COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

ELECTRONIC JOINT APPLICATION OF KENTUCKY UTILITIES COMPANY AND LOUISVILLE GAS AND ELECTRIC COMPANY FOR CERTIFICATES OF PUBLIC CONVENIENCE AND NECESSITY AND APPROVAL OF A DEMAND SIDE MANAGEMENT PLAN	**)**	**CASE NO. 2022-00402**

RESPONSE OF
KENTUCKY UTILITIES COMPANY
AND
LOUISVILLE GAS AND ELECTRIC COMPANY
TO
THE KENTUCKY INDUSTRIAL UTILITY CUSTOMERS, INC.'S
FIRST REQUEST FOR INFORMATION
DATED FEBRUARY 15, 2023

FILED: MARCH 10, 2023

VERIFICATION

COMMONWEALTH OF KENTUCKY)
)
COUNTY OF JEFFERSON)

The undersigned, **Lonnie E. Bellar**, being duly sworn, deposes and says that he is Chief Operating Officer for Louisville Gas and Electric Company and Kentucky Utilities Company and an employee of LG&E and KU Services Company, 220 West Main Street, Louisville, KY 40202, and that he has personal knowledge of the matters set forth in the responses for which he is identified as the witness, and the answers contained therein are true and correct to the best of his information, knowledge and belief.

Lonnie E. Bellar

Subscribed and sworn to before me, a Notary Public in and before said County and State, this 8th day of March 2023.

Notary Public

Notary Public ID No. KYNP53381

My Commission Expires:

July 11, 2026

VERIFICATION

COMMONWEALTH OF KENTUCKY)
)
COUNTY OF JEFFERSON)

The undersigned, **Robert M. Conroy**, being duly sworn, deposes and says that he is Vice President, State Regulation and Rates, for Kentucky Utilities Company and Louisville Gas and Electric Company and an employee of LG&E and KU Services Company, 220 West Main Street, Louisville, KY 40202, and that he has personal knowledge of the matters set forth in the responses for which he is identified as the witness, and the answers contained therein are true and correct to the best of his information, knowledge, and belief.

Robert M. Conroy

Subscribed and sworn to before me, a Notary Public in and before said County and State, this 8th day of March 2023.

Notary Public

Notary Public ID No. KYNP63286

My Commission Expires:

January 22, 2027

VERIFICATION

COMMONWEALTH OF KENTUCKY)
)
COUNTY OF JEFFERSON)

The undersigned, **Charles R. Schram**, being duly sworn, deposes and says that he is Director – Power Supply for LG&E and KU Services Company, 220 West Main Street, Louisville, KY 40202, and that he has personal knowledge of the matters set forth in the responses for which he is identified as the witness, and the answers contained therein are true and correct to the best of his information, knowledge, and belief.

Charles R. Schram

Subscribed and sworn to before me, a Notary Public in and before said County and State this 8th day of March 2023.

Notary Public

Notary Public ID No. KYNP53381

My Commission Expires:

July 11, 2026

VERIFICATION

COMMONWEALTH OF KENTUCKY)
)
COUNTY OF JEFFERSON)

The undersigned, **David S. Sinclair**, being duly sworn, deposes and says that he is Vice President, Energy Supply and Analysis for Kentucky Utilities Company and Louisville Gas and Electric Company and an employee of LG&E and KU Services Company, 220 West Main Street, Louisville, KY 40202, and that he has personal knowledge of the matters set forth in the responses for which he is identified as the witness, and the answers contained therein are true and correct to the best of his information, knowledge, and belief.

David S. Sinclair

Subscribed and sworn to before me, a Notary Public in and before said County and State, this 8th day of March 2023.

Notary Public

Notary Public ID No. KYNP53381

My Commission Expires:

July 11, 2026

VERIFICATION

COMMONWEALTH OF KENTUCKY)
)
COUNTY OF JEFFERSON)

The undersigned, **Stuart A. Wilson**, being duly sworn, deposes and says that he is Director, Energy Planning, Analysis & Forecasting for LG&E and KU Services Company, 220 West Main Street, Louisville, KY 40202, and that he has personal knowledge of the matters set forth in the responses for which he is identified as the witness, and the answers contained therein are true and correct to the best of his information, knowledge, and belief.

Stuart A. Wilson

Subscribed and sworn to before me, a Notary Public in and before said County and State, this 8th day of March 2023.

Notary Public

Notary Public ID No. KYNP53381

My Commission Expires:

July 11, 2026

KENTUCKY UTILITIES COMPANY
AND
LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Kentucky Industrial Utility Customers, Inc.'s
First Request for Information
Dated February 15, 2023

Case No. 2022-00402

Question No. 1-1

Responding Witness: Stuart A. Wilson

Q.1-1. Has the Company studied the economics of operating Ghent 2 only during the seven non-ozone season months (October – April) beginning in 2026 without the need to install a $126 million SCR? If yes, please provide a copy of the study.

A.1-1. Yes. See the response to AG 1-9(b).

KENTUCKY UTILITIES COMPANY
AND
LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Kentucky Industrial Utility Customers, Inc.'s
First Request for Information
Dated February 15, 2023

Case No. 2022-00402

Question No. 1-2

Responding Witness: Lonnie E. Bellar / Stuart A. Wilson

Q.1-2. Please refer to Exhibit SAW-1 Table 31 for Ghent 2.

a. In 2027, what comprises the $36 million Overhaul Costs (Standard)?

b. With respect to the Ongoing Costs for 2023-2032, please identify the component parts that comprise the total. For example, how much of each year's Ongoing Costs is labor, fixed O&M, routine maintenance, major overhauls, etc.

c. If an SCR is needed in 2028 to comply with the Good Neighbor Plan, why are the Environmental Compliance Costs (SCR) incurred 2023-2026?

A.1-2.

a. During a major outage, the Companies do a complete teardown and overhaul of the turbine, followed by the generator inspection which entails opening up the generator and removing the field for inspection and testing. The Companies also do an inspection of the excitation system, stator cooling systems, hydrogen cooling system, and oil systems which include inspection/repair of all associated pumps and motors. There are also jobs beyond the turbine that are only completed during the major outage cycle.

b. See the table below.

Ghent 2 Ongoing Cost Components ($M, Nominal)

Type	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Capital	3.8	12.3	2.1	12.6	7.4	2.2	3.3	12.8	6.6	6.8
Labor	2.4	2.6	2.6	2.7	2.8	2.9	2.9	3.0	3.1	3.2
Non-Labor	2.9	3.0	2.9	3.1	3.0	3.1	3.2	3.3	3.3	3.4
Routine Maintenance	3.0	5.1	4.2	3.1	3.8	4.5	4.2	5.8	5.9	6.0

c. The proposed Good Neighbor Plan would require SCR controls by 2026. The Companies have assumed the compliance deadline will be extended only in cases where replacement generation is least-cost. See the response to PSC 1-56(a).

KENTUCKY UTILITIES COMPANY
AND
LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Kentucky Industrial Utility Customers, Inc.'s
First Request for Information
Dated February 15, 2023

Case No. 2022-00402

Question No. 1-3

Responding Witness: Stuart A. Wilson

Q.1-3. Please confirm that keeping Ghent 2 in operation during the seven non-ozone season months (October – April) would enhance reliability during those months.

A.1-3. Confirmed. All other things equal, continuing to operate Ghent 2 would enhance reliability.

KENTUCKY UTILITIES COMPANY
AND
LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Kentucky Industrial Utility Customers, Inc.'s
First Request for Information
Dated February 15, 2023

Case No. 2022-00402

Question No. 1-4

Responding Witness: Lonnie E. Bellar / David S. Sinclair

Q.1-4. If Ghent 2 is only operated during the seven non-ozone season months (October – April), could the Company perform all planned maintenance during the five summer months? Would summer planned maintenance provide cost savings since maintenance is normally planned for the spring and fall?

A.1-4. The Companies have not performed this analysis but expect that there would be the opportunity to shift some of Ghent 2's maintenance to the summer in this scenario. The potential for cost savings is limited.

KENTUCKY UTILITIES COMPANY
AND
LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Kentucky Industrial Utility Customers, Inc.'s
First Request for Information
Dated February 15, 2023

Case No. 2022-00402

Question No. 1-5

Responding Witness: Lonnie E. Bellar

Q.1-5. Please confirm that even if retired in 2026, Ghent 2 would not be demolished at that time because of the three other operating units at Ghent.

A.1-5. Confirmed. Demolishing only Unit 2 would be difficult given its intricate tie-in to the station's structure and supporting operating systems.

KENTUCKY UTILITIES COMPANY
AND
LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Kentucky Industrial Utility Customers, Inc.'s
First Request for Information
Dated February 15, 2023

Case No. 2022-00402

Question No. 1-6

Responding Witness: Stuart A. Wilson

Q.1-6. Please refer to SAW-1 page 38. The Company states: "Adding Brown BESS further enhances reliability, but its primary value is in providing operational experience for integrating future renewable generation …. But based on its cost, it is not the most cost-effective means of enhancing reliability as modeled."

a. Please identify the most cost-effective means of enhancing reliability instead of the $270 million Brown BESS.

b. What is the present value savings of utilizing the most cost-effective means of enhancing reliability instead of the $270 million Brown BESS?

A.1-6. Note that $270 million is the expected construction cost before the 50% or $135 million investment tax credit.

a. See the response to PSC 1-47(a) and the March 2023 update to Exhibit SAW-1 attached thereto. In the referenced section of Exhibit SAW-1, the Companies evaluated the impacts of the proposed dispatchable DSM programs, Brown BESS, and a 250 MW SCCT on reliability. With the updated ITC revenue requirement calculations, adding the proposed dispatchable DSM programs is the most cost-effective means of enhancing reliability. See the response to PSC 1-25(b). The Companies are proposing Brown BESS primarily as a means of gaining operational experience at utility-scale with BESS in advance of large-scale additions of intermittent renewable energy in the future. See Sinclair Direct Testimony pages 24 – 26.

b. Table 22 on page 39 of the March 2023 update to Exhibit SAW-1 attached to the response to PSC 1-47(a) contains the PVRR impact of adding Brown BESS as modeled, i.e., in addition to the proposed dispatchable DSM programs.

The Companies have not computed the PVRR impacts of (a) adding only the proposed dispatchable DSM programs or (b) adding only the Brown BESS. Tables 20 and 21 in the March 2023 update to Exhibit SAW-1 attached to the response to PSC 1-47(a) show the cost difference in 2028 between these resources is $9-10 million (i.e., in 2028 the annual cost of adding only the Brown BESS is $9-10 million higher than the annual cost of adding only the proposed dispatchable DSM programs).

KENTUCKY UTILITIES COMPANY
AND
LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Kentucky Industrial Utility Customers, Inc.'s
First Request for Information
Dated February 15, 2023

Case No. 2022-00402

Question No. 1-7

Responding Witness: Stuart A. Wilson

Q.1-7. Please refer to SAW-1 page 23. The Company states: "PLEXOS did not select DSM or batteries in any of the fuel price cases. This likely results from the cost of these resources relative to their limited duration, making them uneconomical to achieve minimum reliability and meet the significant need for energy created by coal retirements. Also, batteries do not produce energy, but rather move it in time."

a. For the each of the years of its planned operation, how much energy is the Brown BESS expected to supply?

b. For the each of the years of its planned operation, what is the all-in cost of energy per MWh expected to be supplied from the Brown BESS? The all-in cost should include capital costs, fixed and variable operating costs and the cost of the energy that charges the battery. Please provide the detail of how this calculation is made.

c. What is the energy conversion loss factor for the Brown BESS? For example, for every MWh supplied by the battery, how much energy is used to charge it? If there are winter/summer differences due to ambient air temperature differences please explain.

d. Did the PLEXOS model assume that the battery would only be charged with solar generation, or did it assume any type of charging generation including coal?

e. Does the Company have an estimate of the CO2 footprint of the 125 MW BESS before it begins operation? In other words, how much CO2 was produced by 1) the mining of the minerals that go into the battery; and 2) the manufacturing of the battery? If there is such an estimate, what type of electricity (e.g. coal, natural gas, wind, solar, hydro) was assumed to be used in the manufacturing of the battery?

A.1-7.

a. See the table below. Forecasted supply varies by fuel price scenario, so results are provided for the six fuel price scenarios with no CO_2 price used in the analysis over Brown BESS's 15-year depreciable life. Note that if cycled once per day, the battery would supply 182.5 GWh annually.

Brown BESS Forecasted Supply (GWh)

Year	Low Gas, Mid CTG Ratio	Mid Gas, Mid CTG Ratio	High Gas, Mid CTG Ratio	Low Gas, High CTG Ratio	High Gas, Low CTG Ratio	High Gas, Current CTG Ratio
2026	5.7	4.2	3.7	6.5	14.8	2.3
2027	4.8	3	9.8	6.4	36.6	30.9
2028	10.6	14.8	22.4	12	44.1	56.1
2029	6.3	8.8	21.3	6.1	51	75.6
2030	3.4	8.7	22.7	3.2	49.1	67.1
2031	4.8	8.4	20.4	4.7	42	68.7
2032	3.8	9.9	19.9	3.6	44.6	69.1
2033	4	7.8	23.4	4.1	37.3	62.4
2034	4.3	9	24	4.6	36.2	66.5
2035	4.7	10.7	28.2	6.3	44.9	67.9
2036	2.7	9.8	25.4	2.6	38.5	64.7
2037	3.4	6.9	24.6	4.8	41.7	59.4
2038	2.8	8.8	25.9	2.1	41.6	55
2039	2.4	5.6	25.1	1.7	34	65.9
2040	3.9	8.4	31.1	2.4	52.8	59.9

b. See the table below. These values reflect the updated ITC revenue requirement calculations for Brown BESS described in response to PSC 1-47(a). The cost of the energy that charges the battery is not available, so the average annual system production cost for each fuel price scenario was used as a proxy. This calculation required adding the capital revenue requirements and operating/maintenance costs to the product of the forecasted supply and the average annual system production costs adjusted for the round-trip efficiency losses of the Brown BESS, and dividing this sum by the forecasted supply. See the response to Question No. 6(b) and part (a). The Companies are not capturing potential value for supplying generation-based ancillary services. If the battery is utilized at a higher level (e.g., cycled once per day), its all-in cost of energy will be lower.

Brown BESS All-In Cost of Energy ($/MWh, Nominal)

Year	Low Gas, Mid CTG Ratio	Mid Gas, Mid CTG Ratio	High Gas, Mid CTG Ratio	Low Gas, High CTG Ratio	High Gas, Low CTG Ratio	High Gas, Current CTG Ratio
2026	3,819	5,178	5,876	3,352	1,499	9,438
2027	4,321	6,902	2,144	3,248	605	719
2028	1,821	1,320	892	1,613	473	392
2029	2,856	2,060	882	2,949	394	291
2030	4,969	1,968	788	5,278	388	308
2031	3,345	1,932	830	3,416	427	292
2032	4,050	1,582	819	4,274	393	284
2033	3,721	1,932	685	3,632	448	302
2034	3,346	1,624	650	3,130	447	282
2035	2,955	1,325	545	2,214	362	272
2036	4,931	1,391	580	5,120	401	276
2037	3,773	1,885	579	2,683	364	289
2038	4,392	1,430	535	5,846	355	299
2039	4,906	2,132	532	6,913	407	257
2040	2,902	1,376	427	4,695	277	269

c. Brown BESS has a round-trip efficiency of 0.87, which means that for every 1 MWh of energy supplied by the battery, approximately 1.149 MWh (1/0.87) was used to charge it. Regarding winter/summer differences, see the response to AG 1-28(o).

d. No. In PLEXOS and PROSYM, battery storage can be charged by any generation resource.

e. No, the Companies do not have an estimate of the CO_2 footprint.

KENTUCKY UTILITIES COMPANY
AND
LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Kentucky Industrial Utility Customers, Inc.'s
First Request for Information
Dated February 15, 2023

Case No. 2022-00402

Question No. 1-8

Responding Witness: Robert M. Conroy / Charles R. Schram

Q.1-8. With respect to the solar PPA costs proposed to be recovered in the fuel adjustment clause (FAC), please provide the following.

a. For each of the first ten years of the PPAs, what is the expected cost per MWh for the solar PPAs?

b. For each of the first ten years of the PPAs, what is the expected MWh to be delivered from the solar PPAs?

c. If any of the solar PPA costs are not considered to be economy purchases and therefore not recoverable in the FAC, would the Company seek recovery of the remainder in a rate case?

d. Do the Companies have a position as to how such PPA costs should be recovered from ratepayers? For example, a combination of FAC and base rates, or a new renewable energy recovery rider.

A.1-8.

a. See the agreements filed on March 1, 2023 for pricing information. Customers' net cost for the solar energy will depend on REC sales revenue if the Companies sell the solar RECs.

b. The following table shows the forecast annual generation for each proposed PPA based on assumed weather conditions and panel degradation for ten years from the estimated start date. The projection was made using a range of assumed weather conditions based on historical weather, which causes the forecasted generation to vary from year to year.

Projected PPA Solar Generation (MWh) by Year				
Year	ibV Grays Branch (138 MW)	ibV Nacke Pike (280 MW)	BrightNight Gage (GGSO) (115 MW)	Clearway Song Sparrow (104 MW)
1	298,014	583,424	289,358	263,897
2	315,869	601,726	279,939	259,234
3	305,423	596,164	292,246	272,590
4	327,657	609,436	272,123	248,669
5	292,757	570,807	274,462	256,564
6	304,804	589,547	282,213	256,294
7	306,726	586,886	269,856	249,350
8	289,043	567,094	280,791	258,795
9	304,701	579,452	285,827	265,955
10	317,883	592,881	268,884	248,843

c. Should the energy cost, net of any RECs sales revenue, associated with the PPAs in the future not meet the current definition and treatment of "economy power purchase" in the FAC, the Companies would seek recovery through other means, including base rates or other mechanism.

d. The current approach for recovery of the PPA energy costs, net of REC sales revenue, is through the FAC mechanism. However, as the industry and our generation mix may change over time, the appropriate means of recovering the cost of providing safe and reliable energy to customers may change over time.

KENTUCKY UTILITIES COMPANY
AND
LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Kentucky Industrial Utility Customers, Inc.'s
First Request for Information
Dated February 15, 2023

Case No. 2022-00402

Question No. 1-9

Responding Witness: David S. Sinclair / Stuart A. Wilson

Q.1-9. For the solar generation proposed to be owned by the Companies, please provide the expected production by month for a representative year. Because of the concentrated production during the five ozone season months, would this solar generation improve the economics and reliability of a scenario where Ghent 2 continues to be operated during the seven non-ozone season months beginning in 2026?

A.1-9. See the table below. As stated in Mr. Sinclair's and Mr. Wilson's Direct Testimony, the solar PPAs and owned solar projects are being proposed to hedge future fuel cost and CO_2 regulation risk, not for reliability (though, all other things being equal, they should improve reliability). Therefore, their primary value is driven by marginal fuel costs of other generation, not any decisions related to Ghent 2's operation in the non-ozone months. As demonstrated in Exhibit SAW-1, Table 13, the lowest cost portfolio that had Ghent 2 operating only in the non-ozone season (Portfolio 4) was always more expensive across all fuel and CO_2 price scenarios than the recommended Portfolio 1.

2030 Forecasted Generation (MWh)

Month	Marion County Solar	Mercer County Solar
January	14,839	14,587
February	17,977	16,303
March	19,581	18,892
April	26,276	24,293
May	30,972	28,377
June	32,286	29,812
July	30,687	29,883
August	30,810	27,200
September	27,879	24,738
October	20,314	18,320
November	16,669	15,296
December	11,570	11,617
Total	279,861	259,319

KENTUCKY UTILITIES COMPANY
AND
LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Kentucky Industrial Utility Customers, Inc.'s
First Request for Information
Dated February 15, 2023

Case No. 2022-00402

Question No. 1-10

Responding Witness: Robert M. Conroy

Q.1-10. For the solar generation proposed to be owned by the Companies, do the Companies have a position as to how such costs should be recovered from ratepayers? For example, base rates or a new renewable energy recovery rider.

A.1-10. Yes, LG&E and KU believe all generating resources owned by the Companies should be recovered from retail customers through base rates along with allocations to FERC wholesale customers based on a longstanding ratemaking concept that the facilities will be used and useful to the customers.