COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

ELECTRONIC 2018 JOINT INTEGRATED RESOURCE PLAN OF LOUISVILLE GAS AND ELECTRIC COMPANY AND KENTUCKY UTILITIES COMPANY	))))	CASE NO. 2018-00348

COMMISSION STAFF'S FIRST REQUEST FOR INFORMATION TO LOUISVILLE GAS AND ELECTRIC COMPANY AND KENTUCKY UTILITIES COMPANY

Louisville Gas and Electric Company (LG&E) and Kentucky Utilities Company (KU) (jointly, LG&E/KU), pursuant to 807 KAR 5:001, are to file with the Commission the original and an electronic version of the following information. The information requested is due on October 25, 2019. Responses to requests for information in paper medium shall be appropriately bound, tabbed, and indexed. Electronic documents shall be in portable document format (PDF), shall be searchable and shall be appropriately bookmarked.

Each response shall include the name of the witness responsible for responding to the questions related to the information provided. Each response shall be answered under oath or, for representatives of a public or private corporation or a partnership or association or a governmental agency, be accompanied by a signed certification of the preparer or the person supervising the preparation of the response on behalf of the entity that the response is true and accurate to the best of that person's knowledge, information, and belief formed after a reasonable inquiry.

LG&E/KU shall make timely amendment to any prior response if they obtain information that indicates that the response was incorrect when made or, though correct when made, is now incorrect in any material respect. For any request to which LG&E/KU fail or refuse to furnish all or part of the requested information, LG&E/KU shall provide a written explanation of the specific grounds for their failure to completely and precisely respond.

Careful attention shall be given to copied material to ensure that it is legible. When the requested information has been previously provided in this proceeding in the requested format, reference may be made to the specific location of that information in responding to this request. When applicable, the requested information shall be separately provided for total company operations and jurisdictional operations. When filing a paper containing personal information, LG&E/KU shall, in accordance with 807 KAR 5:001, Section 4(10), encrypt or redact the paper so that personal information cannot be read.

1. Identify and explain any significant changes affecting the load forecast and sensitivity analyses since the filing of LG&E/KU's 2018 Integrated Resource Plan (IRP).

2. Provide updates to any affected tables, schedules, exhibits, etc., as a result of any significant change in the assumptions and conclusions since the filing of the 2018 IRP.

3. Refer to the IRP, Volume 1, Section 5.(1), page 5-2.

a. Provide the highest hourly demand experienced by LGE and KU on an individual utility basis and identify when those demand peaks occurred.

b. Provide the highest annual energy requirements for LG&E, KU, and the combined LG&E/KU system.

4. Refer to the IRP, Volume 1, Section 5.(2), page 5-11, Figure 5-6. Explain whether a reading of 1.10 represents a 10 percent improvement in efficiency over a value of 1.00.

5. Refer to the IRP, Volume 1, Section 5.(2), page 5-22, Figure 5-13, regarding the E.W. Brown Solar Profile on March 15-17, 2017.

a. Explain whether batteries are utilized at the Brown Solar Facility to improve the overall performance.

b. Explain whether LG&E/KU have evaluated the addition of batteries as a possible enhancement to improve overall performance of the facility. If so, provide a copy of the evaluation study.

c. Explain whether the solar cells used in the panels degrade over time resulting in a decline of energy production. Provide the useful life of the Brown Solar Facility.

d. Explain whether the resource assessment analysis takes into account the replacement of the energy/capacity as the solar panels and associated equipment degrade over time.

e. Explain whether LG&E/KU have any technology company or other environmentally-conscious customers who would prefer to purchase green energy produced by the solar facility.

f. Explain whether the solar facility plays any part in LG&E/KU's economic development efforts. If so, to what effect.

6. Refer to the IRP Volume 1, Section 5.(2), page 5-21, Table 5-4. Provide a table illustrating unit retirements over the 55- and 65-year operating life scenarios.

7. Refer to the IRP, Volume 1, Section 5.(3), page 5-13 and 5-28 through 5-29, regarding distributed generation.

a. Explain whether LG&E/KU have any customers with Qualifying Facilities (QF).

b. State whether LG&E/KU have had any customers seek assistance in implementing a QF. If so, provide LG&E/KU's policies regarding these situations.

c. Provide a list of customers by industry name that would be good candidates for QFs. Provide the load of each such customer.

d. Also refer to the IRP, Volume 1, Section 5.(4), page 5-38, Table 5-14, which summarizes LG&E/KU's need for new or replacement capacity under certain circumstances. Explain whether QFs could be considered a reasonable resource option to address LG&E/KU's future capacity needs in addition to the resources listed on Table 5-15 on page 5-39 of the IRP.

e. Explain whether LG&E/KU has ever been approached by a large potential customer interested in self supplying a part of its energy and demand needs. If so, explain how LG&E/KU would encourage this arrangement in the context of economic development.

8. Refer to the IRP, Volume 1, Section 5.(3), pages 5-14 and 5-30, regarding electric vehicle penetration. Explain how LG&E/KU have approached the potential problem of charging of electric cars during periods of peak demand, thereby increasing demand peaks.

9. Refer to the IRP, Volume 1, Section 5.(3), pages 5-24 through 5-26, and Tables 5-7 and 5-9. Quantify the revenue lost to KU as a result of the eight municipals leaving the system and the actions KU has taken to-date to make up the loss of sales.

10. Refer to the IRP, Volume 1, Section 5.(3), page 5-29.

a. Explain the drivers behind the National Renewable Energy Laboratory's more aggressive customer adoption rate reflected in LG&E/KU's high distributed generation forecast scenario.

b. Explain whether the current statutory limit of 30 kW for net metering was relaxed as a part of the high distributed generation forecast scenario. If not, explain how the base case would change if, everything else being equal, the 30 kW limit was raised to 45 kW.

11. Refer to IRP Volume 1, Section 5.(3), pages 5-30 through 5-31, regarding electric vehicles (EV).

a. Explain whether the electric vehicle analysis includes personally-owned EVs as well as EVs owned and operated by municipalities and commercial entities.

b. Explain the reasonable actions LG&E/KU could take to encourage EV charging overnight versus early evenings. Include in the response whether a separate EV tariff would make sense.

c. Explain whether LG&E/KU also included the possible option of either constructing or encouraging the construction of EV charging stations placed in optimal locations as an alternative to at-home charging.

d. If not addressed above, explain whether LG&E/KU's actions to date are following the electric vehicle market as it develops or whether LG&E/KU are actively promoting increased penetration of electric vehicles and the necessary infrastructure that enables the market to grow. If so, describe what actions are being taken.

e. Briefly explain the economics of EV charging stations made available to the public, and the optimal placement of such, versus home-based, individually owned charging stations, and how those economic factors may or may not have a meaningful effect on peak demand.

12. Explain whether there have been any discussions either within LG&E/KU or with customers regarding setting up microgrids or similar arrangements that could be isolated for security and/or reliability reasons with a master meter for the microgrid, including possible behind-the-meter alternative energy sources (regardless of ownership) such that essential functions could be sustained for a period of time during an outage or an emergency event. If so, explain the status and nature of the discussions.

13. Refer to the IRP, Volume 1, Section 5.(4), page 5-35, Table 5-12, and the IRP, Volume 3, 2018 IRP Resource Screening Analysis, page 13. The screening analysis includes both battery storage and SCCT for peaking purposes.

a. Identify and explain the factors that are expected to drive down the cost of batteries over time.

b. Explain the differences in variable O&M costs for SCCT and battery storage.

c. Explain the expected useful life of battery storage units.

d. Provide a comparison of the estimated production cost of a MWh for SCCT and battery storage if the battery storage unit was of similar capacity as the SCCT unit.

e. The Resource Screening Analysis on page 8 lists several attributes of battery storage, including the potential to enhance the variable nature of renewable generation alternatives. Explain whether LG&E/KU have investigated pairing battery storage with its solar PV resources to enhance the variable nature of this resource and, if so, explain the results of the analysis.

14. Refer to the IRP, Volume 1, Section 5.(4), page 5-36, Table 5-13, footnote 22; the IRP, Volume 3, 2018 IRP Resource Screening Analysis, page 10; and Case No. 2017-00441 Order dated October 5, 2018, page 6.[1]

a. Table 5-13 indicates steadily declining Demand Conservation Program (DCP) values. The Case No. 2017-00441 Order at page 6 indicates that LG&E/KU will maintain the DCP for industrial customers, though not add new customers unless an existing customer ceases to participate in the program.

i. Explain why the DCP values in Table 5-13 decline significantly over time.

ii. Explain whether any customers in the commercial sales class participate in the DCP.

b. In the 2018 IRP Resource Screening Analysis, page 10, LG&E/KU indicate that the DCP is a cost effective program and that it is the only Demand-Side

[1] Case No. 2017-00441, *Electronic Joint Application of Louisville Gas and Electric Company and Kentucky Utilities Company for Review, Modification, and Continuation of Certain Existing Demand Side Management and Energy Efficiency Programs* (Ky. PSC Oct. 5, 2018).

Management (DSM) program that can be dispatched. Provide a cost comparison of the cost of the DCP program as compared to other resources during load control events (LCEs) such that even though the program is cost effective, LG&E/KU appear to be phasing out the program.

c. Explain how LG&E/KU forecast LCEs and whether the number of LCEs are projected to decline over time in the same manner as the forecasted decline in DCP participation.

15. Refer to the IRP, Volume 1, Section 5.(4), page 5-36, Table 5-13, and Volume 1, Section 8, pages 8-19 through 8-21, Table 8-12.

a. Confirm that the DCP program referenced in Table 5-13 corresponds to the Residential and Small Nonresidential Demand Conservation and the Large Nonresidential Demand Conservation programs referenced in Table 8-12. If these are not the same programs, explain the differences.

b. Provide an explanation of how the DCP forecast in Table 5-13 is calculated.

c. The DCP forecast in Table 5-13 shows a steadily declining trend on a calendar year basis. The Demand Conservation forecast amounts in Table 8-12 referenced in part a. illustrate the effect on summer and winter peak. While the forecast amounts in Table 5-13 decline significantly, the amounts in Table 8-12 are not similar and decline in a completely different pattern. Provide an explanation of how the DCP amounts in Table 5-13 correspond to the amounts in Table 8-12.

16. Refer the IRP, Volume 1, Section 5.(4), page 5-36, Table 5-13, and Volume 1, Section 5.(4), page 5-38, Table 5-14.

a. Explain the nature and provide a schedule of the various resources being added in Table 5-14 in the 55-year operating life base, high-load and low-load scenarios for each year 2026–2033.

b. In light of the need for new or replacement capacity under the 55-year operating life base and high-load scenarios explain, if not answered above, why the cost-effective DCP program is not cost competitive with other capacity resources and provide a table illustrating the relative resource costs.

17. Refer to the IRP, Volume 1, Section 5.(4), page 5-37. LG&E/KU states, "All other things equal, if the Companies' load increases by 300 MW to 400 MW, the reliability and production cost benefits from adding new SCCT capacity would more than offset the cost of the capacity."

a. Explain whether the statement includes the loss of the 285-MW load associated with the eight municipals that recently departed from KU's system.

b. If not answered above, explain whether the municipals had not left the system, the load would only have to increase 15 MW to 115 MW for the cost benefits to outweigh the cost of new SCCT capacity.

c. If load were to increase 300 MW to 400 MW and LG&E/KU were to find themselves in need of capacity, would LG&E/KU's consideration of possible options include discussions of possible power purchase arrangements or other market alternatives?

18. Refer to the IRP, Volume 1, Section 5.(4), page 5-39, Table 5-15.

a. Also refer to Section 5.(2), page 5-21, Table 5-4. Provide a revised Table 5-15 to include the MW retirements corresponding to each of scenarios.

b. Provide the nameplate capacity of the 1x1 NGCC units.

c. Explain whether the retirements listed under the 65-year operating life plan correspond to these units being retired because they are at the end of their operating life or some other reason.

19. Refer to the IRP, Volume 1, Section 7.(2).(f), page 7-6, Tables 7-12 and 7-13.

a. Define "Energy Loss" as referenced in the two Tables.

b. Explain the reason(s) KU's annual energy losses are significantly higher than those of LG&E.

20. Refer to IRP Volume 1, Section 7.(2).(g), page 7-6, Table 7-14.

a. Provide the incremental energy and demand savings associated with each of the years 2013-2017.

b. Refer to application in Case No. 2017-00441,[2] the Direct Testimony of Gregory Lawson, Exhibit GSL-1, pages 4 and 5 of 182, Figures 1 and 2, respectively.

i. For Figure 1, explain the apparent differences between the listed annual demand savings and the annual savings calculated from the cumulative savings line.

ii. For Figure 2, provide a chart with the associated cumulative totals as was provided in Figure 1.

[2] Case No. 2017-00441, *Electronic Joint Application of Louisville Gas and Electric Company and Kentucky Utilities Company for Review, Modification, and Continuation of Certain Existing Demand Side Management and Energy Efficiency Programs,* (Application Filed Dec. 6, 2017).

c. Provide an explanation of the differences between the annual and cumulative energy and demand savings inherent in IRP Table 7-14 and those in Figures 1 and 2.

21. Refer to the IRP, Volume 1, Section 7.(4).(a), page 7-8, Table 7-19. Provide a revised table including "Losses" for Kentucky only and "Total Requirements" for Kentucky only.

22. Refer to the IRP, Volume 1, Section 5.(4), page 5-36, Table 5-13. Refer also to the IRP, Volume 1, Section 7.(4).(a), pages 7-8 through 7-9, Tables 7-19 and 7-20, respectively. Table 5-13 shows a net peak load forecast declining due to the effects of DCP and DSM programs. Tables 7-19 and 7-20 show KU and LG&E forecasted calendar year sales.

a. Provide tables for both KU and LG&E showing the forecasted GWh effects of DCP and DSM programs, average use-per-customer, residential and commercial calendar sales before and after DCP and DSM programs and forecasted residential and commercial customers for 2018–2033.

b. Table 7-19 shows forecasted residential sales for KU slowly declining through most of the forecast period. Table 7-20 shows forcasted residential sales for LG&E declining initially and then slowly climbing. Explain the differences between the KU and LG&E residential customer classes that drive the differing trends.

23. Refer to IRP Volume 1, Section 8.(2).(a), page 8-2 through page 8–5.

a. Provide a tentative timetable/implementation schedule for the projects and improvements discussed in Section 8.(2).(a) over the IRP planning period.

b. Provide a list of the projects discussed in Section 8.(2).(a) that were included in the forecast maintenance schedule and capital spending plan in LG&E/KU's last rate cases, Case Nos. 2018-00294[3] and 2018-00295.[4]

24. Refer to IRP Volume 1, Section 8.(2).(a), page 8-3.

a. Explain and describe the changes in coal supply that LG&E/KU have undertaken to reduce gaseous emissions that have negatively impacted boiler slagging and precipitator performance. Include in the discussion the characteristics of the coal prior to the changes and the characteristics of the coal now being purchased.

b. Provide a similar discussion for coal burner modifications that have been undertaken to reduce gaseous emissions that have negatively impacted boiler slagging and precipitator performance.

25. Refer to the IRP, Volume 1, Section 8.(3).(b), page 8-6, regarding existing and planned generating resources. Explain how the 2 percent escalation factor was determined.

26. Refer to the IRP Volume 1, Section 8.(3).(e).1, page 8-14, regarding Advanced Metering Systems (AMS) Customer Service Offering. In Case 2017-00441, the Commission approved an increase to the offering of 10,000 meters for residential and 10,000 meters for small commercial customers.

a. Explain in detail whether LG&E/KU are expecting a potential applicants in numbers greater than the approved amounts.

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[3] *Electronic Application of Kentucky Utilities Company for an Adjustment of its Electric Rates* (Application Filed Sept. 28, 2018).

[4] *Electronic Application of Louisville Gas and Electric Company for an Adjustment of its Electric and Gas Rates* (Application Filed Sept. 28, 2018).

b. Discuss the participant satisfaction level with the AMS program.

27. Refer to the IRP, Volume 1, Section 8.(4).(c), page 8-26, Table 8-17.

a. For the Hydro category, explain the increase in generation capacity from 2018 to 2019 and explain why there is an occasional variation for the remaining years versus a constant generation output assumption.

b. For the Solar category, explain why there is a slight variation in generation output in 2021 and 2026 versus a constant output assumption for the remaining years.

28. Refer to the IRP, Volume 1, Section 8.(5).(f), page 8-29, regarding significant capital investments that will be needed in the future to comply with various environmental compliance requirements. Explain whether any of these capital expenditures has been identified. If so, provide the identity of the project and the projected capital expenditures. Consider this an ongoing request throughout this proceeding.

29. Refer to the IRP, Volume 1, Section 8.(5).(f), beginning on page 8-29, regarding environmental regulation compliance and planning. Provide updates as necessary to update the status of compliance with the various environmental regulations referenced in this section of the IRP. Consider this an ongoing request throughout this proceeding.

30. Refer to the IRP, Volume 1, Section 8.(5).(f), page 8-30, regarding the National Ambient Air Quality Standards. Provide a copy of the January 7, 2017 Consent Decree referenced in this section of the IRP.

31. Refer to the IRP, Volume 1, Section 8.(5).(f), page 8-34, regarding greenhouse gas regulations. Identify and explain any events that have transpired since the Affordable Clean Energy Rule was proposed on August 21, 2018.

32. Refer to the IRP, Volume 1, Section 8.(5).(f), page 8-35, regarding the Clean Water Act – 316(b).

a. Provide the options that LG&E/KU is evaluating to bring Mill Creek Unit 1 into compliance with the impingement standard and indicate when this evaluation is anticipated to be completed.

b. Provide the status of the aquatic studies that is needed for the Mill Creek Station with respect to compliance with the entrainment standard and indicate when the final report will be submitted to the Kentucky Division of Water (KDOW). Also, provide the time frame in which LG&E/KU anticipates entering into negotiation discussions with KDOW regarding the appropriate technologies needed to comply with the entrainment standard.

33. Refer to the IRP, Volume 1, Section 8.(5).(f), pages 8-35 through 8-36. Provide a discussion of any revisions to the coal combustion residual rule since the filing of the IRP.

34. Refer to the IRP, Volume 3, E.W. Brown Solar Profile, 2017.

a. Refer to page 2 and the discussion of power limiting, or clipping, as a result of the high array-to-inverter ratio. Explain power limiting or clipping in lay terms and how it causes the solar facility to experience a higher capacity factor.

b. If a similar profile was developed for 2018, provide a copy of that report.

35. Refer to the IRP, Volume 3, 2018 IRP Resource Screening Analysis (Resource Screening Analysis), page 4, Table 1. Refer also to the Resource Screening Analysis, page 5, Figure 1. Provide an updated Table 1 and Figure 1 using cost data from the National Renewable Energy Laboratory's 2019 Annual Technology Baseline.

36. Refer to the IRP, Volume 3, Resource Screening Analysis, page 7, Table 2. The table includes SCCTs as peaking units. The 2018 IRP Reserve Margin Analysis at page 6 discusses both large frame and small frame SCCTs.

a. Explain whether or not large frame SCCTs are included in Table 2 of the Resource Screening Analysis and, if not, why not.

b. If not answered above, explain whether there is a significant cost difference (both fixed and variable) between large frame and small frame SCCTs and, if so, the nature of the cost differences.

37. Refer to the IRP, Volume 3, 2018 IRP Reserve Margin Analysis, Subsection 2, page 6. Explain the characteristics of small- and large-frame SCCTs that permit large-frame SCCTs to be committed with little notice, whereas small-frame SCCTs require more notice.

38. Refer to the IRP, Volume 3, 2018 IRP Reserve Margin Analysis, Section 2, page 4.

a. Explain the drivers behind LG&E/KU experiencing increasing penetration of electric heating. Discuss whether LG&E/KU is experiencing higher growth rates in electric heat or whether the customers in the electric service territories are switching non-electric heating sources to electric or to something else.

b. Explain whether LG&E/KU have programs that actively encourage customers to switch to electric heat. If so, describe the programs.

c. Explain whether the increasing penetration of electric heating is also taking place within LG&E's natural gas operations service territory, both for customers within and outside the electric service territory.

39. Refer to the IRP, Volume 3, 2018 IRP Reserve Margin Analysis, Section 3, page 9.

a. Provide a lay person's explanation for the equivalent load duration curve model from the link provided in footnote 8.

b. Provide a similar explanation for the Strategic Energy Risk Valuation Model.

40. Refer to the IRP, Volume 3, 2018 IRP Reserve Margin Analysis, Section 4.2, page 10. The long term reserve planning margin of MISO (17.1 percent) is at the low end of LG&E/KU's reserve margin range (17 percent - 25 percent) and that for PJM (15.8 percent), and TVA (15 percent) are well below LG&E/KU's range. Explain LG&E/KU's specific characteristics that necessitate the reserve margin being so much higher than neighboring territories.

41. Refer to the IRP, Volume 3, the 2018 IRP Long-Term Resource Planning Analysis, page 24, Table 15. Provide the present value of the revenue requirement for each of the scenarios listed.

42. Refer to the IRP, Volume 3, the 2018 IRP Long-Term Resource Planning Analysis, page 20, Table 11: Key Financial Inputs.

a. Provide a schedule showing how the revenue requirement discount rate was determined.

b. Explain how the deductibility of interest expense for income tax purposes was factored into the computation of the revenue requirement discount rate.

43. Discuss the status of LG&E/KU's economic analysis regarding joining a Regional Transmission Organization.

Gwen R. Pinson
Executive Director
Public Service Commission
P.O. Box 615
Frankfort, KY 40602

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cc: Parties of Record

*Honorable Allyson K Sturgeon
Senior Corporate Attorney
LG&E and KU Energy LLC
220 West Main Street
Louisville, KENTUCKY 40202

*Robert Conroy
LG&E and KU Energy LLC
220 West Main Street
Louisville, KENTUCKY 40202

*Joe F Childers
Joe F. Childers & Associates
300 Lexington Building
201 West Short Street
Lexington, KENTUCKY 40507

*Kentucky Utilities Company
220 W. Main Street
P. O. Box 32010
Louisville, KY 40232-2010

*Justin M. McNeil
Office of the Attorney General Office of Rate
700 Capitol Avenue
Suite 20
Frankfort, KENTUCKY 40601-8204

*Louisville Gas and Electric Company
220 W. Main Street
P. O. Box 32010
Louisville, KY 40232-2010

*Honorable Kendrick R Riggs
Attorney at Law
Stoll Keenon Ogden, PLLC
2000 PNC Plaza
500 W Jefferson Street
Louisville, KENTUCKY 40202-2828

*Kent Chandler
Assistant Attorney General
Office of the Attorney General Office of Rate
700 Capitol Avenue
Suite 20
Frankfort, KENTUCKY 40601-8204

*Larry Cook
Assistant Attorney General
Office of the Attorney General Office of Rate
700 Capitol Avenue
Suite 20
Frankfort, KENTUCKY 40601-8204

*Rebecca W Goodman
Assistant Attorney General
Office of the Attorney General Office of Rate
700 Capitol Avenue
Suite 20
Frankfort, KENTUCKY 40601-8204