. Non-Muni Agg Residential switching activity is expected to remain stable over the Forecast. For example, of Communities that never implemented a Muni Agg program approximately 78% of their Residential usage was related to Blended supply as of May 2017 and that percentage is unchanged from May 2016. A stable level of non-Muni Agg switching activity is anticipated for the remainder of 2017 and into the following years.

2. Looking to the Planning Year ("Planning Year")[4] 2018 and beyond, the savings opportunity will continue to be an important factor. The Blended Service supply price will likely be slightly higher than market prices for the next few years given the existing contracts within the portfolio. This small amount of headroom is due to the above market Long Term renewables contracts ComEd was required to enter into in 2010 as well as the administrative and general costs related to the IPA and the ComEd call center and collection agency costs the ICC requires ComEd to allocate to ComEd supplied customers. These costs are anticipated to provide a relatively small amount of savings (or headroom) between Blended Service and RES pricing going forward.

3. Muni Agg Communities generally have a preference to continue with their programs and that is also expected to occur in the future. This is seen by the percentage of Muni Agg Communities (excluding the City of Chicago) suspending their programs being approximately 30% in 2015; 37% in 2016 and 35% YTD 2017 (based on usage). While there is a preference for Muni Agg, it is not universal. It is important to note that the vast majority of existing Muni Agg Communities have renewed their program at a prior point in time. For example, only 18 of the approximately 200 Muni Agg Communities with a contract expiring in 2017 have not previously renewed their program. In addition, in terms of size, 13 of those 18 Muni Agg Communities are townships with relatively smaller usage. Thus, the preference to renew in the forthcoming years is expected to be greater than indicated by past percentages as the existing Muni Agg Communities continue to evolve into a seasoned group of communities that are very comfortable with Muni Agg.

   Based on these considerations it is assumed that 30% of the Muni Agg communities will suspend their Muni Agg programs in 2018. This percentage is consistent with the expected full-year 2017 results of approximately 30% of the Muni Agg Communities opting for ComEd supply. Applying that percentage to the current group of Muni Agg Communities with a contract expiring in 2018 results in an approximately 650 GWh movement of RES supply to ComEd supply during 2018, which roughly equates to 2.5% of total annual Residential usage. The spreadsheet "2017-18 Muni Ag Renewal Tracking.xlsx" provides additional details. For the years 2019 and thereafter, a status-quo level of Muni Agg activity is anticipated given the very experienced composition of the Muni Agg Communities (i.e., generally have renewed their programs) and a small anticipated savings opportunity. One final point is that no Muni Agg referendums are anticipated in the future as there have not been any in either 2016 or 2017.

[4] A Planning Year runs from June 1 through May 31.

This Forecast is based on a combination of actual results over several years, recent switching activity and granular data (e.g., community level information). ComEd will continue to monitor and analyze Muni Agg activity (along with other switching activities) and keep the IPA informed of any developments. The best approach in forecasting switching activity, especially in a market that is responding to changing conditions, is to provide regular updates. ComEd will provide a forecast update in March 2018 and July 2018; subject to any meaningful development related to switching activity during the remainder of 2017 that will be communicated to the IPA.

4. Regarding the non-residential customer forecast there are two rather distinct groups. The 0 to 100 kW customer group is not materially impacted by Muni Agg activity and has held rather steady the past few years with a small increase in Blended usage in 2017: 2016 average of 37.1% and 38.0% for the first four months of 2017. The outlook is for this general steadiness to continue with a slight increase in Blended usage – reflecting recent activity and some minor influence from less Muni Agg activity. The Watt-hour customer group is influenced by Muni Agg activity. The percentage of RES supplied usage for the watt-hour group often follows the same general pattern as the residential customer group. Therefore, the Watt-hour Blended Service percentage is expected to increase.

The effects of those drivers by customer group are as follows:

1. The Blended Service portion of the 0 to 100 kW customer class is expected to hold fairly steady with a slight increase to approximately 40% during the Forecast period.

2. The Blended Service portion of the Watthour customer class is expected to increase from approximately 40% (April 2017) to approximately 48% by June 2018. As previously noted, this class moves in general tandem with the assumptions described above for the residential class resulting from Muni Agg.

3. The Blended Service portion of the Residential customer class is expected to increase from approximately 61% (April 2017) to approximately 67% by June 2018 for the reasons noted above.

c. Known or Projected Changes to Future Load

Typically when ComEd forecasts future loads it considers whether there are any known major customer decisions that would impact load, such as the relocation of part or all of a

business. For the Eligible Retail Customers, other than the factors we have discussed elsewhere, e.g. switching, energy efficiency measures, growth, etc., there is only one known or projected change that ComEd is aware of that is different from past conditions and could affect future loads for this group of customers. This is the residential real-time pricing program ("RRTP").

In compliance with Section 16-107(b-5) of the PUA, ComEd received ICC approval to implement an RRTP program for a four-year period,[5] and, more recently, to continue the program post-2012.[6] Accordingly, ComEd still anticipates expansion of its marketing for RRTP. The expectation is for RRTP customers to grow from approximately 16,000 in mid-2017 to approximately 52,000 by the end of the year 2022. This forecasted increase is reasonable given the program administrator's marketing plan and is a very small percentage of the existing 3.6 million residential customers.

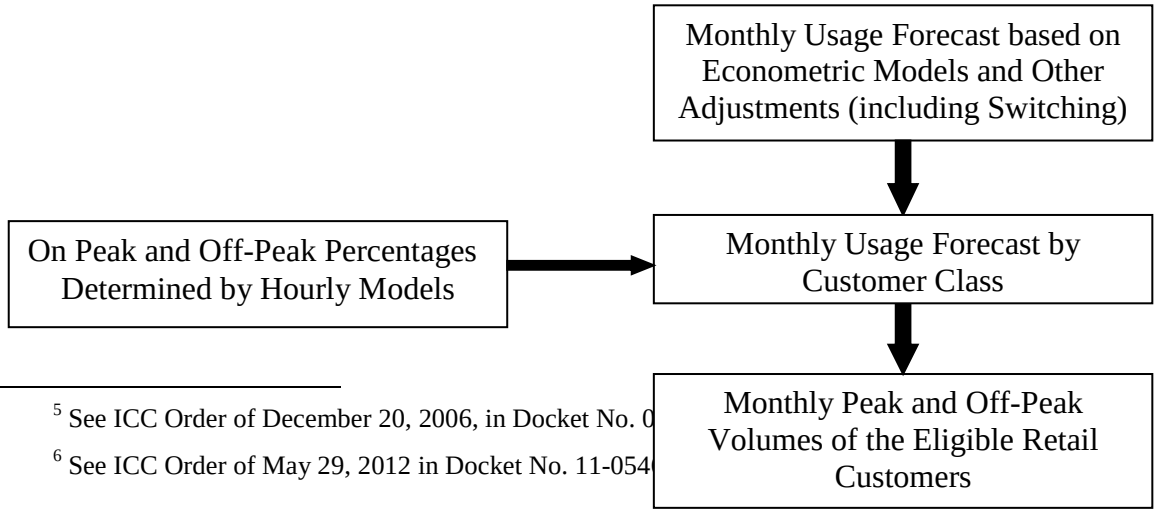
d. Growth Forecast by Customer Class

(i) Introduction

This section describes ComEd's growth forecast by customer class for the 5-year procurement planning period beginning on June 1, 2018. Section II(B)(1) discussed the hourly customer load profiles used by ComEd to develop models to present the historical load analysis required by the PUA and to predict UPC, or usage per customer. As indicated in this section, in arriving at a growth forecast by customer class, there are additional models beyond those customer-level hourly models that are used to forecast future customer class usage. These other models play an important role in determining expected load during the 5-year planning period among the Eligible Retail Customer groups.

The following chart illustrates the steps in the ComEd load forecasting process.

Chart II-5
ComEd Energy Usage Forecast Process



[5] See ICC Order of December 20, 2006, in Docket No. 0

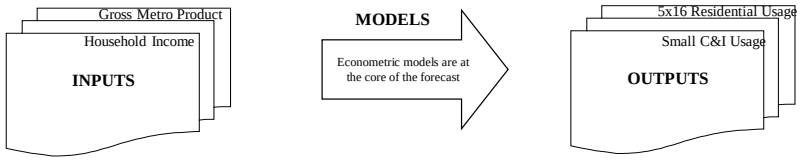
[6] See ICC Order of May 29, 2012 in Docket No. 11-054

The forecasting process is model based subject to adjustments and judgment. A suite of econometric models is used to produce monthly usage forecasts for ComEd's revenue customer classes. The two major customer classes applicable to this Forecast are Residential and Small C&I. That monthly forecast is adjusted for other considerations (e.g., switching activity) and allocated to more granular delivery service classes (e.g., the residential customer class is composed of four delivery service classes). The forecast usage is combined with the input from the hourly models to obtain on-peak and off-peak quantities for each month and delivery service class.

The econometric modeling portion of the process is described in the following chart:

Chart
II-6

Econometric Modeling Process



Economic Forecasts
- Chicago Gross Metro Product
- Real Income per Household
- Household Growth

Switching Forecast
- RES Activity
- Market Developments

Top Down Approach
- Zone output modeled using historical weather and economic variables
- Customer class usage modeled using historic weather data and economic variables for each class
- Customer class forecast calibrated to equal zone output forecast (less line loss)
- Other research and judgment used to determine final energy forecast (e.g., effects from new energy efficiency programs)
- Usage forecast adjusted for projected switching activity
- Hourly customer class models used to determine on-peak and off-peak usage

Sales and Load Forecasts
- ComEd Zone Output
- Customer Class Usage
- Procurement Eligible Usage by On-Peak and Off-Peak Usage

As the chart indicates, ComEd's forecasts of usage for its service territory are based on a "top-down" approach. The top-down approach provides a forecast of total usage for the entire service territory and allocates the usage to various customer classes using the models specific to each class. The allocation is achieved by reducing the forecasted zone usage by the inherent difference between zone and customer class usage (in particular, line loss) and then calibrating the forecasted customer class usage to equal that system-wide at the meter usage. The econometric models are based on monthly data and have very robust characteristics.

Subsequent sections describe the significant relationship between energy usage and other independent variables. For example, the zone model contains sophisticated variables to reflect the effects of temperature and humidity, as well as seasonal usage patterns and other factors. The zone model includes an energy efficiency variable to capture the relationship of ComEd's energy efficiency efforts in reducing usage. Economic variables are also included. Again, by way of example, the gross metropolitan product ("GMP") for the Chicago and other metropolitan areas within ComEd's service territory is a useful measure of economic activity of the service territory. As GMP (which is expressed in billions of dollars) increases, use of electric energy rises as well. There are other economic variables used in the econometric models and those are described below. The economic assumptions (i.e., economic outlook) related to the economic variables are shown in Table II-6.

Table II-6

Chicago Area Economic Forecasts - IHS Markit (May 2017)

Economic Variables	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Gross Metro Product (Billions)	$ 520	$ 534	$ 532	$ 542	$ 558	$ 568	$ 576	$ 587	$ 597	$ 606	$ 615	$ 624
Real Disposable Income (Millions)	$334,712	$348,589	$347,755	$361,048	$373,655	$384,066	$389,844	$403,644	$ 415,781	$425,163	$434,270	$443,043
# of Households (Thousands)	3,313	3,338	3,354	3,357	3,376	3,381	3,381	3,388	3,404	3,426	3,448	3,468
Real Income/HH	$101,025	$104,419	$103,673	$107,535	$110,675	$113,586	$115,317	$119,136	$ 122,160	$124,108	$125,933	$127,758
Total Employment (Thousands)	4,167	4,237	4,304	4,370	4,455	4,506	4,534	4,570	4,613	4,642	4,664	4,691
Non-Manufacturing	3,765	3,830	3,899	3,966	4,046	4,099	4,130	4,161	4,196	4,219	4,239	4,263
Manufacturing	403	406	405	405	409	408	405	409	417	423	425	428
Housing Starts	6,060	7,891	9,324	13,117	11,392	16,728	15,652	18,098	19,492	21,435	23,554	24,875
U.S. GDP	15,021	15,355	15,612	15,982	16,397	16,662	17,035	17,494	17,907	18,295	18,699	19,089

Growth Rate	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Gross Metro Product	1.3%	2.6%	(0.3%)	1.9%	2.9%	1.8%	1.4%	1.9%	1.7%	1.5%	1.5%	1.4%
Real Disposable Income	0.2%	4.1%	(0.2%)	3.8%	3.5%	2.8%	1.5%	3.5%	3.0%	2.3%	2.1%	2.0%
# of Households	(0.1%)	0.8%	0.5%	0.1%	0.6%	0.2%	(0.0%)	0.2%	0.5%	0.7%	0.7%	0.6%
Real Income/HH	0.4%	3.4%	(0.7%)	3.7%	2.9%	2.6%	1.5%	3.3%	2.5%	1.6%	1.5%	1.4%
Total Employment	1.4%	1.7%	1.6%	1.6%	1.9%	1.2%	0.6%	0.8%	0.9%	0.6%	0.5%	0.6%
Non-Manufacturing	1.3%	1.7%	1.8%	1.7%	2.0%	1.3%	0.8%	0.8%	0.8%	0.6%	0.5%	0.6%
Manufacturing	2.0%	1.0%	(0.4%)	(0.1%)	1.0%	(0.2%)	(0.8%)	1.1%	2.0%	1.5%	0.5%	0.6%
Housing Starts	11.6%	30.2%	18.2%	40.7%	(13.2%)	46.8%	(6.4%)	15.6%	7.7%	10.0%	9.9%	5.6%
U.S. GDP	1.6%	2.2%	1.7%	2.4%	2.6%	1.6%	2.2%	2.7%	2.4%	2.2%	2.2%	2.1%

Source: IHS Markit

All of the variables used in each of the models in the forecasting process are identified in Appendix A-4.[7]

The remainder of this section will provide a brief description of the models, starting with the ComEd's Monthly Zone energy usage model ("Monthly Zone Model") and proceeding to the three customer-level models for Monthly Residential bill-cycle energy usage ("Monthly Residential Model"), Monthly Small C&I bill-cycle energy usage ("Monthly Small C&I Model") and Monthly Street Lighting bill-cycle energy usage (Monthly Street Lighting Model").

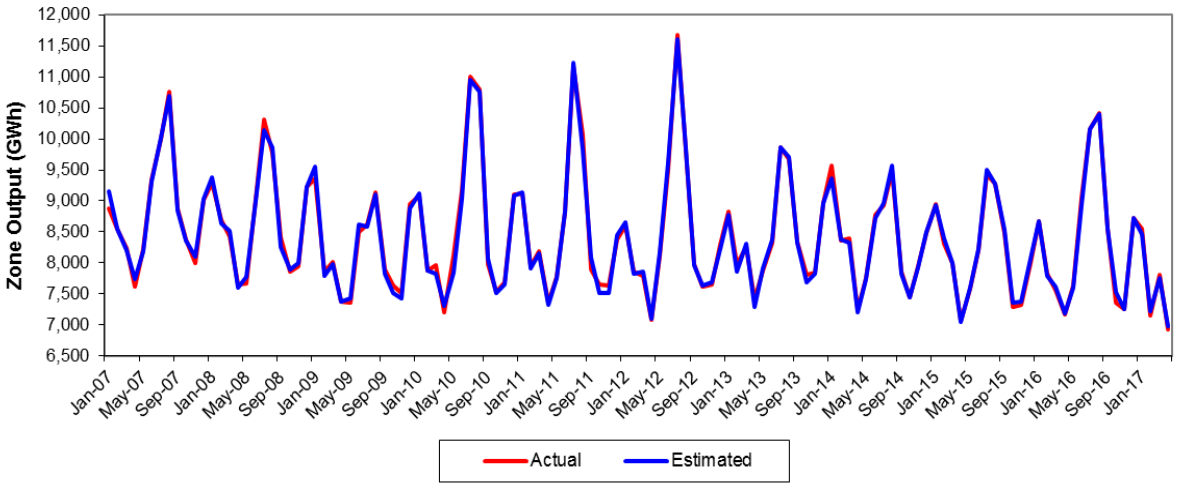
[7] Technical information about the model coefficients and regression statistics are included in Appendix A-2 and A-3.

(ii) ComEd Monthly Zone Model

The Monthly Zone Model forecasts energy usage in gigawatt hours (GWh) for the entire ComEd service territory. The following chart shows the performance of the ComEd Monthly Zone Model by comparing actual zone output to the estimates[8] from that model for each calendar month from January 2006 through April 2017.

Chart II-7

ComEd Monthly Zone Model: Estimated vs. Actual



The graph line depicting the Monthly Zone Model's estimated usage (based on actual weather) and the line showing actual usage for the period are nearly identical.

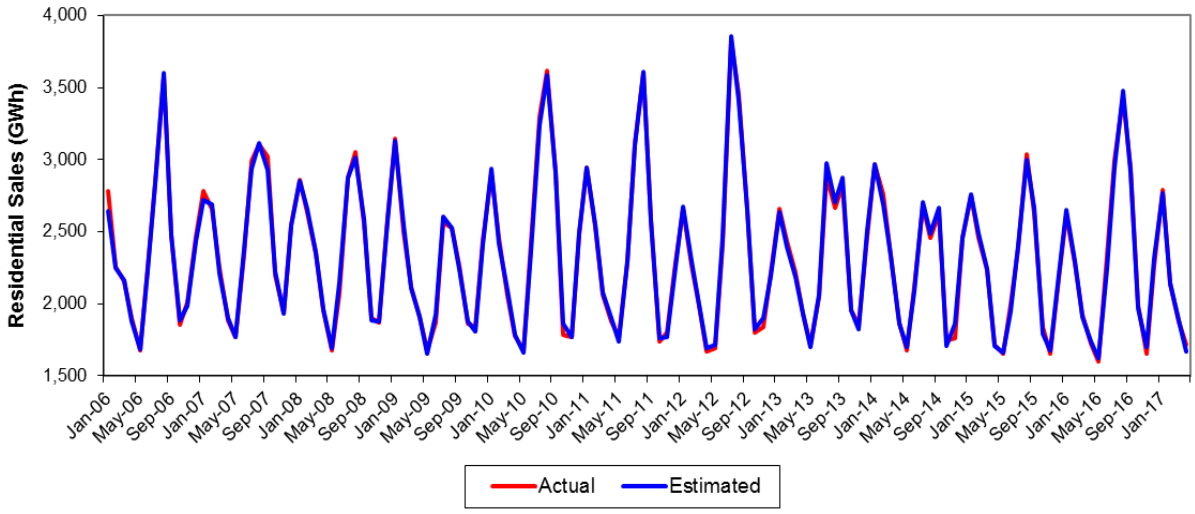
(iii) ComEd Monthly Residential Model

The Monthly Residential Model forecasts monthly residential bill-cycle usage expressed in kWh per customer per day. The Monthly Residential Model is also very useful in understanding energy usage for this customer segment. The following chart compares the monthly energy usage for residential customers estimated by the Monthly Residential Model to the actual residential usage for the time period of January 2006 to April 2017. The graph line depicting the model's estimated usage and the line with actual usage for the period are highly correlated.

[8] Once again, for purposes of this Forecast, the estimates used in Charts II-7, II-8 and II-9 are based on actual weather.

Chart II-8

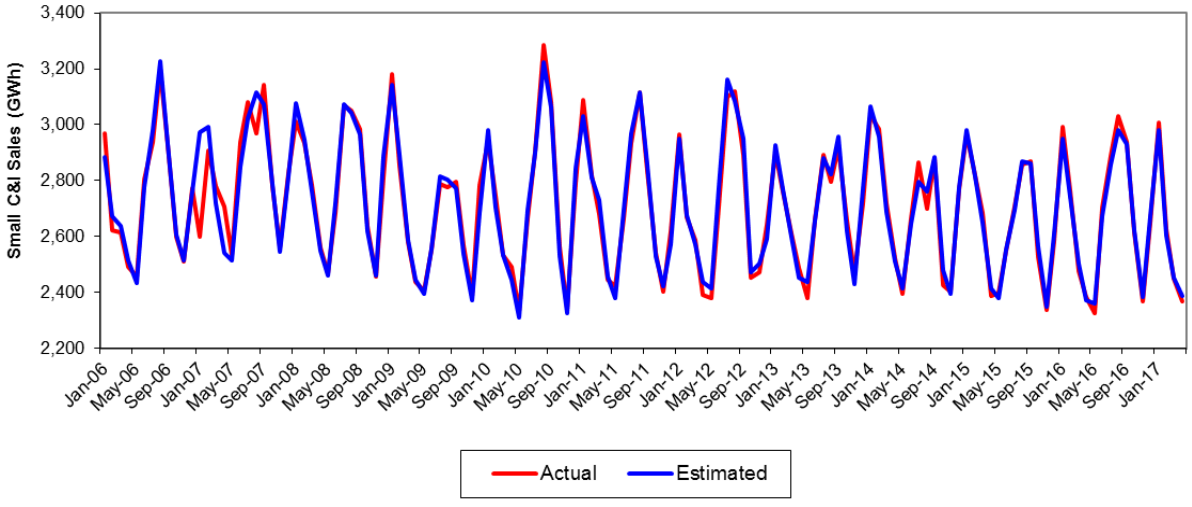
ComEd Monthly Residential Model: Estimated vs. Actual



(iv) ComEd Monthly Small C&I Model

The Monthly Small C&I Model forecasts monthly Small C&I bill-cycle usage. Chart II-9 shows an estimated versus actual comparison demonstrating the model's effectiveness.

Chart II-9
ComEd Monthly Small C&I Model: Estimated vs. Actual



(v) ComEd Monthly Street Light Model

The Monthly Street Lighting Model forecasts monthly bill-cycle usage related to street lighting. This final model estimates use per day in GWh.

(vi) Growth Forecast

The forecast reflects the above assumptions and an anticipated increase in the adoption of solar generation in the coming years. The specifics related to this assumption is as follows:

In the case of forecasting solar adoption by retail customers, a quick review of both historical data and future conditions is useful. A very minor amount of customer-based solar installations have occurred within the ComEd service territory over the past years. As of late 2016 approximately 4 MW of Residential solar has been installed within the service territory and total installations are approximately 10 MW when the non-residential customers are included (based on net-metering customers). This equates to less than 0.1% of the peak demand of the ComEd zone (approximately 21,000 MW). Going forward, this is expected to significantly change because of incentives for solar contained in the Future Energy Jobs Act ("FEJA") enacted in late 2016. The point is that the minor level of past retail solar installation is not relevant in forecasting future solar activity.

As a result, forecasting the pace of solar development in the ComEd's service territory is difficult given the very limited activity of the past and the number of new programs required by FEJA. In particular, over the next four years there should be approximately $500 million provided to support renewable development in the ComEd service territory. These funds, coupled with the aggressive targets in FEJA, as well as the efforts of the IPA and stakeholders, should make rapid deployment of new solar with the ComEd service territory very achievable. As such, the forecast assumes that the five percent net metering cap will be reached by the beginning of the 2021 – 2022 plan year. This assumption results in 400 MW of solar being ratably deployed between June 2018 and May 2021. Additional solar in the following two years results in a total of 666 MW by May 2023. Half of the solar installations are assumed to be Residential and the other half C&I. The reductions in usage are shown in Table II-7(a) and reduce Residential usage by just over 400 GWh in the calendar year 2022 and are equivalent to 1.5% of Residential usage in the year 2022. This is a very high level assumption that will be revisited with each year's forecast to incorporate the latest views and developments regarding the pace of new solar activity within the service territory. The projections by year are shown in Table II-7(a).

Table II-7(a)

Solar Annual Impact		
Calendar Year	Residential (GWh)	Small C&I (GWh)
2018	(16)	(8)
2019	(111)	(56)
2020	(212)	(106)
2021	(312)	(156)
2022	(412)	(206)

ComEd's historical and forecasted weather-adjusted energy usage for the Residential and Small C&I customer classes are shown in Table II-7(b) and include the above solar assumptions.

Table II-7(b)

ComEd Weather Adjusted Annual Energy Usage				
	Residential		Small C&I	
Year	Usage (GWh)	Percent Growth	Usage (GWh)	Percent Growth
2008	28,599		33,391	
2009	28,202	(1.4%)	32,644	(2.2%)
2010	27,865	(1.2%)	32,445	(0.6%)
2011	27,514	(1.3%)	32,182	(0.8%)
2012	27,360	(0.6%)	32,264	0.3%
2013	27,345	(0.1%)	32,115	(0.5%)
2014	27,447	0.3%	32,046	(0.3%)
2015	27,038	(1.5%)	31,771	(0.9%)
2016	26,888	(0.6%)	31,664	(0.3%)
2017	26,910	0.1%	31,476	(0.6%)
2018	26,583	(1.2%)	31,115	(1.1%)
2019	26,581	(0.0%)	30,836	(0.9%)
2020	26,695	0.4%	30,555	(0.9%)
2021	26,544	(0.6%)	30,016	(1.8%)
2022	26,475	(0.3%)	29,661	(1.2%)
2023	26,422	(0.2%)	29,375	(1.0%)

Residential customer class usage has declined by a total of 6.0% from 2008 to 2016 or an average decline of 0.8% per year. This decline is attributed to a combination of the 2009 recession; moderate economic growth thereafter (average of 1.8% annual real GMP growth from 2011 to 2016) and growing energy efficiency programs. The ComEd service territory economy has been lagging the U.S. economy, in terms of economic growth, over the past few years and is expected to continue to do so into the future. The ComEd service territory economy

was 3.5% of the U.S. economy in 2011 (based on comparing real GMP to that of real GDP). That percentage had declined to 3.4% by 2016 and is expected to be 3.3% in 2022. The implementation of ComEd-related energy efficiency programs beginning in 2008 has reduced residential usage over time. Likewise, changes to national lighting standards in recent years have contributed to a decline in usage. Residential use per customer declined by approximately 2% per year in the years 2015 and 2016. Moderate economic growth is expected to continue into the future (real GMP growth of approximately 1.6% per year from 2016 to 2022). Overall, the future moderate economic growth is expected to be offset by energy efficiency efforts to produce an essentially flat load growth. The Residential annual usage is forecasted to decrease by 0.3% per year from 2016 to 2022. Residential usage does not exceed the usage levels of 2008 in the Forecast period.

Small C&I usage declined by a total of 5.2% from 2008 to 2016 or an average of 0.7% per year. Small C&I is ComEd's revenue class related to commercial and industrial customers below 1,000 kW in size. As in the case of Residential, the Small C&I class has been affected by the recession and energy efficiency programs. The forecasted usage from 2016 to 2022 is expected to decline 1.1% per year from growing energy efficiency programs. Small C&I usage also does not exceed 2008 usage levels during the Forecast period.

2. Impact of Demand Side and Energy Efficiency Initiatives

The PUA sets out annual targets for the implementation of cost-effective demand side and energy efficiency measures.

a. Impact of demand response programs, current and projected

(i) Background

ComEd is a strong supporter of the use of demand response to actively manage peak demands. Use of demand response resources grew in the mid to late 1990s, and ComEd has maintained a large portfolio of demand response resources, with participation from residential, commercial, and industrial customers. ComEd is a leader in the development and management of demand response resources, and will increase participation in appropriate programs to meet the requirements of the PUA.

The 2017-2018 (i.e., 6/1/17 to 5/31/18) portfolio of ComEd programs includes the following:

- **Direct Load Control ("DLC"):** ComEd's residential central air conditioning cycling program includes a DLC option with 72,000 customers and a load reduction potential of 86 MW (ComEd Rider AC).

- **Voluntary Load Reduction ("VLR") Program:** VLR is an energy-based demand response program, providing compensation based on the value of energy as determined by the real-time hourly market run by PJM. This program also provides for transmission and distribution ("T&D") compensation based on the local

conditions of the T&D network. This portion of the portfolio has 915 MW of potential load reduction (ComEd Rider VLR).

- **Hourly Pricing (formerly known as Residential Real-Time Pricing - RRTP) Program:** ComEd residential supply customers have the option to select Hourly Pricing (i.e., Rate BESH), provided they have a smart meter. The Hourly Pricing program gives customers access to hourly electricity prices that are based on the Residual ComEd Zone PJM wholesale market prices. These prices vary from hour to hour and day to day according to the actual market price of power. This program has roughly 8.2 MW of price response potential.

- **Peak Time Savings (PTS) Program:** This program is required by Section 16-108.6(g) of the PUA and was approved by the ICC in Docket No. 12-0484. The PTS program is an opt-in, market-based demand response program for customers with smart meters. Under the program, customers receive bill credits for kWh usage reduction during curtailment periods. Enrollment in Peak Time Savings has since quadrupled to more than 233,000 customers enabling ComEd to bring more than 48 MW of capacity to the wholesale market. ComEd sold 76 MW of capacity from the program into the PJM capacity auction for the 2018 Planning Year, and 85 MW for the 2019 Planning Year based on anticipated growth.

(ii) Legislative Requirement

Section 8-103B(f)(4.5) of the PUA establishes a goal to implement demand response measures, providing that:

> (c) Implement cost-effective demand-response measures to reduce peak demand by 0.1% over the prior year for eligible retail customers, as defined in Section 16-111.5 of this Act, and for customers that elect hourly service from the utility pursuant to Section 16-107 of this Act, provided those customers have not been declared competitive. This requirement continues until December 31, 2026.

Section 1-10 of the Illinois Power Agency Act defines demand response as "measures that decrease peak demand or shifts demand from peak to off-peak periods."

Table II-8 shows the estimated annual MWs of demand response measures that will need to be implemented over the Five-year Forecast period to meet the goals set forth in the PUA:

Table II-8
Estimated Annual Level of Demand Response Measures

Planning Year	Peak Load (Prior Year) (MW)	Annual Goal	Annual Goal (MW)
2018	7,582	0.1%	7.58
2019	8,247	0.1%	8.25
2020	8,247	0.1%	8.25
2021	8,211	0.1%	8.21
2022[9]	8,196	0.1%	8.20

(iii) Impact of Demand Response Programs

Demand response programs do not impact ComEd's load forecasts. Load forecasts are made on a weather normalized, unrestricted basis. Since demand response measures are called on days when the temperature is hotter than "normal", the avoided capacity and energy associated with these resources is incremental to the weather normal forecast, and thus is not factored into the load forecasts. In fact, when developing forecasts, any impact on energy usage from actually implementing a demand response measure in a prior year is added back into that prior year's usage data and then weather normalized before being used to assist in the forecasting process. This assures that the forecast represents a complete picture of the unrestricted demands on the system.

b. Impact of Energy Efficiency Programs

The PUA has a number of provisions regarding various types of energy efficiency programs. This section discusses the impact of each on these programs on the Forecast.

(i) Section 8-103B Energy Efficiency Measures

As of June 1, 2018, Section 8-103 of the PUA is superseded by Section 8-103B which has new energy efficiency requirements for ComEd. Section 8-103B requires ComEd to implement cost-effective energy efficiency measures beginning January 1, 2018. This provision provides annual kWh targets based on a projection of the upcoming years' energy usage for all delivery service customers. Additionally, there is a spending cap that limits the amount of expenditures on energy efficiency measures in any year.

(A) kWh Targets

The kWh target for energy efficiency is based on a projection of the amount of energy to be delivered by ComEd to all of its delivery service customers in the upcoming Planning Year. Previously, the kWh target was an annual goal based on first year savings. Starting in 2018 under Section 8-103B, the kWh targets will be based on cumulative persisting annual savings ("CPAS") which is defined as the total electric energy savings in a given year

[9] ComEd's recently filed Energy Efficiency Plan in ICC Docket 17-0312 is a four year plan, 2018-2021. For 2022, which is not covered in the Plan, the goal is projected in a manner consist with the Plan.

from measures installed in that year or in previous years, but no earlier than January 1, 2012, that are still operational and providing savings in that year because the measures have not yet reached the end of their useful lives. The table below shows the target percentages.

Table II-9
Target Cumulative Persisting Annual Savings ("CPAS") Percentages to Meet Energy Efficiency Goals

Year	Annual CPAS Percent Reduction in Energy Delivered
2018	7.8%
2019	9.1%
2020	10.4%
2021	11.8%
2022	13.1%
2023	14.4%
2024	15.7%
2025	17.0%
2026	17.9%
2027	18.8%
2028	19.7%
2029	20.6%
2030	21.5%

(B) Projected Overall Goals

The annual energy efficiency goals were determined based on the kWh targets and the rate impact criteria. ComEd has filed its first plan under Section 8-103B on June 30, 2017 and ICC approval is required by September 15, 2017. Also, for purposes of this Forecast only,[10] the allocation of the energy (kWh) targets to the various customer classes (as shown in Table II-7(b)) was based on several years of historical data and judgment.

The above percentages represent the CPAS goal to be achieved by the end of each Planning Year for all delivery services customers. Since the various energy efficiency measures will be implemented and phased in over the course of each Planning Year and since Eligible Retail Customers are only a subset of delivery services customers, the actual amount of GWh for Eligible Retail Customers that is impacted in each Planning Year will be somewhat less (as shown in Table II-10, below).

[10] The PUA does not prescribe how the kWh targets are to be apportioned among the customer classes, and the energy efficiency plan did not set goals on a customer class basis.

(C) Impact on Forecasts

Energy efficiency measures directly impact the amount of energy used by customers throughout the year. As such, they will directly impact the forecasts of future load. The following chart depicts the cumulative impacts of these measures on the Forecast:

Table II-10
Cumulative Impacts of EE on Load Forecast by Customer Type[11]

Planning Year	Residential Allocation (GWh)	Watt-Hour Allocation (GWh)	0-100 kW Allocation (GWh)
2018	3,809	39	700
2019	3,962	45	798
2020	4,075	51	897
2021	4,129	56	997
2022	4,137	62	1,091

c. Impact of Renewable Energy Resources

Section 1-75(c) of the IPA Act (20 ILCS 3855/1-75(c)) establishes goals and cost thresholds for cost effective renewable energy resources. However, other than the impact of DG solar which was discussed earlier in this document and the energy prices hedging impact related to the 2010 Long Term Renewable contracts, there is no impact on the amount of energy ComEd must procure for Eligible Retail Customers.

3. Five-Year Monthly Load Forecast

Based on all of the factors discussed in this section, ComEd has developed the following forecast of projected energy usage of Eligible Retail Customers for the period from June 1, 2018 through May 31, 2019:

[11] These amounts are cumulative from 2008, when the statutory program began.

Table II-14

ComEd Procurement Period Load Forecast (Expected Load) Projected Energy Usage and Average Demand For Eligible Retail Customers (Weather Normal, Line Loss and DSM Adjusted)					
Year	**Month**	**Total Load (MWh)**		**Average Load (MW)**	
		On-Peak	**Off-Peak**	**On-Peak**	**Off-Peak**
2018	6	1,146,287	1,064,417	3,412	2,772
2018	7	1,386,804	1,362,692	4,127	3,340
2018	8	1,416,979	1,172,754	3,850	3,119
2018	9	862,804	1,030,435	2,838	2,477
2018	10	910,916	804,290	2,475	2,139
2018	11	938,994	953,066	2,795	2,475
2018	12	1,010,663	1,211,516	3,158	2,857
2019	1	1,147,814	1,158,333	3,261	2,955
2019	2	968,411	977,239	3,026	2,776
2019	3	893,788	993,016	2,660	2,440
2019	4	840,452	782,800	2,388	2,127
2019	5	889,737	857,304	2,528	2,187
Totals		**12,412,732**	**12,368,778**		

The forecast set forth above shows ComEd's expected load for the 2018 Planning Year. The PUA requires that the forecast cover a 5-year planning period. The forecast for ComEd's expected load for the 5-year planning period is set forth in Appendix B-1. The PUA also requires ComEd to provide low-load and high-load scenarios. That information for the 2018 Planning Year is set forth in Tables II-15 and II-16. The low-load and high-load scenarios for the 5-year planning period are set forth in Appendix B-2 and Appendix B-3, respectively. In all of the forecasted usage tables, "line loss" refers only to distribution losses.

Table II-15

ComEd Procurement Period Load Forecast (Low Load) Projected Energy Usage and Average Demand For Eligible Retail Customers (Line Loss and DSM Adjusted)					
Year	**Month**	**Total Load (MWh)**		**Average Load (MW)**	
		On-Peak	**Off-Peak**	**On-Peak**	**Off-Peak**
2018	6	989,859	944,408	2,946	2,459
2018	7	1,105,106	1,154,705	3,289	2,830
2018	8	1,119,556	923,077	3,042	2,455
2018	9	848,902	1,005,372	2,792	2,417
2018	10	857,741	749,577	2,331	1,994
2018	11	868,205	871,115	2,584	2,263
2018	12	956,615	1,153,001	2,989	2,719
2019	1	1,128,615	1,133,032	3,206	2,890
2019	2	910,160	920,912	2,844	2,616
2019	3	810,538	900,347	2,412	2,212
2019	4	791,265	726,496	2,248	1,974
2019	5	833,741	786,272	2,369	2,006
Totals		**11,220,303**	**11,268,314**		

Table II-16

ComEd Procurement Period Load Forecast (High Load) Projected Energy Usage and Average Demand For Eligible Retail Customers (Line Loss and DSM Adjusted)					
Year	**Month**	**Total Load (MWh)**		**Average Load (MW)**	
		On-Peak	**Off-Peak**	**On-Peak**	**Off-Peak**
2018	6	1,318,826	1,190,381	3,925	3,100
2018	7	1,653,462	1,604,104	4,921	3,932
2018	8	1,929,335	1,629,986	5,243	4,335
2018	9	865,773	1,052,075	2,848	2,529
2018	10	948,903	842,486	2,579	2,241
2018	11	1,043,960	1,072,677	3,107	2,786
2018	12	1,095,140	1,310,632	3,422	3,091
2019	1	1,193,235	1,195,577	3,390	3,050
2019	2	1,051,736	1,023,718	3,287	2,908
2019	3	917,705	1,054,495	2,731	2,591
2019	4	906,960	840,497	2,577	2,284
2019	5	882,940	836,775	2,508	2,135
Totals		**13,807,975**	**13,653,403**		

The low-load and the high-load scenarios are based upon a change to three of the main variables impacting load: weather, switching and load growth.

The Low-Load Forecast assumes that the summer weather is cooler than normal, that load growth occurs at a rate 2% less than the Expected Load Forecast and higher RES service relative to the Expected Load Forecast shown in Table II-14. In this scenario for switching purposes, Residential, Watt-Hour and 0 to 100 kW Blended usage is reduced by a total of four percentage points over the course of the calendar years 2018 and 2019. This switching change equates to approximately 750 GWh for Program Year 2018 and 1,500 GWh for Program Year 2019. The percentage of Eligible Retail Customers taking Blended Service in this switching scenario is 57.0% (based on usage) as of December 2019 compared to 61% in the Expected Load Forecast.

The High-Load Forecast assumes that the summer weather is hotter than normal, that load growth occurs at a rate 2% more than is expected, and lower RES service. In this scenario for switching purposes, Residential, Watt-Hour and 0 to 100 kW Blended usage is reduced by a total of four percentage points over the course of the calendar years 2018 and 2019. This switching change equates to approximately (750) GWh for Program Year 2018 and (1,500) GWh for Program Year 2019. The percentage of Eligible Retail Customers taking Blended Service in this switching scenario is 65% as of December 2019 compared to 57% in the Expected Load Forecast.

The +/- 2% load growth assumption in both scenarios reflects, in part, the current economic uncertainty. That uncertainty is described by IHS Markit in its U.S. Executive Summary dated May 2017:

> "Recession Induces by Strained Trade Relations" Scenario: In the pessimistic scenario, the U.S. economy suffers a recession during the second half of 2018, instigated by strained trade relations. Talk of trade barriers cause imports to decline, but exports fall even further as a result of retaliation. Uncertainty regarding the trade situation, combined with political turmoil, cause economic conditions in the rest of the world to worsen. Meanwhile, total factor productivity stagnates during 2018 and businesses react to uncertainty by postponing significant capital investment. Likewise, consumers are discouraged by the economic situation with real consumer spending managing only 1.3% growth during 2018, versus 3.2% in the baseline. The stock market plunges, losing more than 22% of its value from its current high to its fourth-quarter 2018 trough. Unemployment climbs through the middle of 2019, reaching an eventual peak of 6.2% that is significantly above the baseline. The Federal Reserve responds to the recession by returning interest rates to their rock-bottom levels. In this scenario, real GDP grows 0.1% in 2018 and declines 0.1% in 2019 (versus 2.7% and 2.4% in the baseline, respectively).
>
> "Lower Taxes and Fewer Regulations" Scenario: In the optimistic scenario, the administration provides a boost to both the supply and demand sides of the economy. On the supply side, a rollback of regulations and lower corporate taxes result in greater capital spending and improved productivity. With higher productivity, wages and price pressures remain muted in 2017. Since inflation is not a problem, the Federal Reserve takes a slow approach to raising interest rates. On the demand side, higher incomes combine with lower oil prices, inflation and interest rates to support robust consumer spending; real spending growth averages 3.7% in 2018 (compared with 3.2% in the

baseline). Housing starts climb rapidly, reaching a 1.51 million annual rate by the end of 2018 (compared with 1.38 million in the baseline). Meanwhile, economic conditions in the rest of the world improve with the help of structural reforms and quantitative-easing programs. The S&P 500 increases 8.0% in 2018, compared with 4.7% in the baseline. In this scenario, real GDP grows 3.8% in 2018 and 3.2% in 2019.

ComEd's intention is to keep the IPA informed of significant changes in its forecast during the procurement proceeding.

III. CONCLUSION

For all of the reasons described here, ComEd believes that its Forecast for the period June 1, 2018 through May 31, 2023 is consistent with the requirements of the PUA and provides an appropriate approach to develop the procurement plan to acquire supply for the Eligible Retail Customers.

Appendices

A. Load Forecast Models

1. Residential Single Family Model (Hour 16)

2. ComEd Model Coefficients

3. ComEd Model Regression Statistics

4. Detailed Description of Variables Used In Forecast Models

B. Five-Year Load Forecast

1. Expected load

2. Low Load

3. High Load

Appendix A-1

Residential Single Family Model (Hour 16)			
Variable	**Coefficient**	**T-Stat**	**Notes**
Constant	0.8794	13.11	Constant term
Monday Binary	-0.1098	-4.88	Daily Binary - Monday
Tuesday Binary	-0.1118	-4.74	Daily Binary - Tuesday
Wednesday Binary	-0.1144	-4.81	Daily Binary - Wednesday
Thursday Binary	-0.1465	-6.13	Daily Binary - Thursday
Friday Binary	-0.1384	-5.84	Daily Binary - Friday
Saturday Binary	-0.0364	-2.13	Daily Binary - Saturday
MLK Binary	0.0874	0.89	Martin Luther King's Day
Presidents Day Binary	0.0650	0.66	President's Day
GoodFriday Binary	0.0188	0.20	Good Friday
Memorial Day Binary	0.1436	1.41	Memorial Day
July4th Binary	0.1249	1.08	July 4th.
LaborDay Binary	0.2977	2.83	Labor Day
Thanksgiving Binary	0.2578	2.55	Thanksgiving Day
FriAThanks Binary	0.1652	1.59	Friday after Thanksgiving Day
XMasWeek Before Binary	0.1600	1.24	Week before Christmas
XMasEve Binary	0.2959	1.54	Christmas Eve
XMasDay Binary	0.1169	0.83	Christmas Day
XMasLights Binary	-0.0031	-0.97	Christmas Lights
XMasWeek Binary	-0.0471	-0.36	Christmas Week
New Years Eve Binary	0.0288	0.16	New Year's Eve Day
New Years Day Binary	0.1210	0.86	New Year's Day
Feb Binary	-0.0697	-1.03	Monthly Binary - February
Mar Binary	-0.1351	-2.02	Monthly Binary - March
MarDLS Binary	0.0187	0.27	Day That Daylight Savings Begins In March -
Apr Binary	-0.1450	-2.00	Monthly Binary - April
May Binary	-0.2043	-2.70	Monthly Binary - May
Jun Binary	0.0595	0.76	Monthly Binary - June
Jul Binary	0.1756	2.18	Monthly Binary - July
Aug Binary	0.2607	3.02	Monthly Binary - August
Sep Binary	0.1022	1.21	Monthly Binary - September
Oct Binary	-0.1077	-1.39	Monthly Binary - October
NovDLS Binary	0.0261	0.31	Day That Daylight Savings Ends In November -
Nov Binary	-0.2046	-2.51	Monthly Binary - November
Dec Binary	-0.0097	-0.12	Monthly Binary - December
JanWalk	-0.0030	-1.17	Monthly Time Trend - January
FebWalk	-0.0027	-1.03	Monthly Time Trend - February
MarWalk	-0.0021	-0.57	Monthly Time Trend - March
AprWalk	-0.0004	-0.15	Monthly Time Trend - April
MayWalk	0.0073	2.96	Monthly Time Trend - May

JunWalk	0.0058	2.30	Monthly Time Trend - June
JulWalk	-0.0006	-0.24	Monthly Time Trend - July
AugWalk	-0.0043	-1.77	Monthly Time Trend - August
SepWalk	-0.0030	-1.10	Monthly Time Trend - September
OctWalk	-0.0003	-0.11	Monthly Time Trend - October
NovWalk	0.0068	2.32	Monthly Time Trend - November
DecWalk	0.0036	1.17	Monthly Time Trend - December
Shift2016	0.0257	1.96	An End Shift to describe usage for 2016 and beyond
SeasonHDD	0.0063	5.04	Seasonal Heating Degree Days Spline
LagHDD	0.0005	0.36	1 Day Lag Seasonal Heating Degree Days Spline
Lag2HDD	0.0012	0.94	2 Day Lag Seasonal Heating Degree Days Spline
SeasonTDD	0.1682	39.15	Seasonal Cooling Degree Days Spline
LagTDD	0.0018	0.39	1 Day Lag Seasonal Cooling Degree Days Spline
Lag2TDD	0.0117	2.88	2 Day Lag Seasonal Cooling Degree Days Spline
HDDWkEnd	0.0001	0.05	Weekend Seasonal Heating Degree Days Spline
TDDWkEnd	0.0013	0.29	Weekend Seasonal Cooling Degree Days Spline
AR(1)	0.2111	5.48	Autoregressive Term

The coefficients provide the effect that each variable has on the hourly usage for a single hour (Hour 16 which includes the load from 3 p.m. to 4 p.m. in the afternoon). The "T-Stat" provides the statistical significance of the variable, with a value generally greater than +/- two (2) indicating that the coefficient is significantly different from zero. The hourly model for Hour 16 has an adjusted R-squared of 0.95, which means that 95% of the variance in the hourly data is being explained by the model.

At the daily level, the mean average percent error ("MAPE") for the summation of the hourly models is 7.5%. The 7.5% daily MAPE means that the average percentage difference on a daily basis between the usage predicted by the model and the actual usage for that period was very small. In other words, the model can explain usage with almost a 94% accuracy rate. Such a high accuracy rate is particularly noteworthy because the model is dealing with very short time frames in which many factors may come into play. The high accuracy rate, the low MAPE and the high R-squared indicate that the model captures the vast majority of factors that affect electrical usage.

Appendix A-2

ComEd Model Coefficients

ComEd Zone Model			
Variable	**Coefficient**	**StdErr**	**T-Stat**
CONST	842.712	796.94	1.06
CalVars.Jan	65.689	32.45	2.02
CalVars.Feb	-140.058	78.83	-1.78
CalVars.Mar	-375.681	74.00	-5.08
CalVars.Apr	-406.97	68.06	-5.98
CalVars.May	-313.195	85.93	-3.65
CalVars.Jun	-182.015	73.99	-2.46
CalVars.Jul	-125.564	84.12	-1.49
CalVars.Aug	-3.974	77.44	-0.05
CalVars.Sep	-210.743	69.14	-3.05
CalVars.Oct	-274.899	69.05	-3.98
CalVars.Nov	-260.612	78.48	-3.32
CalHDD.HDD_Spring	2.459	0.17	14.18
CalHDD.HDD_Fall	2.314	0.22	10.51
CalHDD.HDD_Winter	1.906	0.09	21.51
CalCDD.SpringTDD	10.752	1.26	8.57
CalCDD.SummerTDD	13.692	0.31	44.85
CalCDD.FallTDD	10.158	3.65	2.79
Monthly.EconIndex15	7084.096	811.74	8.73
EE_Savings.Total	-0.895	0.08	-10.77
AR(1)	0.561	0.08	6.95

Residential Customer Class Model			
Variable	**Coefficient**	**StdErr**	**T-Stat**
Monthly.Jan	18.955	2.03	9.336
Monthly.Feb	17.782	2.038	8.727
Monthly.Mar	17.027	2.013	8.457
Monthly.Apr	16.252	2.015	8.067
Monthly.May	15.99	1.988	8.043
Monthly.Jun	16.899	1.969	8.582
Monthly.Jul	19.249	1.973	9.758
Monthly.Aug	19.282	1.967	9.803
Monthly.Sep	18.679	1.963	9.517
Monthly.Oct	17.201	1.964	8.76
Monthly.Nov	16.408	2.029	8.088
Monthly.Dec	17.99	2.013	8.936
CycVars.IncPerHH_Index	1.873	1.735	1.08
CycWthrT.ResHDD_Spring	0.25	0.035	7.104
CycWthrT.ResHDD_Fall	0.316	0.057	5.555
CycWthrT.ResHDD_Winter	0.232	0.013	17.34
CycWthrT.ResCDD_Spring	2.474	0.623	3.974
CycWthrT.ResCDD_Jun	2.663	0.179	14.88
CycWthrT.ResCDD_Jul	2.284	0.066	34.37
CycWthrT.ResCDD_Aug	2.424	0.065	37.57
CycWthrT.ResCDD_Sep	2.504	0.12	20.78
CycWthrT.ResCDD_Fall	2.916	0.243	12.01
CycVars.ResBill_MA_Index	-2.127	0.548	-3.883
CycVars.ResEE_PerDay	-0.571	0.053	-10.84
AR(1)	0.316	0.099	3.189

Small C&I Customer Class Model			
Variable	**Coefficient**	**StdErr**	**T-Stat**
Monthly.Jan	27.935	6.689	4.176
Monthly.Feb	30.778	6.711	4.587
Monthly.Mar	30.494	6.663	4.576
Monthly.Apr	30.409	6.622	4.592
Monthly.May	29.204	6.62	4.411
Monthly.Jun	29.502	6.62	4.456
Monthly.Jul	30.028	6.649	4.516
Monthly.Aug	32.595	6.653	4.9
Monthly.Sep	32.927	6.644	4.956
Monthly.Oct	32.753	6.639	4.933
Monthly.Nov	29.953	6.654	4.501
Monthly.Dec	26.906	6.698	4.017
CycWthrT.SCI_HDD	0.572	0.042	13.58
CycWthrT.SCI_CDD	2.522	0.161	15.687
CycWthrT.SCI_CDDTrend_2021_Cap	-0.032	0.012	-2.685
CycVars.SCI_Econ_Index3	51.706	6.856	7.542
SCI.DelayedBill2	-0.027	0.003	-9.264
CycVars.SCI_EEPerDay	-0.67	0.07	-9.587
AR(1)	0.129	0.095	1.355

StreetLighting Class Model			
Variable	**Coefficient**	**StdErr**	**T-Stat**
Monthly.Jan	2.826	0.044	64.17
Monthly.Feb	2.711	0.047	57.45
Monthly.Mar	2.269	0.051	44.78
Monthly.Apr	2.061	0.047	43.49
Monthly.May	1.827	0.051	36.18
Monthly.Jun	1.761	0.051	34.64
Monthly.Jul	1.652	0.049	33.64
Monthly.Aug	1.81	0.047	38.37
Monthly.Sep	2.03	0.049	41.62
Monthly.Oct	2.178	0.047	46.43
Monthly.Nov	2.427	0.043	56.78
Monthly.Dec	2.59	0.042	61.57
CycVars.SL_DelayedBillsPerDay	-0.748	0.201	-3.725
CycVars.SL_DelayedBillsPerDayLag	0.886	0.201	4.411

Appendix A-3

ComEd Model Regression Statistics

Regression Statistics	Zone	Residential	Small C&I	Street Lighting
Iterations	23	16	13	1
Adjusted Observations	107	131	130	45
Deg. of Freedom for Error	86	106	111	31
R-Squared	0.993	0.995	0.972	0.973
Adjusted R-Squared	0.992	0.994	0.967	0.962
AIC	9.152	-1.975	0.515	-4.962
BIC	9.676	-1.427	0.934	-4.4
Log-Likelihood	-620.45	-31.5	-198.95	61.79
Model Sum of Squares	99,144,402	2,698.13	5,602.69	6.21
Sum of Squared Errors	681,615.47	12.41	162.47	0.17
Mean Squared Error	7,925.76	0.12	1.46	0.01
Std. Error of Regression	89.03	0.34	1.21	0.07
Mean Abs. Dev. (MAD)	59.18	0.25	0.92	0.05
Mean Abs. % Err. (MAPE)	0.71%	1.14%	1.03%	2.20%
Durbin-Watson Statistic	2.316	1.93	1.873	2.113
Ljung-Box Statistic	39.15	18.89	22.97	37.62
Prob (Ljung-Box)	0.0263	0.7581	0.5217	0.0379
Prob (Jarque-Bera)	0.0028	0.7296	0.66	0.391

Appendix A-4
Detailed Description Of Variables
Used In Forecast Models

The econometric models are statistical multi-variant regressions that determine the correlation between electrical usage (dependent variable) and weather, economic and monthly factors (independent variables). ComEd's weather normals are based on the 30-year time period of 1986 to 2015 for the forecast years of 2017 to 2022. The following models are used in producing the energy usage forecast (GWh) for the eligible customers:

Monthly Zone energy usage for the ComEd zone
Monthly Residential bill-cycle energy usage
Monthly Small C&I bill-cycle energy usage
Monthly Street Lighting bill-cycle energy usage

ComEd's Load Forecasting group with the input of industry experts developed the models. The following sections describe each model and its specifications. Appendices A-2 and A-3 contain the coefficients and other regression statistics for the models.

ComEd's Monthly Zone Model

The dependent variable in the Monthly Zone Model is monthly zone energy usage for the ComEd service territory. The monthly zone usage is in GWh units.

The independent variables within the model are:

- The monthly binary variables reflect monthly usage patterns. Customer electrical usage is a function of other items besides cooling and heating (e.g., lighting). This other usage is not constant per month and the monthly binary variables are used to account for this variability. December is excluded from the monthly binaries, as the constant term establishes December as the base from which the monthly binary variables are adjusted.

- The EconIndex15 variable is a composite economic variable that weights the contributions of GMP, US Gross Domestic Product ("GDP"), households, manufacturing employment and non-manufacturing employment in the ComEd service territory. GMP is the gross metropolitan product for the Chicago metropolitan area and also includes other metropolitan areas within ComEd's service territory. This variable measures economic activity for the ComEd service territory. Both the GMP and GDP are adjusted for inflation and obtained from IHS Economics. Further, the variables are adjusted for the number of weekends (and holidays) and weekdays within a calendar month because overall energy usage for a given month is a function of those daily influences. The variables' units are billions of dollars. The households component is the total number of households within the ComEd service territory. This economic variable reflects the effect of a growing customer base on energy usage. This variable is also adjusted for the number of weekends, holidays and weekdays within a calendar

month. Both manufacturing and non-manufacturing employment are measured for the ComEd service territory and are also adjusted for the number of weekdays, weekends and holidays. The five economic variables are each indexed to January 2008 and then weighted based on an exponential formula with each of these economic variables receiving a roughly one-fifth weighting.

- The EE_Savings.Total variable is composed of estimated monthly cumulative gross energy efficiency savings across ComEd's Residential, Small C&I and Large C&I customer class programs. This variable is intended to capture the overall trend of energy efficiency activity in the ComEd service territory by ComEd sponsored programs (e.g., lightbulbs, home energy reports).

- The temperature and humidity degree day ("TDD") variables are weather variables designed to capture the effect on usage from cooling equipment. The TDD variable is similar in design to a cooling degree day ("CDD") variable. A CDD weather variable is often used in energy models. The standard CDD measures the difference in the average daily temperature above a specific threshold (typically 65 degrees as that is a common point at which cooling activity begins). The TDD variable provides several enhancements to the typical CDD variable as delineated below:

  The average daily temperature is the 24-hour average instead of the average of the maximum and minimum temperatures for the day. This captures frontal movements within the day.

  Humidity is included in the TDD variable as humidity does influence electrical usage.

  The TDD variable uses multiple degree bases instead of just a 65 degree-base. This captures the change in the rate at which customers use electricity at different temperature levels.

  The TDD variable is interacted with seasonal binary variables (i.e., Spring, Summer and Fall) to reflect the seasonal usage pattern related to cooling equipment.

  The TDD variable is in degree-day units.

- The HDD Spline variable is a weather variable that measures the relationship on electrical usage from space heating equipment (e.g., natural gas furnace fans and electrical space-heating equipment). The HDD Spline variable is similar in concept to the industry-standard heating degree day ("HDD") weather variable. The HDD Spline provides a couple of enhancements to the HDD weather variable:

The average daily temperature is the 24-hour average instead of the average of the maximum and minimum temperatures for the day. This captures frontal movements within the day.

The HDD Spline uses multiple degree bases instead of just a 65 degree-base. This captures the change in the rate at which customers use electricity at different temperature levels.

The HDD Spline variable is in degree-day units.

The coefficient values and the standard measurements of significance within the model (e.g., t-stats) and the overall model performance (e.g., R-squared and MAPE) are contained in Appendices A-2 and A-3.

ComEd Residential Model

The dependent variable in the Residential Model is residential use per customer per day and the units are kWh per customer per day.

The independent variables are noted below. (Because many of the variables follow the same purpose and logic as in the Monthly Zone model, please see the Monthly Zone Model description for additional information.)

- The monthly binary variables reflect monthly usage patterns.
- The Real Income per Household Index variable is the disposable personal income for the Chicago metropolitan area and other metropolitan areas within the ComEd service territory (adjusted for inflation) divided by the number of households for the same area. The data is obtained from IHS. This variable captures the rising household incomes within ComEd's service territory and the correlation it has with consumer purchases of electronic equipment and housing stock. The variable is in dollars per household units indexed to January 2008.
- The Monthly Bill (Moving Average) Index variable is a typical monthly residential electricity bill assuming historical tariff charges and weather normal customer usage for the year 2002 (adjusted for inflation). Specifically, the historical tariff charges for a single-family and multi-family (both non-space heat) were multiplied by the weather adjusted billing units from the year 2002 for both residential groups. The monthly bills for both residential groups were weighted, based on energy usage, to form a single monthly bill. The monthly bill was also adjusted for the Chicago CPI-U. A 12 month moving average is calculated for each month (average of the current month and the 11 preceding months). Lastly, this variable is indexed to January 2008. This variable reflects the influence of electricity charges/prices over time related to consumer behavior.

- See EE_Savings.Total variable in the Zone Model section above for description. The ResEE_PerDay variable is a measure of gross energy efficiency savings on a per customer per day basis for the Residential customer class.

- Weather variables used in the residential model are similar in concept to the weather variables described in the Monthly Zone Model section and will not be repeated here.

ComEd Small C&I Model

The dependent variable in the Small C&I Model is Small C&I use per day and the units are GWh per day. The independent variables within the model are:

- The monthly binary variables, weather variables and shift variables are similar in concept to the Monthly Zone Model and will not be repeated here.

- The Small C&I Economic Index variable is a composite economic variable that weights the contributions of GMP and non-manufacturing employment in the ComEd service territory. These economic variables are each indexed to January 2008 and then weighted based on an exponential formula with a weighting of employment (80%) and GMP (20%). The GMP variable is defined in the Zone model description above and the employment variable is an economic variable that measures the total non-manufacturing employment in the Chicago area. Job growth is correlated to Small C&I development and growth

- See EE_Savings.Total variable in the Zone Model section above for description. The SCI_EEPerDay variable is a measure of gross energy efficiency savings on a per day basis for the Small C&I customer class

- The Delayed Bill variable is the month over month (current vs. one month prior) variance in the Small C&I's estimated usage (GWh) of bills that are delayed beginning in October 2009. This variable is used to inform the model about an increase in delayed bill activity primarily in 2010.

ComEd Street Light Model

The dependent variable in the Street Lighting Model is Street Lighting use per day and the units are GWh per day. The independent variables are:

- Monthly binary variables and a shift variable are similar in concept to the Monthly Zone Model.

- The Delayed Bill Per Day variable is the current month's estimated Streetlight usage (GWh) of bills that are delayed beginning in January 2008 on a per day basis.

- The Delayed Bill Per Day Lag variable is the previous month's estimated Streetlight usage (GWh) of bills that are delayed beginning in January 2008 on a per day basis.

Appendix B-1

ComEd Procurement Period Load Forecast (Expected Load) Projected Energy Usage and Average Demand For Eligible Retail Customers (Weather Normal, Line Loss and DSM Adjusted)					
Year	Month	Total Load (MWh)		Average Load (MW)	
		On-Peak	Off-Peak	On-Peak	Off-Peak
2018	6	1,146,287	1,064,417	3,412	2,772
2018	7	1,386,804	1,362,692	4,127	3,340
2018	8	1,416,979	1,172,754	3,850	3,119
2018	9	862,804	1,030,435	2,838	2,477
2018	10	910,916	804,290	2,475	2,139
2018	11	938,994	953,066	2,795	2,475
2018	12	1,010,663	1,211,516	3,158	2,857
2019	1	1,147,814	1,158,333	3,261	2,955
2019	2	968,411	977,239	3,026	2,776
2019	3	893,788	993,016	2,660	2,440
2019	4	840,452	782,800	2,388	2,127
2019	5	889,737	857,304	2,528	2,187
2019	6	1,101,582	1,138,169	3,442	2,845
2019	7	1,477,070	1,328,661	4,196	3,389
2019	8	1,369,528	1,241,707	3,891	3,168
2019	9	917,817	991,522	2,868	2,479
2019	10	909,824	806,619	2,472	2,145
2019	11	887,915	998,618	2,775	2,490
2019	12	1,066,210	1,170,215	3,173	2,868
2020	1	1,148,358	1,162,516	3,262	2,966
2020	2	966,779	1,045,001	3,021	2,779
2020	3	939,198	957,879	2,668	2,450
2020	4	835,778	787,132	2,374	2,139
2020	5	784,432	926,020	2,451	2,184
2020	6	1,200,167	1,042,212	3,410	2,832
2020	7	1,530,115	1,260,286	4,158	3,352
2020	8	1,291,697	1,295,043	3,844	3,174
2020	9	962,723	941,522	2,865	2,452
2020	10	866,671	844,511	2,462	2,154
2020	11	887,572	1,005,008	2,774	2,506
2020	12	1,127,180	1,127,813	3,202	2,877
2021	1	1,037,572	1,254,865	3,242	2,960
2021	2	971,287	975,775	3,035	2,772
2021	3	983,791	919,653	2,673	2,452
2021	4	829,148	788,432	2,356	2,142
2021	5	771,199	911,174	2,410	2,149

ComEd Procurement Period Load Forecast (Expected Load) Projected Energy Usage and Average Demand For Eligible Retail Customers (Weather Normal, Line Loss and DSM Adjusted)					
Year	**Month**	**Total Load (MWh)**		**Average Load (MW)**	
		On-Peak	**Off-Peak**	**On-Peak**	**Off-Peak**
2021	6	1,191,286	1,026,010	3,384	2,788
2021	7	1,382,993	1,371,459	4,116	3,361
2021	8	1,346,670	1,226,408	3,826	3,129
2021	9	944,186	935,248	2,810	2,436
2021	10	820,246	879,033	2,441	2,154
2021	11	933,839	967,423	2,779	2,513
2021	12	1,179,951	1,076,398	3,206	2,863
2022	1	1,090,979	1,206,368	3,247	2,957
2022	2	969,702	979,085	3,030	2,781
2022	3	980,467	923,640	2,664	2,463
2022	4	785,134	821,739	2,337	2,140
2022	5	800,620	866,227	2,383	2,123
2022	6	1,183,677	1,010,909	3,363	2,747
2022	7	1,303,200	1,417,774	4,073	3,344
2022	8	1,404,169	1,157,806	3,816	3,079
2022	9	925,621	931,902	2,755	2,427
2022	10	819,231	878,828	2,438	2,154
2022	11	934,561	967,445	2,781	2,513
2022	12	1,070,262	1,178,766	3,185	2,889
2023	1	1,093,646	1,213,422	3,255	2,974
2023	2	966,408	979,518	3,020	2,783
2023	3	974,286	925,480	2,648	2,468
2023	4	741,260	850,080	2,316	2,125
2023	5	828,650	821,456	2,354	2,096
Totals		**61,948,306**	**61,900,639**		

Appendix B-2

ComEd Procurement Period Load Forecast (Low Load) Projected Energy Usage and Average Demand For Eligible Retail Customers (Line Loss and DSM Adjusted)					
Year	Month	Total Load (MWh)		Average Load (MW)	
		On-Peak	Off-Peak	On-Peak	Off-Peak
2018	6	989,859	944,408	2,946	2,459
2018	7	1,105,106	1,154,705	3,289	2,830
2018	8	1,119,556	923,077	3,042	2,455
2018	9	848,902	1,005,372	2,792	2,417
2018	10	857,741	749,577	2,331	1,994
2018	11	868,205	871,115	2,584	2,263
2018	12	956,615	1,153,001	2,989	2,719
2019	1	1,128,615	1,133,032	3,206	2,890
2019	2	910,160	920,912	2,844	2,616
2019	3	810,538	900,347	2,412	2,212
2019	4	791,265	726,496	2,248	1,974
2019	5	833,741	786,272	2,369	2,006
2019	6	865,578	989,295	2,705	2,473
2019	7	1,097,742	1,085,956	3,119	2,770
2019	8	995,093	954,207	2,827	2,434
2019	9	850,578	920,460	2,658	2,301
2019	10	810,596	711,897	2,203	1,893
2019	11	779,026	862,807	2,434	2,152
2019	12	952,614	1,058,830	2,835	2,595
2020	1	1,084,821	1,068,071	3,082	2,725
2020	2	860,987	936,134	2,691	2,490
2020	3	815,816	825,787	2,318	2,112
2020	4	743,972	708,295	2,114	1,925
2020	5	706,442	815,448	2,208	1,923
2020	6	951,983	836,930	2,704	2,274
2020	7	1,154,231	943,650	3,136	2,510
2020	8	914,722	955,526	2,722	2,342
2020	9	867,327	848,736	2,581	2,210
2020	10	750,351	728,489	2,132	1,858
2020	11	752,691	857,067	2,352	2,137
2020	12	981,513	1,006,664	2,788	2,568
2021	1	956,446	1,136,449	2,989	2,680
2021	2	863,495	846,649	2,698	2,405
2021	3	843,299	771,646	2,292	2,058
2021	4	728,405	690,067	2,069	1,875
2021	5	695,529	771,461	2,174	1,819

ComEd Procurement Period Load Forecast (Low Load) Projected Energy Usage and Average Demand For Eligible Retail Customers (Line Loss and DSM Adjusted)					
Year	**Month**	**Total Load (MWh)**		**Average Load (MW)**	
		On-Peak	**Off-Peak**	**On-Peak**	**Off-Peak**
2021	6	955,334	778,296	2,714	2,115
2021	7	1,041,118	988,317	3,099	2,422
2021	8	982,720	840,860	2,792	2,145
2021	9	831,291	828,182	2,474	2,157
2021	10	696,713	742,190	2,074	1,819
2021	11	778,900	806,078	2,318	2,094
2021	12	1,015,790	933,922	2,760	2,484
2022	1	973,859	1,082,269	2,898	2,653
2022	2	842,405	835,166	2,633	2,373
2022	3	825,645	757,500	2,244	2,020
2022	4	682,586	698,443	2,032	1,819
2022	5	715,554	709,028	2,130	1,738
2022	6	939,361	742,155	2,669	2,017
2022	7	970,700	993,981	3,033	2,344
2022	8	998,765	779,700	2,714	2,074
2022	9	801,196	805,731	2,385	2,098
2022	10	680,601	728,027	2,026	1,784
2022	11	767,757	786,019	2,285	2,042
2022	12	905,542	998,852	2,695	2,448
2023	1	962,119	1,061,842	2,863	2,603
2023	2	817,135	824,703	2,554	2,343
2023	3	802,145	745,766	2,180	1,989
2023	4	632,143	707,707	1,975	1,769
2023	5	691,501	688,964	1,964	1,758
Totals		**52,554,440**	**52,462,533**		

Appendix B-3

ComEd Procurement Period Load Forecast (High Load) Projected Energy Usage and Average Demand For Eligible Retail Customers (Line Loss and DSM Adjusted)					
Year	Month	Total Load (MWh)		Load (MW)	
		On-Peak	Off-Peak	On-Peak	Off-Peak
2018	6	1,318,826	1,190,381	3,925	3,100
2018	7	1,653,462	1,604,104	4,921	3,932
2018	8	1,929,335	1,629,986	5,243	4,335
2018	9	865,773	1,052,075	2,848	2,529
2018	10	948,903	842,486	2,579	2,241
2018	11	1,043,960	1,072,677	3,107	2,786
2018	12	1,095,140	1,310,632	3,422	3,091
2019	1	1,193,235	1,195,577	3,390	3,050
2019	2	1,051,736	1,023,718	3,287	2,908
2019	3	917,705	1,054,495	2,731	2,591
2019	4	906,960	840,497	2,577	2,284
2019	5	882,940	836,775	2,508	2,135
2019	6	1,337,602	1,338,508	4,180	3,346
2019	7	1,821,240	1,675,640	5,174	4,275
2019	8	1,999,879	1,777,638	5,681	4,535
2019	9	1,001,715	1,034,875	3,130	2,587
2019	10	1,002,293	884,641	2,724	2,353
2019	11	1,044,260	1,176,855	3,263	2,935
2019	12	1,217,471	1,329,039	3,623	3,257
2020	1	1,250,553	1,260,976	3,553	3,217
2020	2	1,092,939	1,155,869	3,415	3,074
2020	3	1,030,024	1,041,993	2,926	2,665
2020	4	936,611	883,316	2,661	2,400
2020	5	796,682	953,151	2,490	2,248
2020	6	1,479,230	1,295,440	4,202	3,520
2020	7	1,991,738	1,602,924	5,412	4,263
2020	8	1,996,109	1,861,406	5,941	4,562
2020	9	1,037,522	1,048,679	3,088	2,731
2020	10	986,141	943,170	2,802	2,406
2020	11	1,065,151	1,213,675	3,329	3,027
2020	12	1,306,021	1,312,874	3,710	3,349
2021	1	1,150,289	1,391,284	3,595	3,281
2021	2	1,095,224	1,122,622	3,423	3,189
2021	3	1,118,756	998,807	3,040	2,663
2021	4	954,567	895,707	2,712	2,434
2021	5	798,536	957,214	2,495	2,258

ComEd Procurement Period Load Forecast (High Load) Projected Energy Usage and Average Demand For Eligible Retail Customers (Line Loss and DSM Adjusted)					
Year	**Month**	**Total Load (MWh)**		**Load (MW)**	
		On-Peak	**Off-Peak**	**On-Peak**	**Off-Peak**
2021	6	1,508,227	1,291,439	4,285	3,509
2021	7	1,863,533	1,756,928	5,546	4,306
2021	8	2,087,720	1,827,595	5,931	4,662
2021	9	1,041,648	1,059,190	3,100	2,758
2021	10	949,818	1,004,504	2,827	2,462
2021	11	1,150,766	1,183,883	3,425	3,075
2021	12	1,394,841	1,278,013	3,790	3,399
2022	1	1,230,208	1,367,470	3,661	3,352
2022	2	1,116,400	1,147,850	3,489	3,261
2022	3	1,141,698	1,018,512	3,102	2,716
2022	4	924,619	950,517	2,752	2,475
2022	5	858,248	916,412	2,554	2,246
2022	6	1,537,561	1,289,892	4,368	3,505
2022	7	1,802,852	1,846,093	5,634	4,354
2022	8	2,171,092	1,805,968	5,900	4,803
2022	9	1,066,128	1,052,971	3,173	2,742
2022	10	963,309	1,028,660	2,867	2,521
2022	11	1,176,424	1,206,207	3,501	3,133
2022	12	1,294,525	1,422,967	3,853	3,488
2023	1	1,258,612	1,401,733	3,746	3,436
2023	2	1,144,988	1,160,929	3,578	3,298
2023	3	1,151,114	1,047,355	3,128	2,793
2023	4	889,647	1,004,814	2,780	2,512
2023	5	915,676	876,641	2,601	2,236
Totals		**73,958,182**	**72,756,249**		