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PUBLIC SERVICE
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Jeff D. Cline, Manager – Annual Report Branch
Public Service Commission of Kentucky
Division of Filings
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Frankfort, Kentucky 40602-0615

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April 1, 2020

**Re: Annual Resource Assessment Filing for Kentucky Utilities
Company Pursuant to Administrative Case No. 387**

Dear Mr. Cline:

Enclosed, in accordance with Ordering Paragraph (2) of the Commission's Order in Administrative Case 387, dated October 7, 2005, are an original and ten (10) copies of the 2019 Annual Resource Assessment Filing for Kentucky Utilities Company, along with a Petition for Confidential Protection regarding certain information provided in response to Item Nos. 11 and 14.

Additionally, in response to your letter dated May 31, 2013, which requested a discussion regarding the consideration given to price elasticity in the forecasted demand, energy, and reserve margin information submitted with the annual Administrative Case No. 2000-387 resource assessments. The discussion is provided following Item No. 14.

Sincerely,

A handwritten signature in black ink that reads 'Andrea M. Fackler'.

Andrea M. Fackler

COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION OF KENTUCKY

In the Matter of:

A REVIEW OF THE ADEQUACY OF)	
KENTUCKY'S GENERATION CAPACITY)	ADMINISTRATIVE
AND TRANSMISSION SYSTEM)	CASE NO. 387

2019 ANNUAL RESOURCE ASSESSMENT FILING
OF
KENTUCKY UTILITIES COMPANY
PURSUANT TO APPENDIX G
OF THE COMMISSION'S ORDER
DATED DECEMBER 20, 2001
AS AMENDED BY THE
COMMISSION'S ORDER
DATED MARCH 29, 2004

FILED: APRIL 1, 2020

VERIFICATION

COMMONWEALTH OF KENTUCKY)
)
COUNTY OF JEFFERSON)

The undersigned, **Ashley M. Vinson**, being duly sworn, deposes and says that she is Manager – Transmission Policy and Tariffs for LG&E and KU Services Company, and that she has personal knowledge of the matters set forth in the responses for which she is identified as the witness, and the answers contained therein are true and correct to the best of her information, knowledge and belief.



Ashley M. Vinson

Subscribed and sworn to before me, a Notary Public in and before said County and State, this 17th day of March 2020.



Notary Public

Notary Public, ID No. 003967

My Commission Expires:

7/11/2022

VERIFICATION

COMMONWEALTH OF KENTUCKY)
)
COUNTY OF JEFFERSON)

The undersigned, **Delyn Kilpack**, being duly sworn, deposes and says that she is Manager – Transmission Strategy and Planning for LG&E and KU Services Company, and that she has personal knowledge of the matters set forth in the responses for which she is identified as the witness, and the answers contained therein are true and correct to the best of her information, knowledge and belief.



Delyn Kilpack

Subscribed and sworn to before me, a Notary Public in and before said County and State, this 17th day of March 2020.

 (SEAL)

Notary Public

Notary Public, ID No. 603967

My Commission Expires:

7/11/2025

KENTUCKY UTILITIES COMPANY

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ITEM NO. 1

The information originally requested in Item 1 of Appendix G of the Commission's Order dated December 20, 2001, in Administrative Case No. 387, is no longer required pursuant to the Commission's Order of March 29, 2004, amending the previous Order.

KENTUCKY UTILITIES COMPANY

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ITEM NO. 2

The information originally requested in Item 2 of Appendix G of the Commission's Order dated December 20, 2001, in Administrative Case No. 387, is no longer required pursuant to the Commission's Order of March 29, 2004, amending the previous Order.

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ITEM NO. 3

RESPONDENT: Tim Jones / Michael Sebourn

3. Actual and weather-normalized monthly coincident peak demands for the just completed calendar year. Demands should be disaggregated into (a) native load demand (firm and non-firm) and (b) off-system demand (firm and non-firm).

Response:

See attached Table KU-3, which shows the actual and weather-normalized native Kentucky Utilities Company ("KU") peak demands. The normalized native KU stand-alone peak demands are available only on a seasonal (summer/winter) basis.

**TABLE KU-3
NATIVE AND OFF-SYSTEM DEMANDS BY MONTH FOR 2019**

**Kentucky Utilities
Company**

Time of Monthly Native Peak	Actual			Normal Weather (Seasonal)	Off-System (1)		
	Native Peak	Non-Firm	Firm	Native Peak	Firm	Non-Firm	Total
1/31/2019 9:00	4,352	0	4,352	4,296	0	0	0
2/1/2019 9:00	3,436	0	3,436		0	1,022	1,022
3/5/2019 8:00	3,994	0	3,994		0	0	0
4/1/2019 7:00	3,113	0	3,113		0	76	76
5/24/2019 14:00	3,200	0	3,200		0	55	55
6/28/2019 16:00	3,250	0	3,250		0	2	2
7/10/2019 15:00	3,532	0	3,532	3,593	0	225	225
8/19/2019 16:00	3,671	0	3,671		0	3	3
9/10/2019 16:00	3,597	0	3,597		0	7	7
10/2/2019 16:00	3,505	0	3,505		0	296	296
11/13/2019 8:00	3,693	0	3,693		0	250	250
12/19/2019 8:00	3,643	0	3,643		0	0	0

Notes

(1) The allocation of off-system sales split between Louisville Gas and Electric Company (“LG&E”) and KU is handled in the After-the-Fact Billing process in accordance with the Power Supply System Agreement between LG&E and KU. The individual company sales will include an allocation of the sales sourced with purchased power and allocated to the individual company based on each company's contribution to off-system sales.

KENTUCKY UTILITIES COMPANY

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ITEM NO. 4

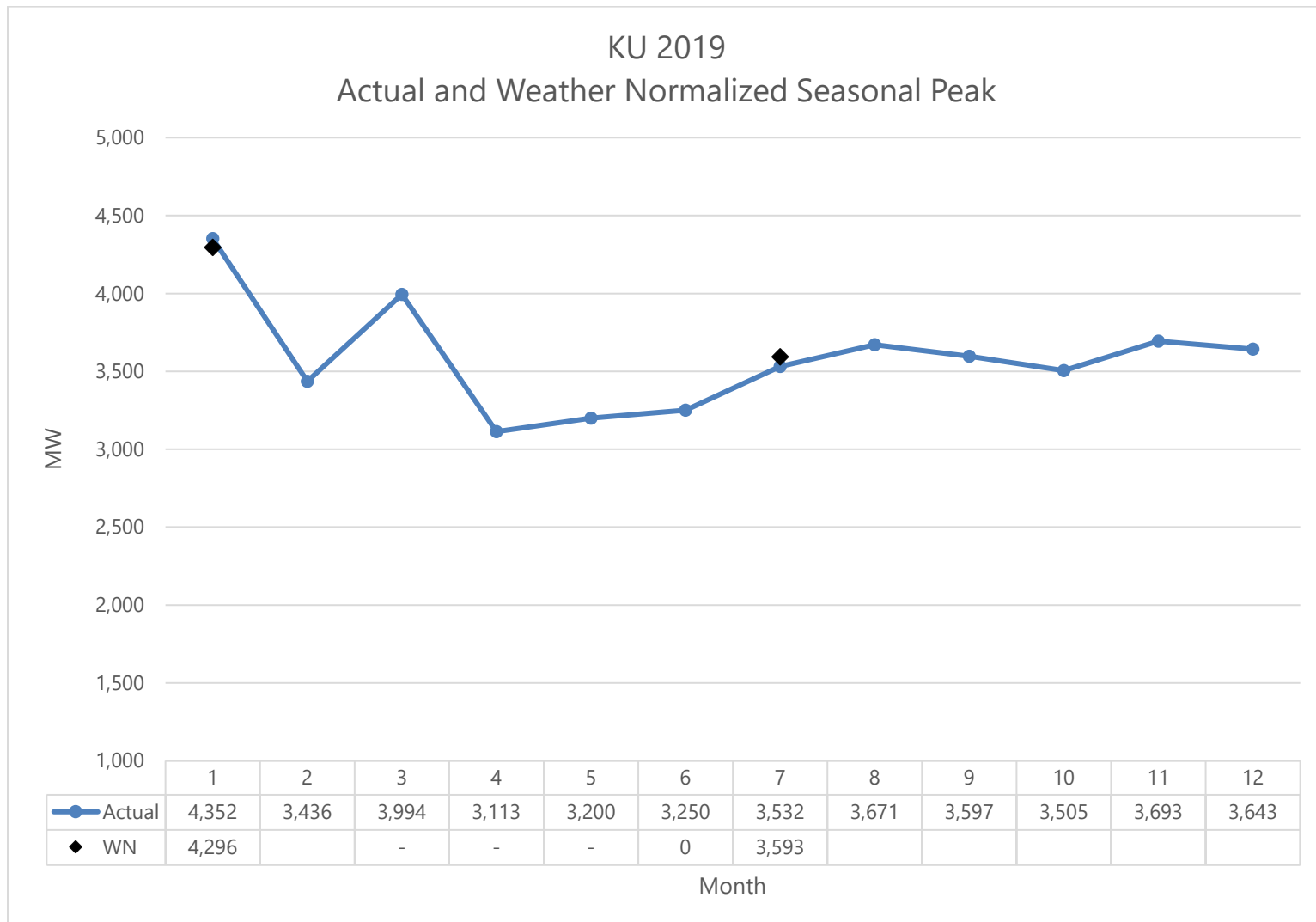
RESPONDENT: Tim Jones

4. Load shape curves that show actual peak demands and weather-normalized peak demands (native load demand and total demand) on a monthly basis for the just completed calendar year.

Response:

See attached Figure KU-4.

Figure KU-4



KENTUCKY UTILITIES COMPANY

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ITEM NO. 5

The information originally requested in Item 5 of Appendix G of the Commission's Order dated December 20, 2001, in Administrative Case No. 387, is no longer required pursuant to the Commission's Order of March 29, 2004, amending the previous Order.

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ITEM NO. 6

RESPONDENT: Tim Jones / Michael Sebourn

6. Based on the most recent demand forecast, the base case demand and energy forecasts and high case demand and energy forecasts for the current year and the following four years. The information should be disaggregated into (a) native load (firm and non-firm demand) and (b) off-system load (both firm and non-firm demand).

Response:

- a) See attached Table KU-6a. The values in Table KU-6a reflect the impact of KU's Energy Efficiency programs.
- b) Off-system sales ("OSS") projections for 2020-2024 contained in the attached Table KU-6b are based on the combined KU and LG&E (together the "Companies") current plan. For OSS, only base case total sales energy projections exist for 2020-2024. The projections consist of the expected market sales, denoted as "Wholesale OSS." All OSS are non-firm.

Table KU-6a
Kentucky Utilities Company
Demand and Energy Forecasts

	2020	2021	2022	2023	2024
Base Case Energy Sales (GWh)	19,006	18,918	18,858	18,804	18,784
High Case Energy Sales (GWh)	19,606	19,541	19,555	19,618	19,825
Base Case Energy Requirements (GWh)	20,262	20,168	20,104	20,047	20,025
High Case Energy Requirements (GWh)	20,792	20,714	20,722	20,785	21,009
Base Case Native Peak Demand (MW)	4,218	4,206	4,193	4,182	4,173
High Case Native Peak Demand (MW)	4,328	4,320	4,322	4,337	4,378

Table KU-6b
Combined Companies
Total Base Case Off-System Sales Energy Projection

	2020	2021	2022	2023	2024
Existing OSS (GWh)	0	0	0	0	0
Wholesale OSS (GWh)	321	280	303	435	454
Total OSS (GWh)	321	280	303	435	454

KENTUCKY UTILITIES COMPANY

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ITEM NO. 7

RESPONDENT: Michael Sebourn

7. The target reserve margin currently used for planning purposes, stated as a percentage of demand. If changed from what was in use in 2001, include a detailed explanation for the change.

Response:

As part of the 2018 Integrated Resource Plan ("2018 IRP"), the Companies established an optimal reserve margin range of 17% to 25%. The range provides an optimum level of reliability through various system operating conditions. The 2018 IRP was filed with the Commission in November 2018.

A detailed explanation of the current target reserve margin is documented in the report titled, "2018 IRP Reserve Margin Analysis," included in Volume III of the Companies' 2018 IRP.

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ITEM NO. 8

RESPONDENT: Michael Sebourn

8. Projected reserve margins stated in megawatts and as a percentage of demand for the current year and the following 4 years. Identify projected deficits and current plans for addressing these. For each year identify the level of firm capacity purchases projected to meet native load demand.

Response:

See attached Table KU-8. No reserve margin deficits are projected. The Companies will monitor load requirements and evaluate supply alternatives to address future capacity deficits.

For illustrative purposes, the expected energy output of the proposed 100 MW solar PPA at the time of the Companies' summer peak load was assumed to be 60% of its maximum output, as shown in this table.

**Table KU-8: Summer Reserve Margin Forecast - Combined Companies
(MW, Base Energy Requirements Forecast)**

	2020	2021	2022	2023	2024
Gross Peak Load	6,671	6,663	6,656	6,655	6,652
Demand Conservation Program	-94	-90	-86	-82	-79
Demand Side Management	-267	-273	-279	-284	-290
Net Peak Load	6,310	6,300	6,291	6,288	6,283
Existing Capability ¹	7,486	7,487	7,487	7,487	7,487
Small-Frame SCCTs ²	73	73	59	59	59
Curtailed Service Rider	139	139	139	139	139
Proposed Solar Power Purchase Agreement	0	0	60	60	60
OVEC Purchase ³	162	162	162	162	162
Total Supply	7,860	7,861	7,907	7,907	7,907
Reserve Margin	1,549	1,560	1,616	1,618	1,623
Reserve Margin %	24.6%	24.8%	25.7%	25.7%	25.8%

¹ Existing capability is shown excluding small-frame SCCTs, CSR, and OVEC and including 1 MW derates on each of the E.W. Brown Units 8, 9, and 11, which are planned to be resolved by 2024.

² Cane Run 11 was retired in November 2019. Zorn is planned to be retired by the end of 2021.

³ OVEC's capacity reflects the 162 MW that is expected to be available to the Companies at the time of the summer peak, including the Companies' share of the bankrupt OVEC sponsor, FirstEnergy Solutions.

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ITEM NO. 9

The information originally requested in Item 9 of Appendix G of the Commission's Order dated December 20, 2001, in Administrative Case No. 387, is no longer required pursuant to the Commission's Order of March 29, 2004, amending the previous Order.

KENTUCKY UTILITIES COMPANY

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ITEM NO. 10

The information originally requested in Item 10 of Appendix G of the Commission's Order dated December 20, 2001, in Administrative Case No. 387, is no longer required pursuant to the Commission's Order of March 29, 2004, amending the previous Order.

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ITEM NO. 11

RESPONDENT: Michael Sebourn

11. A list that identifies scheduled outages or retirements of generating capacity during the current year and the following four years.

Response:

The planned maintenance outage schedule for 2020 through 2024 is being provided pursuant to a Petition for Confidential Protection. The schedule is regularly modified based on actual operating conditions, forced outages, changes in the schedule required to meet environmental compliance regulations, fluctuations in wholesale prices, and other unforeseen events.

KU does not have any retirements scheduled in the current year or the following four years.

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ITEM NO. 12

RESPONDENT: Michael Sebourn

12. Identify all planned base load or peaking capacity additions to meet native load requirements over the next 10 years. Show the expected in-service date, size and site for all planned additions. Include additions planned by the utility, as well as those by affiliates, if constructed in Kentucky or intended to meet load in Kentucky.

Response:

The Companies jointly plan their generation portfolio. LG&E and KU do not currently forecast a need for additional generating capacity in the next 10 years.⁴

⁴ On January 23, 2020, the Companies filed for approval of a twenty-year contract with Rhudes Creek Solar, LLC for the purchase of the output of a 100 MW solar generation facility to be built in Hardin County, Kentucky. The purchases under this contract will be as-available only and therefore not considered capacity purchases. However, in Case No. 2020-00016, the Companies' were asked questions about their forecasted summer planning reserve margins. For illustrative purposes only, the expected energy output of the proposed 100 MW solar PPA at the time of the Companies' summer peak load was assumed to be 60% of its maximum output.

KENTUCKY UTILITIES COMPANY

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ITEM NO. 13

RESPONDENT: Ashley Vinson

13. The following transmission energy data for the just completed calendar year and the forecast for the current year and the following four years:
- a. Total energy received from all interconnections and generation sources connected to the transmission system.
 - b. Total energy delivered to all interconnections on the transmission system.
 - c. Peak load capacity of the transmission system.
 - d. Peak demand for summer and winter seasons on the transmission system.

Response:

Data exists for 2019. The Companies do not forecast this type of data; therefore, no forecast exists for 2020-2023.

- a. LG&E and KU operate as a single NERC Balancing Area that contains several generators not owned by LG&E and KU; the non-Company owned facilities are also included as sources below:

Tie Lines Received (MWh)	20,043,747
Net Generation-LG&E (MWh)	14,266,853
Net Generation-KU (MWh)	19,989,185
Net Received from OMU (MWh)	1,601,047
Net Generation-KMPA (MWh)	40,461
Net Generation-EKPC (MWh)	<u>145,832</u>
Total Sources (MWh)	56,087,125

- b. LG&E and KU operate as a single Balancing Area; the amount of energy delivered at the interconnections of the single Balancing Area was 19,821,662 MWh).

- c. There is no set number for peak load capacity for the transmission system. The system is built to support Network Service and firm Point-to-Point customers in accordance with the LG&E/KU Transmission Planning Guidelines. Actual transmission capacity available for Network Customers, import, export or thru flow will vary depending on which facilities (generation, load or transmission) in the interconnected transmission system of the eastern interconnect are connected and operated at any given time.
- d. The maximum summer peak transmission load for the combined LG&E/KU transmission system was 7,296 MW for the peak hour of 8/19/19 at 4PM.

The maximum winter peak transmission load for the combined LG&E/KU transmission system was 7,113 MW for the peak hour of 1/30/19 at 8PM.

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ITEM NO. 14

RESPONDENT: Delyn Kilpack

14. Identify all planned transmission capacity additions for the next 10 years. Include the expected in-service date, size and site for all planned additions and identify the transmission need each addition is intended to address.

Response:

The requested information is being provided pursuant to a Petition for Confidential Protection.

**Discussion Regarding the Consideration Given to Price Elasticity in the
Forecasted Demand, Energy and Reserve Margin Information
Provided with Annual Resource Assessment Filings
2020**

Price elasticity of demand is a direct input into the Louisville Gas and Electric Company and Kentucky Utilities Company (collectively “the Companies”) Residential and General Service (small commercial) forecast models. These models use Itron’s Statistically Adjusted End Use (“SAE”) Models. The elasticity coefficients used in the SAE models are applicable to shorter-term forecasting (up to 10 years). Over the longer-term, the implied elasticity estimate increases (in absolute value) in the SAE models due to assumed improvements in the efficiencies and saturations of appliances and other equipment to appropriately adjust demand.

In developing the elasticity coefficients, the Companies have consulted multiple sources to better understand how customers respond to electricity prices. These sources include ITRON, available studies¹, and our small commercial customers. The Companies’ price elasticity of demand coefficients are consistent with the ranges cited in the studies. Sources do not indicate any recent change in customer response to electricity prices but the Companies continue to monitor new research and data. Specifically, EPRI research states that the “effect of including recent information covering a period of rising prices appears to be minimal.”

Currently, the Companies use an elasticity coefficient of -0.1 for the Residential forecast. Below, the residential price elasticity of demand is applied in a simple example to determine the impact on customer usage for a hypothetical customer, price, and price increase.

Inputs

Electricity Price: \$0.10/kWh

Monthly customer usage: 1,000 kWh

Price increase: 5%

Price Elasticity of demand: -0.1

Formula

(price elasticity of demand) = (% change in quantity demanded) / (% change in price)

Restated as:

(% change in quantity demanded) = (% change in price) x (price elasticity of demand)

Results

Completing the equation based on the inputs above:

¹ “Regional Differences in the Price-Elasticity of Demand for Energy” by M.A. Bernstein and J. Griffin, RAND Corporation for NREL (2006); “Price Responsiveness in the AEO2003 NEMS Residential and Commercial Buildings Sector Models” by S. Wade, Energy Information Administration (2005); “Price Elasticity of Demand for Electricity: A Primer and Synthesis” by B. Neenan, EPRI (2007) ; “Trends in Regional U.S. Electricity and Natural Gas Price Elasticity” by V. Niemeyer, EPRI (2010); “A Global Survey of Electricity Demand Elasticities” by C. Dahl was presented at the 34th IAEE International Conference: Institutions, Efficiency, and Evolving Energy Technologies in June 2011 at the Stockholm School of Economics in Sweden.

$$(\% \text{ change in quantity demanded}) = (.05) \times (-0.1) = -0.005 = -0.5\%$$

Therefore, the revised monthly customer usage is 0.5% less than 1,000 kWh, or 995 kWh per month.

For small commercial customers, the Companies currently use a price elasticity of demand of -0.15. The Companies' discussions with small commercial customers indicate that these customers will attempt to pass along higher costs for electricity in the price of their goods and services. These customers typically noted that they have few options for changing their use of energy after upgrading lighting and climate control to increase efficiency.

The Companies' forecasts for Large Commercial and Industrial customers also consider how customers respond to energy prices, but these forecasts do not use the SAE models to incorporate explicit price elasticity of demand coefficients. Instead, the Companies' forecast the largest customers' energy and demand on an individual basis and use specific industry indices for others. Recognizing that customers may respond to price through efficiency measures or other operational changes, these individual forecasts and indices inherently reflect the expected changes in customers' energy use due to economic inputs, including the price of electricity. The Companies recognize that larger commercial and industrial customers may not display a smooth reduction in usage as prices rise. Over the longer-term, in extreme cases, some large energy intensive customers may even cease operations or relocate upon reaching certain energy price points.