COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

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

ATTORNEY GENERAL'S INITIAL DATA REQUESTS

Comes now the intervenor, the Attorney General of the Commonwealth of Kentucky, by and through his Office of Rate Intervention, and submits these Initial Data Requests to Louisville Gas & Electric Co. and Kentucky Utilities Co. [hereinafter jointly referred to as "the Companies"] to be answered by the date specified in the Commission's Order of Procedure, and in accord with the following:

(1) In each case where a request seeks data provided in response to a staff request, reference to the appropriate request item will be deemed a satisfactory response.

(2) Identify the witness who will be prepared to answer questions concerning each request.

(3) Repeat the question to which each response is intended to refer. The Office of the Attorney General can provide counsel for the Companies with an electronic version of these questions, upon request.

(4) These requests shall be deemed continuing so as to require further and supplemental responses if the company receives or generates additional information within the scope of these requests between the time of the response and the time of any hearing conducted hereon.

(5) Each response shall be answered under oath or, for representatives of a public or private corporation or a partnership or association, be accompanied by a signed certification

of the preparer or 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.

(6) If you believe any request appears confusing, request clarification directly from Counsel for the Office of Attorney General.

(7) To the extent that the specific document, workpaper or information as requested does not exist, but a similar document, workpaper or information does exist, provide the similar document, workpaper, or information.

(8) To the extent that any request may be answered by way of a computer printout, identify each variable contained in the printout which would not be self-evident to a person not familiar with the printout.

(9) If the company has objections to any request on the grounds that the requested information is proprietary in nature, or for any other reason, notify the Office of the Attorney General as soon as possible.

(10) As used herein, the words ''document'' or ''documents'' are to be construed broadly and shall mean the original of the same (and all non-identical copies or drafts thereof) and if the original is not available, the best copy available. These terms shall include all information recorded in any written, graphic or other tangible form and shall include, without limiting the generality of the foregoing, all reports; memoranda; books or notebooks; written or recorded statements, interviews, affidavits and depositions; all letters or correspondence; telegrams, cables and telex messages; contracts, leases, insurance policies or other agreements; warnings and caution/hazard notices or labels; mechanical and electronic recordings and all information so stored, or transcripts of such recordings; calendars, appointment books,

schedules, agendas and diary entries; notes or memoranda of conversations (telephonic or otherwise), meetings or conferences; legal pleadings and transcripts of legal proceedings; maps, models, charts, diagrams, graphs and other demonstrative materials; financial statements, annual reports, balance sheets and other accounting records; quotations or offers; bulletins, newsletters, pamphlets, brochures and all other similar publications; summaries or compilations of data; deeds, titles, or other instruments of ownership; blueprints and specifications; manuals, guidelines, regulations, procedures, policies and instructional materials of any type; photographs or pictures, film, microfilm and microfiche; videotapes; articles; announcements and notices of any type; surveys, studies, evaluations, tests and all research and development (R&D) materials; newspaper clippings and press releases; time cards, employee schedules or rosters, and other payroll records; cancelled checks, invoices, bills and receipts; and writings of any kind and all other tangible things upon which any handwriting, typing, printing, drawings, representations, graphic matter, magnetic or electrical impulses, or other forms of communication are recorded or produced, including audio and video recordings, computer stored information (whether or not in printout form), computer-readable media or other electronically maintained or transmitted information regardless of the media or format in which they are stored, and all other rough drafts, revised drafts (including all handwritten notes or other marks on the same) and copies of documents as hereinbefore defined by whatever means made.

(11) For any document withheld on the basis of privilege, state the following: date; author; addressee; indicated or blind copies; all persons to whom distributed, shown, or explained; and, the nature and legal basis for the privilege asserted.

(12) In the event any document called for has been destroyed or transferred beyond the control of the company, state: the identity of the person by whom it was destroyed or transferred, and the person authorizing the destruction or transfer; the time, place, and method of destruction or transfer; and, the reason(s) for its destruction or transfer. If destroyed or disposed of by operation of a retention policy, state the retention policy.

(13) Provide written responses, together with any and all exhibits pertaining thereto, in one or more bound volumes, separately indexed and tabbed by each response, in compliance with Kentucky Public Service Commission Regulations.

(14) "And" and "or" should be considered to be both conjunctive and disjunctive, unless specifically stated otherwise.

(15) "Each" and "any" should be considered to be both singular and plural, unless specifically stated otherwise.

Respectfully submitted,

ANDY BESHEAR
ATTORNEY GENERAL

LAWRENCE W. COOK
JUSTIN M. McNEIL
KENT A. CHANDLER
REBECCA W. GOODMAN
ASSISTANT ATTORNEYS GENERAL
700 CAPITOL AVE., SUITE 20
FRANKFORT KY 40601
(502) 696-5453
FAX: (502) 573-8315
Rebecca.Goodman@ky.gov
Larry.Cook@ky.gov
Justin.McNeil@ky.gov
Kent.Chandler@ky.gov

Certificate of Service and Filing

Counsel certifies that the foregoing is a true and accurate copy of the same document being filed in paper medium with the Commission within two business days; that the electronic filing has been transmitted to the Commission on October 4, 2019; that there are currently no parties that the Commission has excused from participation by electronic means in this proceeding.

This 4th day of October, 2019.

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Assistant Attorney General

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1. Reference IRP vol. 1, p. 5-5, regarding the retirement of the Zorn 1 CT in 2021, ". . . as the anticipated cost to comply with impending gas pipeline regulations and maintain sufficient gas pressure to operate Zorn 1 is in the tens of millions of dollars. . ."
    a. Identify the "impending gas pipeline regulations" referenced in this paragraph.

    b. Will this regulation pose a cost issue for any of the Companies' other CTs and/or for CR7? Provide a discussion.

2. Reference IRP vol. 1, p. 5-5, Table 5-1. Explain whether the final line of the table, "Total Demand-Side Resources" is an accurate description of the figures it references.

3. Reference IRP vol. 1, p. 5-13, wherein the IRP states that all growth in distributed generation is forecasted to occur through net metering, and that net metering is forecasted to increase from 3 MW to 170 MW by the end of 2033, although the forecast is "particularly uncertain."

    a. Confirm that the modeling for net metering growth took into account the "favorable net metering policy" then-enacted that provided for a netting of usage against the retail rate.
    b. Update the modeling for net metering penetration as a result of the March 26, 2019 enactment of Senate Bill 100 in the 2019 Regular Session of the Kentucky General Assembly, which repealed in significant part, the "favorable net metering policy."
    c. Pursuant to the article at the link below,[1] confirm that on or about February 1, 2019 the Companies issued an RFP for between 10 MW – 200 MW of renewable energy by January 1, 2022, and the Companies are requesting that the source be located within Kentucky.

        i. Confirm that pursuant to the article, all evaluations of the RFP were expected to be complete by March 29, 2019. If so confirmed, provide the results of the evaluations.

    d. Explain whether the Companies' resource planning takes PURPA Qualifying Facilities into consideration, and if so, how.
    e. Explain why no distributed generation is anticipated to occur through increased industrial CHP, cogeneration, or through PURPA Qualifying Facilities.

[1] https://www.lanereport.com/110233/2019/02/lge-and-ku-issue-request-for-renewable-energy/

f. Reference the Companies last IRP, Case No. 2014-00131, the Staff Report at p. 42, citing the 2014 IRP filing, vol. 3 at p. 27, which states that the Companies do not purchase power from non-utility sources. Is this a policy decision of the Companies, or is it based solely on the cost of power from such sources?

(i) Have the Companies ever purchased power from a non-utility source? If so, provide details.

g. Confirm that in the Companies' last IRP, Case No. 2014-00131, the Staff Report at pp. 54-55 recommended that the Companies continue to discuss the existence, and promotion of any cogeneration and distributed generation in their systems, and the impact of such generation on their systems.
h. Provide a discussion of whether and how the Companies use CHP and/or cogeneration as an economic development tool in discussions with both new and existing industrial customers. If the Companies do not do so, explain why not.

4. Reference IRP vol. 1, p. 5-15, wherein the IRP states "A detailed evaluation (using production cost simulation models) of all demand-side and supply-side resource options is impractical due to the significant amount of time required for computer simulation."

a. Explain what length of time is referenced in the statement that leads to the Companies' believing the described process "is impractical."
b. Explain how the Companies determined the length of time provided in response to 4(a), above.

5. Reference IRP vol. 1, p. 5-18, paragraph 1. When calculating capacity costs for existing and new generation, explain why the Companies believe it is reasonable to include the revenue requirement associated with new generation that considers net book value, but ignore the revenue required associated with the net book value of existing resources.

6. Reference IRP vol. 1, p. 5-18, paragraph 1 and IRP vol. 3, p. 5, response to 10 (e)(i). Explain the apparent inconsistency of treating unrecovered capital costs of an existing resource as sunk when contemplating retirement and considering "Captial and fixed costs for existing units . . . in the resource planning analysis."

7. Reference IRP vol. 1, p. 5-19, the heading "Long-Term Resource Planning Analysis – Models and Methods." Explain the role that hedges, both physical and financial, play in this analysis.

8. Reference IRP vol. 1, p. 5-20. Explain whether the Companies have received any degree of certainty regarding the Affordable Clean Energy Rule, and if so, to what degree?

9. Reference IRP vol. 1, p. 5-20, the heading "Generating Unit Operating Life." Provide a discussion of the various factors that could become relevant in whether the Companies utilize a 55-year, or 65-year generating unit operating life.

    a. Have the companies always planned on a 65-year generating unit operating life? If not, provide the operating life traditionally relied upon.
    b. Provide the operating lives utilized in setting depreciation rates for the Companies' generation units, by unit.
    c. Explain why the Companies have deemed it reasonable to assume only two operating life scenarios, 55 and 65 years, instead of relying on performance and on-going costs of each unit in resource planning?

10. Reference IRP vol. 1, Table 5-4 at p. 5-21. Confirm that if the Companies decide to utilize the 55-year generating unit operating life, by the time the Companies file their next IRP the Companies likely will need to decide whether to acquire at least some new supply side resource(s).

11. Reference IRP vol. 1, p. 5-22, wherein the IRP concludes that "solar generation has virtually no value in the Companies' service territories as a source of winter capacity."

    a. Explain why it is reasonable to impart value to capacity only if it is expected to be available during the seasonal peak.
    b. Should the Commission take the Companies' conclusion as an indication that LG&E/KU's resource planning accounts only for system peaks, and does not take into account an intention to serve load every hour of the year at the lowest reasonable cost?

12. Reference IRP vol. 1, p. 5-24, footnote 17. Provide a copy of the 2016 Synapse Energy Economic Forecast referenced, as the link provided is no long accessible.

13. Explain whether the Companies' IRP analyses included an examination of the economic feasibility of the early retirement(s) of one or more coal-fired units and replacement with either gas-firing of existing plants, renewable resources or a combination of both. For example, Northern Indiana Public Service Co. on October 31, 2018 filed its IRP [2] which

[2] The actual IRP filing is accessible at the following link:
https://www.nipsco.com/docs/librariesprovider11/rates-and-tariffs/irp/2018-nipsco-irp.pdf?sfvrsn=15
and an executive summary of the IRP filing can be accessed at the following link:
https://www.nipsco.com/docs/librariesprovider11/rates-and-tariffs/irp/irp-executive-summary.pdf?sfvrsn=9

has concluded that in certain scenarios, early retirement of its coal units could save ratepayers more than $4 billion over 30 years. Include in your analysis the availability of investment tax credits and renewable energy certificates, if any.

14. Provide a discussion regarding the extent to which the Companies have examined the potential for both: (i) building and owning their own renewable generation sources within their service territories; and/or (ii) entering into PPAs for renewable generation from sources located within or outside their service territories. With regard to resources outside their territories, explain how congestion or the risk of congestion could affect the cost and benefits in determining resource decisions.

    a. Reference IRP vol. 3, "2018 IRP Reserve Margin Analysis," § 4.4 regarding Available Transmission Capacity ("ATC"), which determines the amount of power that can be imported from neighboring regions. Confirm that based on the summer months of 2016-2017, and the winter months of 2017-2018, the Companies' ATC is zero 45% of the time.
        (i) Confirm that during peak hours, ATC is assumed to be approximately 500 MW for 66% of the time.
        (ii) Provide any estimates of ATC availability for the next three (3) calendar years.
        (iii) Provide cost estimates for the transmission system upgrades that would be necessary to increase the Companies' ATC by the following amounts: (1) 100 MW; (2) 250 MW; and (3) 500 MW for year 2021.
        (iv) Explain whether any of the findings and conclusions of the 2018 IRP Reserve Margin Analysis pertaining to ATC would change in any manner if the Companies were to join an RTO. Provide a detailed discussion.
    b. Have the Companies, or any entity acting on their behalf, conducted any studies or analyses of the cost impact of congestion with regard to entering into any external PPAs for renewable energy or other resources? If so, provide copies of all such studies.
    c. With regard to the cost-effectiveness of continuing to use existing coal-fired generation assets as opposed to switching to renewable sources of generation, state whether the IRP modeling examines both a coal plant's marginal cost of energy, and a renewable source's lower, levelized, cost of energy.

15. For purposes of comparing noncombustible renewable energy generation to fossil fuel generation sources, and costs attendant with both forms of generation, explain whether

the Companies' modelling compares energy consumption based on the fossil fuel equivalence approach, or the captured energy approach as discussed in more detail in the EIA publication accessible at the below-referenced link.[3]

16. Reference the Companies' prior IRP docket, Case No. 2014-00131, the Companies' response to Sierra Club 2.3. In that response, the Companies stated that fixed O&M and capital costs are not: (i) factored into the calculation of revenue requirements for any of the scenarios modeled as part of the IRP; (ii) impacted by the scenarios evaluated; therefore, they were not considered in the analysis; and (iii) considered when assessing whether to retire existing units.

    a. For each of (i) – (iii), above, explain whether this remains the same for the instant IRP filing, and if so, explain fully why.
    b. Given that environmental compliance requires significant sums of capital costs, and both fixed and variable O&M, explain whether the failure to take fixed O&M and capital costs into consideration is consistent with the Commission's requirement to take into consideration the impact of existing and future environmental regulations, as set forth in question no. 9, above.
    c. Reference the Companies' Reply Comments to the Sierra Club in that same case, p. 5, in which they state that with regard to Sierra Club's criticisms of the Companies' analysis of capital and fixed operating and maintenance ("O&M") costs of existing units and the retirement of existing units, they "... will consider performing alternative analyses for possible unit retirements in future IRP scenario modeling." Explain whether such alternative analyses were employed in the instant IRP, and if so: (i) identify them and where they are located in the filing; (ii) explain whether they were used as inputs in the Strategist modelling; and (iii) explain whether they were used in calculating total revenue requirements.
    d. Reference Case No. 2014-00131, the Staff Report at p. 49, quoting the Companies' response to the Sierra Club's comments, item no. 2, wherein the Companies stated they ".... will consider performing alternative analyses for possible unit retirements in future IRP scenario modeling; indeed, the Companies already perform rigorous, time-consuming analyses of the kind suggested." Identify where the current IRP filing takes such alternative analyses into consideration.
    e. Do the Companies now agree with the Sierra Club that the failure to consider the economic impact of capital and fixed O&M costs biases the modeling results in favor of retaining existing units? Provide a discussion.

[3] https://www.pressreleasepoint.com/eia-offers-two-approaches-compare-renewable-electricity-generation-other-sources

17. Reference IRP vol. 1, p. 5-28, wherein the IRP discusses "Cost of Service," and notes that "Electricity prices are anticipated to increase at a planned rate over the first five years of the forecast period."

    a. Explain the support for the assumption regarding the planned rate of increasing electricity prices over the first five years of the forecast period.
    b. Provide the rate of increase over the referenced five-year period.
    c. Explain why two percent is the most-reasonable inflation rate for electricity prices.

18. Reference IRP vol. 1, p. 5-28, wherein the IRP notes, "All growth in distributed generation through 2033 is forecasted to occur through net metering."

    a. Explain why the Companies do not forecast any generation additions over the next 15 years from qualifying facilities.
    b. Explain whether the Companies have sought or received waivers from the obligations imposed by 18 C.F.R. § 292.303.

19. Reference IRP vol. 1, p. 5-35 & 5-36, and Table 5-13. Based on the Companies' actual experience, provide the observed summer capacity in MWs for the Demand Conservation Program in 2019. Explain the variation between the observed actual MW capacity of the program in 2019, compared to the forecasted amount of 96.

20. Explain how the Companies' IRP modeling takes into consideration the continuing costs of complying with state and federal environmental regulations for coal-fired generating plants, including but not limited to ash storage and ash pond remediation/reclamation.

    a. Provide any year-over-year inflation factors and discount rates used in estimating costs for environmental compliance with regard to coal-fired generation, including ash storage and ash pond remediation/reclamation.
    b. Provide a discussion of how the year-over-year inflation factors and discount rates for environmental compliance with regard to coal-fired generation, including ash storage and ash pond remediation/reclamation are taken into consideration in considering the costs and benefits of continued operation of coal-fired plants, as opposed to obtaining other power sources.

21. Produce the most recent estimate that the Companies have prepared or caused to be prepared of the capital and O&M costs to comply with the following regulations:

a. Mercury and Air Toxics Standards;
b. Coal Combustion Residuals rule;
c. Effluent Limitations Guidelines;
d. 316(b) cooling water intake rule;
e. NAAQS, including any new ozone standard, including any standards still in the draft stages or which are still open to pubic comment;
f. Cross State Air Pollution Rule;
g. Carbon regulations, including the Clean Power Plan and the Affordable Clean Energy Plan;
h. Any applicable state environmental regulations; and
i. Pending enforcement actions by citizen groups or regulatory agencies of any state and/or federal environmental requirements.

22. Provide the most recent attainment status of Jefferson, Oldham, Trimble and Fayette counties with the EPA's ozone NAAQS. Provide a discussion of the impacts and ramifications of each county's attainment status.

23. State whether the IRP modelling takes into consideration estimates for gas transportation, and if so, whether estimates are prepared for both firm and interruptible transportation.

24. In any IRP scenario in which one or more supply side resources may be indicated, state whether any of the Companies' analyses have included pumped water storage.

    a. Discuss whether constructing an open-loop pumped storage facility in proximity with either or both of the Companies' hydropower facilities at the Ohio River Falls, and/or the Dix Dam would be economically feasible under any scenario.
    b. If not, then explain whether the companies have conducted any due diligence with regard to a closed-loop water facility.
    c. Explain to what extent the physical height of the upper pool is relevant with regard to the amount of power that can be generated.

25. Provide the capacity factors (both summer and winter) and dispatch rates for the Companies' hydropower resources for each of the past three (3) years.

26. Reference Figure 5-17 at p. 5-31. State whether the electric vehicle ("EV") charging patterns are based on so-called "DC fast charge" facilities, slower charging facilities or a combination of both.

a. In the event the adoption of EVs throughout the service territory should lead to increased load, have the companies performed any analyses, studies or modeling regarding whether the use of batteries, and/or additional peak generation would be more cost effective?
b. If the Companies' response to subpart a., above is "yes," state whether this in any way changes the Companies' response to question no. 14, above, and if so, explain in complete detail.
c. Provide copies of any analyses, studies or modeling regarding the cost effectiveness of batteries as opposed to both small-frame SCCTs and large-frame SCCTs.

27. Reference IRP vol. 1, p. 5-37, footnote 31, wherein the IRP notes "The increase [in the upper end of the target reserve margin] from 21 percent to 25 percent is driven primarily by an increase in the assumed variability of winter peak demands."

a. Explain, in detail, the studies the Companies have conducted, or plan to conduct, regarding programs (DSM, DCP, etc.) to narrow the variability of winter peak demands. Any discussion should include whether the Companies have discovered any cost-effective programs to reduce the variability, thus allowing customers to pay less to maintain reliability at a much-less bloated reserve margin.

28. Regarding the level of EV penetration, explain whether the Companies have considered utilizing blockchain technology and apps[4] to enhance the ability of customers who procure charging devices and technology of their own to rent-out their private stations to other EV owners/users.

a. Do the Companies believe that the potential for owners of EV recharging facilities to use the rent proceeds to pay the costs for the charging facilities, will enhance the level of EV penetration in the Companies' service territories?

29. Reference IRP vol. 3, "2018 IRP Reserve Margin Analysis," Final Recommendation at p. 26, which concludes that if the Companies' load increases by 300 to 400 MW, "the reliability and production cost benefits from adding new SCCT capacity would more than offset the cost of the capacity." Should the need to procure one or more peaking units arise at any point in the future, as a potential alterative thereto, have the Companies explored the potentials for one or more of the following:

[4] *See, e.g.*, https://emotorwerks.com/about/enewsso/latest-news/353-blockchain-enabled-electric-car-charging-comes-to-california

a. batteries;
b. CHP; and/or
c. energy performance contracts (EPCs) to obtain additional reductions in energy consumption for schools, hospitals and office buildings, which can be supplemented with blockchain technology to perform the complex bookkeeping associated with EPCs?

30. Demonstrate where in the IRP filing the Companies addressed affordability of electricity rates, and if so, how.

    a. Explain whether the Companies are aware that a growing number of its large industrial customers are concerned that rates are becoming unaffordable. See, for example, comments from the Kentucky Auto Industry Association referenced in the article accessible at the below link.[5]

31. Reference IRP vol. 1, p. 6-3, the heading "Loss of Large Customers." In this heading the Companies state that at the time of the 2014 IRP, "a number" of large customers closed, resulting in a loss of annual load of 555 GWh. Provide the number of customers lost, their individual annual load for the last three complete years of operation, and state whether the Companies are aware if any of these customers left the system due to increasing electric rates. Provide also any studies the Companies, or any consultants acting on their behalf, may have prepared regarding elasticities of demand pertaining to each Company's "all-in" rates.

32. Reference IRP vol. 1, p. 6-2 & 6-3. Explain whether the 215 GWh of western Kentucky coal load is included in the 555 GWh of load lost due to "A number of the Companies' large customers" closing.

33. Discuss how the IRP takes into consideration projections that most of the Commonwealth's population growth through 2025 will occur in the Lexington and Louisville metropolitan areas.[6]

    a. Can the Companies confirm that the decreased energy usage depicted throughout this IRP, as exemplified at Table 5-11, is not due to any potential population decrease in their service territories?

[5] https://www.utilitydive.com/news/new-campaign-will-ask-coal-users-to-face-the-cold-hard-economic-case-agai/539613/

[6] See, e.g., "Kentucky Demographics: Present and Future," Kentucky State Data Center, University of Louisville Dept. of Urban and Public Affairs, in particular p. 25, accessible at: http://www.ksdc.louisville.edu/wp-content/uploads/2015/08/kysu.pdf

b. Do the Companies believe there is a correlation between the urbanization movement in their service territories, as discussed on p. 6-7, and efficiency gains for the residential and commercial classes, as discussed on p. 6-4?

34. Reference IRP vol. 1, p. 5-37. Confirm that the Companies are targeting a reserve margin range of 17% - 25% for resource planning.

a. Reference NERC's M-1 Planning Reserve Margin, accessible at the link below.[7] Confirm that the SERC-North 2018 reference margin is 18%, the 2022 Anticipated Reserve Margin is 19.20%, and the 2022 Reference Margin level is 15%.

35. Reference IRP vol. 3, "2018 IRP Reserve Margin Analysis," p. 10. Confirm the following target reserve margins in surrounding RTOs: (i) MISO, at 17.1%; (ii) PJM at 15.8%; and (iii) TVA at 15%.

36. State whether the Companies continue to set the value of their avoided cost of capacity at zero.

37. Reference IRP vol. 1, p. 6-8, "Increasing Electric Heating Penetration."

a. Is the increasing penetration of electric heating for electric utilities that also have their own LDC operation part of a national trend, or is this true only for LG&E? Provide a discussion and any pertinent data.
b. Provide the average residential bills for the months of November through March for both LG&E (both electric and gas) and KU, for the past three calendar years. If the Companies can break out the portion of the electric bill used for heating purposes, provide that information separately.
c. Does LG&E provide public service messages promoting the cost-effectiveness of gas heating? If so, provide copies of examples.

38. Reference IRP vol. 1, Tables 6-11 & 8-1. Explain what depreciable lives were used for each of the "Existing Capabilities" in the table.

39. Reference IRP vol. 1, p. 7-2 & 7-3, Tables 7-3 & 7-4. Explain the lines "System Billed Sales," "System Used Sales" and "Energy Requirements." Any explanation should indicate in which category technical and non-technical losses are, and are not, reflected.

[7] https://www.nerc.com/pa/RAPA/ri/Pages/PlanningReserveMargin.aspx

40. Reference IRP vol. 1, p. 5-7, which states, *inter alia*, "Energy requirements are the sum of electricity sales and transmission and distribution losses."

    a. Provide a table depicting the Companies' transmission and distribution energy losses for each of the past four (4) years. To what extent, if any, has the Companies' increased capital spending for transmission and distribution modernization over the past several years reduced such losses? Describe in detail.

41. Reference IRP vol. 1, p. 7-1 through 7-7. Update the Tables with observed information for 2018, and if available, annualized amounts for 2019.

42. Reference IRP vol. 1, p. 8-2, "Efficiency Improvements." Explain how the new Affordable Clean Energy Rule and its determination of best system of emission reduction affects the Companies' plans to conduct improvements to generation efficiencies.

43. Reference IRP vol. 1, p. 8-5. Explain the meaning of the sentence, "The Companies plan to continue to design for near unity power factor at the substation bus where capacitor installations on the distribution system are reasonable and feasible."

44. Reference IRP vol. 1, p. 8-8, Table 8-3.

    a. Explain how the Companies determined the anticipated capacity factor for each unit in each year provided.
    b. If available, for each generating unit that is expected to operate at a capacity factor of 5% or less for any year between 2018 and 2033, provide the following:
        i. The number of days each unit is anticipated to operate each year, 2018 through 2033.
        ii. The number of hours each unit is anticipated to operate each year, 2018 through 2033.
        iii. For each unit that is anticipated to operate at least one (1) hour each time it is dispatched, provide the anticipated run time for each dispatch over one (1) hour.

45. Reference IRP vol. 1, p. 8-12, Table 8-7. Provide the costs for the Solar Share that were previously redacted since the bids have been analyzed and a contractor ultimately chosen.

46. Reference IRP vol. 1, p. 8-12, Table 8-8.

    a. Provide a breakdown of the "Variable and Fixed O&M Costs," between fixed and variables costs.

b. Based on the costs provided as "variable" in response to 47 (a), above, provide a further breakdown of the variable expenses between expenses related to items that vary with usage, like fuel, and costs that vary with the number of starts, such as long-term inspection and overhaul expenses.
c. Provide the calculations for costs categories for "Average Variable Production Costs."

47. Reference IRP vol. 1, p. 8-13, Table 8-9.

a. Explain the calculation and determination of "Off-System Sales" for the years 2018 through 2033.
b. Explain whether the off-system sales amounts for 2018 and 2019 are correct, or are expected to be accurate.

48. Reference IRP vol. 1, p. 8-28, "Electric Transportation." Explain whether the Companies have commissioned or completed any studies relating to the electrification of mass transit, such as city buses.

49. Reference IRP filing vol. 2, the "Electric Sales & Demand Forecast Process."

a. Identify any and all outside consultants/contractors who assisted in the preparation of this report, and the gathering, processing and analysis of data upon which the report is based.

b. State whether the consultants/contractors identified in response to this question have utilized the same data and/or report for other utilities, either inside or outside of the Commonwealth, in other IRP filings. If so, identify the jurisdictions and provide docket numbers.

50. According to the articles at the link below,[8] several major insurance companies have issued new directives stating they will cease: (i) issuing new insurance policies to companies that derive more than 30% of their revenues from thermal coal mining; and (ii) making new investments in companies that have a large exposure to thermal coal mining or coal-based energy production. According to the second article ("Energy Transition Prompts More Insurers to Back Away From Coal"), insurance policy premiums and the cost of capital will increase for utilities having significant coal-fired generation resources.

[8] https://www.latimes.com/business/la-fi-chubb-bans-coal-coverage-20190701-story.html ; https://www.axios.com/energy-transition-prompts-more-insurers-back-away-from-coal-1e85a50f-ef35-4ce7-b57b-0bec745a376e.html

a. Provide a discussion of whether these new directives on behalf of major insurance companies will have any effect on the Companies, their production facilities, and fuel sources, and if so, how.
b. State whether these new directives have entered into the Companies' planning and decision making regarding the instant IRP. If not, state whether they will or may enter into the Companies' planning and decision making regarding future IRP filings.

51. Explain whether the Companies' IRP modelling takes into consideration the escalating number of coal mining company bankruptcy filings. If not, why not?

a. If the modeling does not take this factor into consideration, explain what would have to be done to do so.
b. If the Companies believe the increasing incidence of coal mining company bankruptcies is of little or no concern, explain fully why not.
c. Provide the most current forecast of KU's sales to the mining industry in both Kentucky and Virginia.
d. For the regions served by the Companies, provide any coal price estimates for the next ten (10) years the Companies may have conducted.
e. Are the Companies aware of any Moody's Investors Service analyses regarding the stability of coal mining companies over the next one (1) to five (5) years? If so, provide copies.

52. Explain whether any of the Companies' generating and/or transmission facilities are required to meet any North American Electric Reliability Corporation (NERC) Critical Infrastructure Protection standards. If so:

a. explain whether the Companies' generating facilities have been designated as low, medium or high impact;
b. provide the costs of meeting such standards (both initial and on-going costs), and how they are calculated into the overall costs of these facilities; and
c. explain whether those costs are significant enough for them to be taken into consideration in the IRP modeling, and if so, how.

53. Provide an update on the status of the Companies' Joint Application with the FERC [9] to remove the merger mitigation de-pancaking component of their Rate Schedule No. 402.

[9] FERC Docket Nos. EC98-2-00 and ER 18-2162-000.

54. Reference IRP sections pertaining to load forecast. Explain whether the Companies' load forecasts took into consideration the projected 15-year compound annual growth rate in peak demands developed by both MISO and PJM for: (i) their respective zones located closest to the Companies' service territories; and (ii) for the entire footprint of both RTOs.

55. Provide the projected peak load forecast for each company, by year, from the Companies' last IRP filing. Provide also the actual peak load for each of the last three (3) years for both companies.

56. Provide copies of any presentations the Companies and/or their parent companies may have made to investors regarding their plans for capital investments in the next five (5) years.

    a. Provide the IRP's high and low cost scenarios for investment plans over the same time period.

57. Provide the most-current remaining life assessment for Brown unit no. 3.

58. Provide the following historical annual data by unit, from 2010 to present:

    a. Fixed O&M cost;
    b. Variable O&M cost (without fuel)
    c. Fuel costs;
    d. Capital costs
    e. Capacity factor; and
    f. Generation in kWh.

59. State whether the Companies are still utilizing an Independent Transmission Operator, and if so, identify the entity performing this function.

60. Provide the following for each year since the Companies' last IRP filing, for both the transmission and distribution systems: SAIDI, SAIFI, CAIDI, and outages per hundred line miles per year (OHMY).

61. Explain whether the Companies continue to participate in the reserve sharing agreement with TVA. If so, provide an explanation of this agreement, including the annual cost of compliance and/or other expenses related to the agreement.

62. Reference the Companies' prior IRP filing, Case No. 2014-00131, the Companies' response to Sierra Club 2.4, in which the Companies stated, "A capacity value for the

Companies' existing units was not estimated or necessary for this analysis." Explain whether this remains the case in the instant IRP filing, and if so, why.

a. Have the Companies provided a capacity value in other cases since the conclusion of Case No. 2014-00131? If so, identify the docket(s) and the precise documents in which the capacity value was presented.

63. Reference the Companies' prior IRP filing, Case No. 2014-00131, the Companies' response to Sierra Club 2.5, in which the Companies stated that Brown unit no. 3 was designated as must-run in all hours for all years. State whether Brown 3's status has changed in the instant IRP filing, and if so, why. If not, why not?

a. For all hours Brown unit no. 3 was dispatched in the last three (3) years, indicate how often the dispatch was on an economic basis.

64. Based on the referenced "High CO_2 scenario," provide the projected capacity factors for each coal and gas-fired unit in the Companies' current fleet between 2020 and 2033.

65. Explain whether the IRP models scenarios for utilizing solar facilities pursuant to PPAs, and if so, how and where?

66. Based on the IRP modeling, describe under what scenarios, assumptions and constraints that the addition of any additional supply-side resources might become necessary.

67. Reference the Companies' 2014-00131 IRP filing in general. Confirm that based on the Companies' assumptions and constraints, many optimal plans added additional supply-side resources in the form of a natural gas combined cycle or combustion turbine. Explain what changes have occurred between the conclusion of that case and the filing of the instant IRP to alter those conclusions.

68. Provide the Companies' off-system sales for each of the past three (3) years.

69. Provide the Companies' current order of economic dispatch.

70. Reference the Staff Report in Case No. 2014-00131, pp. 13-14, wherein Staff noted that in order to evaluate GHG regulation, the Companies developed two approaches: establishing a price per ton of CO_2 and establishing a cap on CO_2 mass emissions. Under the first approach, "mid" and "zero" price scenarios were considered, while under the second approach, the Companies' emissions were capped at 29.4 million tons of CO_2 annually. Explain whether in the instant IRP filing, the Companies evaluated the potential

for revised GHG regulation based on similar "mid" and "zero" price scenarios. If not, why not?

71. Explain whether the current IRP filing utilizes "low," "mid," and "high" natural gas price scenarios from EIA, as the last IRP filing did.

72. Reference the Staff Report in Case No. 2014-00131, p. 36, wherein Staff states: "The viability of the plants in its fleet hinges equally on the possibility of more stringent future environmental regulations, as opposed to significant mechanical failure, causing premature plant retirement." Do the Companies believe this statement remains true? If not, explain why not.

73. Reference the Staff Report in Case No. 2014-00131, pp. 36-37, wherein Staff references the Bluegrass Unit no. 3 tolling agreement that allowed the Companies to use 165 MW of firm generation capacity and output from that unit up through April 30, 2019. Now that the tolling agreement has ended, describe the impact on the Companies' supply side resources, including any higher dispatch rates for other units, or any additional off-system power purchases.

74. Discuss to what extent, if any, the Companies utilized Strategist to evaluate DSM alternatives.

75. Provide the amount of energy savings attributable to the Companies' AMS programs.

76. In Case No. 2017-00441, the Companies stated that at that time, they were engaged in an "on-going" analysis of whether it would be cost effective to join a regional transmission organization (RTO).[10] Provide the most recent such study, or if it is already provided in the record of another case, provide a citation to that case, and its precise location in the record of that case.

    a. Provide the level of the Companies' sales into and purchases from PJM, TVA and MISO for each of the past four (4) years.
    b. Explain to what degree congestion cost within an RTO contributes to any decisions regarding the cost effectiveness of joining an RTO. Explain also if the Companies are aware of PJM's near record low total congestion costs for 2019, at $254 million (footprint-wide).

[10] Case No. 2017-00441, Companies' response to AG 2-6.

77. State whether the Companies have filed any more recent DSM/EE potential studies since the 2014 Cadmus EE Potential Study filed in Case No. 2014-00003. If so, provide a copy in the record of the instant case.

    a. Provide the level of actual DSM savings achieved by the end of 2018, as well as the level of savings the 2014 Cadmus study had projected by 2018.
    b. Provide the level of DSM-EE programming customers actually consumed through 2018, as well as the projected "achievable potential" of DSM-EE programming projected in the 2014 Cadmus study through 2018.
    c. If any additional or different EM&V methodologies or analyses were conducted regarding the Companies' DSM/EE portfolio since the time of the least IRP or the 2014 Cadmus study, provide the results of both actual dollar and energy savings.

78. If not already provided in the instant IRP, provide the results of the Cadmus industrial DSM/EE potential study. If those results are already provided in the record of another case, provide a citation to that case, and its precise location in the record of that case.

79. Reference IRP vol. 3, "2018 IRP Reserve Margin Analysis," p. 7, Figure 3. The figure indicates it is illustrative only. Provide the chart evidencing the Companies' actual Economic Reserve Margin of 23.5%, based on Capacity Costs and Reliability and Production Cost, for 2021.

80. Reference IRP vol. 3, "2018 IRP Reserve Margin Analysis," p.11.

    a. Explain to what degree the Companies took into account the forced outage rate of each resource.
    b. Do the Companies use the ICAP or UCAP value of capacity (in MWs) in resource planning?

81. Reference IRP vol. 3, "2018 IRP Reserve Margin Analysis," p. 10.

    a. Based on actual experiences, explain why it is reasonable to assume neighboring regions are "at their target levels," particularly PJM, where the reserve margin has consistently been well in excess of target levels.
    b. Explain what impact using observed reserve margins of neighboring utilities as a proxy moving forward as compared to target reserve margins in the Companies' planning.

82. Reference IRP vol. 3, "2018 IRP Reserve Margin Analysis," p. 13. Explain what the sentence "The Companies' import capability is assumed to be negatively correlated with load" means.

83. Reference IRP vol. 3, "2018 IRP Reserve Margin Analysis," p. 23, in which the Companies state that beginning in 2019, they will begin operating the Demand Conservation Programs (DCP) in maintenance mode, and that under several modelling scenarios, the DCP could be retired.

    a. Are the Companies able to bid the DCP into any wholesale markets? Explain. If the Companies are so able but have not done so, explain why not.
    b. Explain whether any retirement of the DCP could include curtailable load. Are the Companies able to bid curtailable load into any wholesale markets? Explain. If the Companies are so able but have not done so, explain why not.
    c. Explain whether any of the Companies' future modelling takes into consideration any aspects of load flexibility, as discussed in more detail in a recent Brattle Group study entitled, "The National Potential for Load Flexibility: Value and Market Potential Through 2030," a summary of which is accessible at the below link.[11] If so, discuss any options that load flexibility could bring to reduce the Companies' all-in costs. Include also a discussion of whether adoption of any elements of load flexibility could yield the type of demand response that could be bid into a wholesale market(s).

84. Reference IRP vol. 1, Table 5-3. Identify any counties in the KU service territories which are projected to lose population, and provide the projected losses.

85. Reference IRP vol. 3, "2018 IRP Reserve Margin Analysis," p. 23. Identify the three coal units which have not been retrofitted with SCRs, together with their respective power output ratings.

86. Reference IRP vol. 3, "2018 IRP Long-Term Resource Planning Analysis," p. 8, paragraph 3.2, wherein it is stated that because three of the Companies' coal units have not retrofitted with SCR, future changes to the NAAQS may require one or more of the following compliance actions within the next 3-7 years: (i) additional NO_X emissions investments; (ii) changes in plant operations in ozone season; or (iii) unit retirements and acquisition of new generation.

[11] https://www.brattle.com/news-and-knowledge/publications/the-national-potential-for-load-flexibility-value-and-market-potential-through-2030

a. Describe the nature of the NO_X investments, and provide an estimate or projection of potential costs associated therewith.
b. Describe the measures the Companies would have to take to deal with any potential changes in plant operations during the ozone season, for example, what costs could be associated with obtaining replacement power.
c. Explain whether the Companies have any modelling or projections depicting a rank-order of the unit(s) that are most likely to have to be replaced under the scenario in (iii), above.
d. Explain whether retrofitting one or more of these three units to natural-gas firing would be cost-effective, given their remaining life span. If so, have the Companies modelled such a possibility? Explain.
e. If any of the three units have to be retired prematurely, state whether any emissions allowances can be credited to other units.
f. Explain what effect(s), if any, the following rulings from the U.S. Court of Appeals for District of Columbia Circuit will or could have on the Companies' decisions in this regard. Explain if the ruling(s) will or could trigger one or more of the three compliance actions the Companies identified, and if so, which option(s):
    (i) the August 23, 2019 ruling in *Murray Energy Corp. v. Environmental Protection Agency, et al.*,[12] which upheld most of the EPA's 2015 thresholds for ground-level ozone and which set 70 parts per billion as the highest acceptable ozone level; and
    (ii) the September 13, 2019 ruling in *Wisconsin v. EPA*,[13] which will require EPA to revise portions of the Cross-State Air Pollution Rule (CSAPR) to add deadlines for upwind states such as Kentucky to reduce NO_x emissions so that downwind states can satisfy federal ozone standards.
g. If one or more of the three units have to be replaced, explain what effect this will or may have on the remaining lives of the remainder of the Companies' coal-fired fleet, i.e., with regard to the issue of the 55-year life span vs. the 65-year life span.
    (i) If two or three of these units have to be retired, would those retirements make it more likely that the life span of the remaining coal units will be 55 years?

87. Reference IRP vol. 3, "2018 IRP Long-Term Resource Planning Analysis," p. 22, near-term replacement analysis. Here, the Companies evaluated replacing Brown 3 with 500 MW of solar generation coupled with 400 MW of battery storage.

[12] Case No. 15-1385.
[13] Case No. 16-1406.

a. State whether under this particular analysis, the battery storage would be utilized for peak load, or to augment or replace solar generation on a real-time basis due to the inherent intermittency of solar generation (e.g., cloudy weather, drop-off following sundown).
b. In any scenario / analysis in which solar generation was considered as a resource, did the Companies also consider an alternative power source (e.g., gas, or wind) as a back-up due to the intermittency of solar generation?

88. Reference IRP vol. 3, "2018 IRP Long-Term Resource Planning Analysis," p. 3, Executive Summary, wherein it is stated, ". . . the Companies evaluated whether – in the near-term – existing resources should be replaced with a combination of battery storage and renewables. Several of the cases required significant amounts of replacement capacity in the latter part of the 15-year planning period."

    a. Explain whether this means that analyses involving battery storage and renewables are more likely to be deployed under a 65-year life scenario, or the 55-year scenario.

89. Reference IRP vol. 3, "2018 IRP Long-Term Resource Planning Analysis," p. 4, wherein it is stated that in both the 55-year and 65-year life scenarios, natural gas combined cycle (NGCC) capacity consistently appears as the least-cost source of replacement capacity in the longer-term, even under high gas and high CO_2 scenarios.

    a. Are there any situations in which a high CO_2 scenario would indicate a NGCC would not be the least-cost resource?
    b. What is the second-least cost resource in both the 55-year and 65-year life span scenarios, under alternatively a high gas cost, or high CO_2 cost scenario?

90. Reference IRP vol. 3, "2018 IRP Reserve Margin Analysis," p. 17, Table 9. Are the "Stay-Open Cost" inclusive of capital costs necessary to comply with environmental rules?

91. Reference IRP vol. 3, "2018 IRP Reserve Margin Analysis," p. 20, wherein the IRP provides an operating reserve demand curve. Explain the basis for the shape of the curve, including providing the "market purchase data" used to determine the remainder of the curve not charted by the spinning reserve requirement and the mean value of unserved energy. Any response should indicate whether the tail of the curve ever meets zero, or merely approaches it. If the tail of the demand curve meets zero, provide the Reserve Capacity in Excess of Hourly Load at which it does so.

92. Reference IRP vol. 3, "2018 IRP Reserve Margin Analysis," p. 21 & 22. Explain how the Companies determined an LOLE of five (5) to be the screen to measure reliability viability for the analyses.

93. Reference IRP vol. 3, "2018 IRP Reserve Margin Analysis," p. 22. Explain what the amounts included in column A, "Capacity Cost" in Tables 13 and 14 represent. For instance, do the deltas between the "existing" capacity cost and other scenarios represent the increment (or decrement) cost to customers for each choice as modeled?

94. Reference IRP vol. 3, "2018 IRP Long-Term Resource Planning Analysis," p. 4, wherein it is stated that wind generation is optimal only under the 65-year life scenario with the following additional scenarios: high energy requirement, high gas and CO_2 prices. Explain whether this modelling took into consideration the transmission capacity necessary to import wind generation, and any potential additional costs associated therewith.

95. In all modelling and analyses in which solar and wind generation were considered, explain whether applicable Tax Credits were included or excluded in analyzing energy production costs.

96. In all modelling and analyses in which wind generation were considered, explain whether cost analyses took into consideration the fact that, according to the U.S. Department of Energy's 2018 Wind Technologies Market Report,[14] prices for wind generation in long-term contracts are at an all-time low.

97. Confirm that Trimble 2 has load-following capability. Explain whether this unit is more appropriately classified as base load, or intermediate.

98. Reference IRP vol. 3, "2018 IRP Long-Term Resource Planning Analysis," p. 20, Table 11, Key Financial Inputs. Explain whether using the Companies' most-recently approved Return on Equity and cost of debt would trigger any significant changes or conclusions in the current IRP.

[14] https://emp.lbl.gov/wind-technologies-market-report