

COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

ELECTRONIC 2021 INTEGRATED)	CASE NO.
RESOURCE PLAN OF DUKE ENERGY)	2021-00245
KENTUCKY, INC.)	

COMMISSION STAFF'S FIRST REQUEST FOR INFORMATION
TO DUKE ENERGY KENTUCKY, INC.

Duke Energy Kentucky, Inc. (Duke Kentucky), pursuant to 807 KAR 5:001, is to file with the Commission an electronic version of the following information. The information requested is due on October 21, 2021. The Commission directs Duke Kentucky to the Commission's July 22, 2021 Order in Case No. 2020-00085¹ regarding filings with the Commission. 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.

¹ Case No. 2020-00085, *Electronic Emergency Docket Related to the Novel Coronavirus COVID-19* (Ky. PSC July 22, 2021), Order (in which the Commission ordered that for case filings made on and after March 16, 2020, filers are NOT required to file the original physical copies of the filings required by 807 KAR 5:001, Section 8).

Duke Kentucky shall make timely amendment to any prior response if Duke Kentucky obtains information that indicates the response was incorrect when made or, though correct when made, is now incorrect in any material respect. For any request to which Duke Kentucky fails or refuses to furnish all or part of the requested information, Duke Kentucky shall provide a written explanation of the specific grounds for its 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, Duke Kentucky shall, in accordance with 807 KAR 5:001, Section 4(10), encrypt or redact the paper so that personal information cannot be read.

1. Refer to the Integrated Resource Plan (IRP), Section 1, page 5. Duke Kentucky states that it must anticipate the potential for changes in environmental policy. Explain whether the modeling used for this IRP includes Duke Energy's environmental initiatives. If so, explain how the initiatives were factored into the modeling.

2. Refer to the IRP, Section 1, page 6, Figure 1.4. Explain the drivers of the negative one percent rate impact predicted for 2022 under the 2021 IRP portfolio.

3. Refer to the IRP, Section 1, pages 7–8. Explain which project Duke Kentucky is developing that will add value to the system and community.

4. Refer to the IRP, Section 1, page 8. Discuss the PJM zone separation history.

5. Refer to the IRP, Section 2B, page 9.
 - a. Explain whether Duke Kentucky's current PJM reserve margin is 8.7 percent (UCAP). If not, provide Duke Kentucky's current reserve margin requirement, and explain the rationale for setting an 8.7 percent minimum reserve margin for this IRP's modeling.
 - b. Explain how increasing levels of renewable penetration throughout the PJM region might affect future reserve margin requirements.
 - c. If increasing levels of renewable penetration generally affects the PJM reserve margin requirements, explain whether this is accounted for in the modeling or if the 8.7 percent reserve was persistent throughout the model years.
6. Refer to the IRP, Section 2, pages 13–14. Explain how Duke Kentucky balanced its evaluation of the near term cost of the 12 portfolios against the longer terms costs and how much emphasis Duke Kentucky put on the near term costs versus the longer term costs in the selection of the 2021 IRP portfolio.
7. Refer to the IRP, Section 3B Power Prices, pages 20–29.
 - a. For any of the expansion plans, explain whether Duke Kentucky is aware of any known or anticipated nuclear generation unit retirements in the PJM region.
 - b. Explain whether the Encompass model was allowed to add new nuclear generation capacity. If so, explain whether it is realistic to make such assumptions.
 - c. Explain whether the existing nuclear capacity is capable of producing the forecast generation.
8. Refer to the IRP, Section 3C, page 30.

a. Explain the basis for Duke Kentucky setting the carbon pricing at \$5/ton beginning in 2025. If legislative initiatives influenced Duke Kentucky's carbon pricing, provide citations to the legislation.

b. For select scenarios, the carbon price of \$5/ton begins in 2025 and increases \$5/ton/year. Explain whether the scenarios with carbon regulation have the carbon price increasing at this rate over the entire forecast period such that by 2035 the price of carbon would be \$55/ton.

9. Refer to the IRP, Section 3D, page 31, Figure 3.8 - PJM Power Prices.

a. Provide the units for the axis - Average of Power Price.

b. Explain the meaning of NCL in the scenario titles.

10. Refer to the IRP, Section 4A, page 34. Explain whether the selection of fractional unit indicates a partial ownership or partnership in a full unit. If so, explain whether Duke Kentucky assumes that a partnership is guaranteed for the purposes of modeling.

11. Refer to the IRP, Section 4A, Figure 4.1, page 35.

a. Explain whether the capacity factors listed for solar and wind are specific to Kentucky.

b. Explain why summer capacity and not winter capacity or both were not modeled.

c. Explain whether the solar PV listed in the table is utilized by the Encompass model with the presumption that Duke Kentucky will own and build the generation.

d. Explain whether the possibility of utilizing a solar power purchase agreement arrangement in the modeling. If not, explain why not.

e. Explain why only 4-hour lithium batteries were modeled and whether there are lithium ion batteries being installed that are greater than 10 MW or with a capability beyond four hours.

f. Explain and list the multiple ways in which battery storage was utilized in the Encompass modeling.

g. Refer also to Figure 6.5, page 53. Figure 4.1 lists a combined cycle gas turbine 2X1 unit (CC) at 1,157 MW summer capacity. Figure 6.5 lists only 45 MW being added in 2027. Explain how only 45 MW of CC capacity can be added.

12. Refer to the IRP, Section 4B, pages 36–37, and Section 6B, Figures 6.1 and 6.2, pages 44 and 46.

a. Confirm that the only assumptions Duke Kentucky changed in the various scenarios is carbon pricing and the price of natural gas. If not, explain what other assumptions were changed from one scenario to the other.

b. Page 36 lists the Woodsdale station units at 462 MW, and Figures 6.1 and 6.2 list Woodsdale at 564 MW. Reconcile the difference.

c. On page 36, solar generation is listed at 6.8 MW for installed capacity, but is not included in the unforced capacity figures because it is connected at the distribution level. Figures 6.1 and 6.2 do not list the existing 6.8 MW of solar capacity and only show solar additions. Explain the discrepancy.

d. Refer to Figure 6.1. Explain whether Duke Kentucky is building and owning the wind generation or acquiring the capacity through a power purchase agreement.

e. Refer to Figure 6.1. Explain the meaning of SMR.

f. The title of Figure 6.2 indicates that the results assume no carbon regulation. However, the data in the tables reference that there is carbon regulation. Explain the discrepancy.

g. Refer to Figure 4.1, page 35. Solar capacity is cost modeled at 50 percent of nameplate capacity. Explain whether the solar capacity listed in Figures 6.1 and 6.2 represents nameplate capacity or 50 percent of nameplate capacity.

13. Refer to the IRP, Section 4B, Figure 4.2 page 37.

a. Explain whether the 44.08 percent of total energy purchases represents the sum of hourly market purchases that are more economical than what can be generated by Duke Kentucky's existing generation portfolio. If not, explain the nature of the purchases.

b. Explain whether the level of energy purchases is expected to continue over the IRP forecast period. If so, at what annual levels?

14. Refer to the IRP, Section 5, pages 39–41. Provide a table showing anticipated demand-side management (DSM) participation customer counts throughout the IRP planning period. Also provide the participation broken down by program.

15. Refer to the IRP, Section 6B, Figures 6.1–6.5, pages 44–53.

a. Explain whether the capacity positions listed in the various scenarios represent summer capacity values.

b. Update the Figures to show the demand and reserve margins that corresponds to the annual forecasted capacity projections.

16. Refer to the IRP, Section 6C, Figures 6.3–6.4, pages 48 and 51.

a. Explain the type of resource FDR represents in Figure 6.3 and how it was priced.

b. Provide a more thorough explanation of what assumptions were changed from what level to achieve the various results in Figures 6.3 and 6.4.

c. Identify which scenario results the portfolios in Figures 6.3 and 6.4 should be compared to. For example, should the portfolios be compared to Figure 6.2 base case or to some other portfolio.

17. Refer to the IRP, Section 6C, page 49. Provide amount the capacity factor of East Bend 2 would be reduced if it was converted to a gas burning facility.

18. Refer to the IRP, Section 6D, page 52.

a. Explain why it is over simplistic to conduct a single variable sensitivity analysis, and explain whether there is value in isolating a single variable's effects on a portfolio.

b. Explain Duke Kentucky's qualitative or quantitative rationale for setting the capital cost reduction at 20 percent.

c. Provide a more thorough explanation (including the timing) of how more solar and wind generation enters the PJM market, the resources will have a depressive impact on the hourly PJM power prices which will have an effect on Duke Kentucky's renewable generation additions. Include in the explanation how the

assumption of decreasing price of renewables over time differs from the costs represented in Figure 4.1 on page 35 and assumed in the other scenarios.

19. Refer to the IRP, Section 6E, pages 55 and 56.

a. Given how close Present Value Revenue Requirements (PVRR) are for the portfolios plotted in Figure 6.6, provide a chart that shows the numerical values.

b. Explain whether a similar analysis was performed with the Low, High, and Base Gas Price cases.

20. Refer to the IRP, Section 6E, pages 58 and 59.

a. Given how close CO₂ reductions are for the portfolios plotted in Figure 6.7, provide a chart that shows the numerical values.

b. Describe the 2005 CO₂ Emissions of Duke Kentucky that are used in Figure 6.7 as a comparison to future reductions.

21. Refer to the IRP, Section 6E, page 60. Explain whether Duke Kentucky is aware of any discussions regarding market purchases counting toward emissions in future regulation or reporting standards.

22. Refer to the IRP, Section 6E, pages 61 and 62.

a. Given how close Market Purchases as percent of Total Load are for the portfolios plotted in Figure 6.7, provide a chart that shows the numerical values.

b. Explain whether a similar analysis was performed with the Low, High, and Base Gas Price cases.

23. Refer to the IRP, Section 7, page 65. Explain in greater detail how the lessons learned from the portfolios developed and tested in the previous sections culminate into the 2021 IRP Portfolio.

24. Refer to the IRP, Section 7, Figure 7.1, page 65.
- a. Confirm that Figure 7.1 is the same as the Transitional A portfolio in Figure 6.3, page 48.
 - b. If not answered previously, explain whether Duke Kentucky has begun installing battery capacity, whether the installation requires a Certificate of Public Convenience and Necessity (CPCN), and whether it will be installed in conjunction with additional solar capacity.
 - c. If not already answered, explain whether the listed solar capacity is installed nameplate or 50 percent of nameplate per PJM and whether it includes the existing 6.8 MW of solar capacity.
 - d. Explain whether the new wind capacity will be built and owned by Duke Kentucky and whether the capacity will reside in Kentucky or out of state.
25. Refer to the IRP, Section 7B, page 69. Explain the requirements relevant to Duke Kentucky in PJM's Capacity Performance requirement.
26. Refer to the IRP, Appendix B, pages 76–77.
- a. Explain how Duke Kentucky transformed the primary metropolitan statistical area (PMSA) economic data from Moody's Analytics (Moody's) to its Kentucky service territory.
 - b. Provide a list of economic variables obtained from Moody's that were used in the various customer class demand forecasts.
 - c. Explain whether Duke Kentucky used Moody's Baseline or Consensus forecast scenario and what transformations, if any, were applied to the data.
27. Refer to the IRP, Appendix B, pages 81–82, and Figure B-Oc, page 88.

- a. Explain how each of the economic variables was derived.
 - b. Explain why there are two Cooling statistical adjusted end-used (SAE) variable in the residential usage per customer model as opposed to using one or the other and whether there are multicollinearity issues.
 - c. Explain the qUPC_SAE_Res.pre2014q3 variable in the Qtrly Residential Usage Per Customer model.
 - d. Explain the qUPC_SAE_COM.Covid variable in the Qtrly Commercial Usage Per Customer model.
 - e. Explain the qSales_SAE_Ind.MFG_ren variable in the Quarterly Industrial Sales model.
 - f. Explain why the qSales_SAE_Ind.Price variable in the Quarterly Industrial Sales model which is insignificant was let in the model.
28. Refer to the IRP, Appendix B in general. Explain the process of variable selection for the various forecasts or explain whether these variables are standardly used across Duke Energy Corp. and its affiliated utilities.
29. Refer to the IRP, Appendix B, page 84.
- a. Explain in detail the weather normalization period used by Duke Kentucky. Discuss the reasoning for using the weatherization period and whether it is the same or different from what the other Duke affiliates are using.
 - b. Explain whether Duke Kentucky considered 20-year normal weather. If so, explain why it was not applied in the IRP.
30. Refer to the IRP, Figure B-0b, page 86, and Figure B-5, page 103. Confirm that Figure B-0b should list the same load factor information as listed in Figure B-5.

31. Refer to the IRP, Appendix B, Figure B-0c, pages 88–89, Figure B-1 page 96, and Figure B-2, pages 98–99.

a. Confirm that dividing column (1) in Figure B-2a by column 1 in Figure B-1 yields residential MWh use per customer per year.

b. Confirm that dividing column (2) in Figure B-2a by column 2 in Figure B-1 yields commercial MWh use per customer per year.

c. Explain the meaning of column (6) in Figure B-2a.

d. Comparing the two tables in Figure B-2, confirm that there were no MWhs attributable to EE programs for years 2015-2017 for residential and 2015 for commercial customer classes.

e. Provide an updated Figure B-2 showing the MWhs per year of EE that is subtracted to arrive at column 9, “Net Energy for load.” If the numbers do not match the MWh numbers in Figure 5-2 page 41, explain why.

32. Refer to the IRP, Appendix A, Transmission and Distribution Forecast. Response 5.(4) on page 69 states that there are currently no transmission system projects planned or in progress. With the recent increased number of merchant plants application in Kentucky, explain whether or not Duke Kentucky anticipates a need for either an upgrade or additional transmission.

33. Refer to the IRP, Appendix A, Transmission and Distribution Forecast page 70. Explain if there are any distribution upgrades planned that are in response to an increase in residential distributed energy from resources such as roof top solar, batteries, or electric vehicles.

34. Refer to the IRP, Appendix B, Figure B-3b, page 100, and Figure B-4a, page 101.

a. Provide an updated Figure B-4a table showing separately the amounts of energy efficiency (EE) and demand response (DR) that can be subtracted from seasonal peak loads in Figure B-3b to obtain the peak loads in Figure B-4a. If the numbers do not match the Total DSM Impacts MW numbers in Figure 5-2 page 41, explain why.

b. Confirm that the peak load forecasts in Figure B-4a are the peak loads used to calculate the required PJM reserve margins. If not, explain which peak load forecasts are utilized and why.

35. Refer to the IRP, Appendix B, Figure B-3a, page 99, and Figure B-4a, page 101.

a. Explain how the peak forecasts were derived.

b. Provide the amounts of Demand Resource or controllable load that is subtracted from the seasonal peak forecasts.

36. Refer to the IRP, Appendix B, Figure B-5, page 103. Explain why the peak volumes in column 2 do not exclude the demand resource volumes.

37. Refer to the IRP, Appendix B, page 87, and Figure B-5, page 103. Confirm that Figure B-5 contains the load factor calculations and not the high, low, and most likely forecasts before EE.

38. Refer to the IRP, Appendix B, pages 86–87, and Figure B-5, page 103, Figure B-4b, page 102, and Figure B-2a, page 97.

a. Confirm that the load factor calculations in Figure B-5 are taken from Figure B-4b and Figure B-2a

b. For the volumes taken from Figure B-2a, explain why column 7 “total Consumption” was used and not net column 9, “Net Energy for Load.”

39. Refer to the IRP, Appendix B Figure B-2a, page 97. Provide an updated table showing the MWhs per year of EE that is subtracted to arrive at column 9 “Net Energy for load.”

40. Refer to the IRP, Appendix B, page 87, and Figure B-6, page 104.

a. Confirm that the peak load forecast in the “most likely” column matches the peak load forecast in Figure B-4b.

b. The most likely peak load forecast excludes EE. If not answered above, explain why demand resources were not also subtracted from the peak load forecasts and that the forecast.

41. Refer to the IRP, Appendix B, page 87, and Figure B-6, page 104.

a. Provide a copy of the Moody’s discussion of the assumptions driving its base forecast, and what changes were made for the optimistic and pessimistic scenarios.

b. Explain whether Duke Kentucky made any adjustments to the Moody’s data or assumptions to make its own high and low sensitivity forecasts listed in Figure B-6. If so, explain each of the changes.

c. Explain in detail how Duke Kentucky made its high and low energy and demand forecasts.

42. Refer to Section C, Energy Efficiency and Demand-Side Management in general. Discuss whether Duke Kentucky plans to continue providing the variety of DSM programs in the future if load reduction is unnecessary.

43. Refer to Case No. 2017-00427.² In this case Duke Kentucky filed testimony in support of its DSM portfolio, particularly in support of the direct impact the DSM programs have on Duke Kentucky's participation in PJM.

a. Provide any updates regarding DSM impacts to Duke Kentucky's participation in PJM as an FRR entity.

b. On page 9 of the final Order, the Commission noted that Duke Kentucky relies on the PowerShare and Power Manger as a capacity resource in Duke Kentucky's FRR plan.

(1) Explain what actions, if any, Duke Kentucky is taking to increase participation in these two DSM programs to avoid additional capacity purchases to meet Duke Kentucky's PJM requirements.

(2) Provide the annual amount of PowerShare capacity directly modeled into the FRR construct and, if different, in the IRP.

(3) Provide the annual amount of from the Power Manager DSM Program that is embedded in the FRR plan and, if different, in the IRP.

44. Confirm that Duke Kentucky relies on the utility total cost score for cost-effectiveness and inclusion in Duke Kentucky's DSM portfolio.

45. Regarding DSM programs in general, explain whether Duke Kentucky models saturation points of each program. If so, explain how Duke Kentucky explores alternatives and solutions to DSM program saturations.

46. Refer to page 138 of the IRP. Regarding the Peak Time Rebate Pilot Program, provide any studies that Duke Kentucky has performed regarding the possibility

² Case No. 2017-00427, *Electronic Annual Cost Recovery Filing for Demand Side Management by Duke Energy Kentucky, Inc.* (Ky. PSC Oct. 15, 2018).

of converting the PTR Pilot to a Price Responsive Demand Program that is recognize in PJM.

47. Refer to Duke Kentucky's Low Income Services DSM Program. Explain whether Duke Kentucky has evaluated a program that would assist in paying for health and safety repairs so that the Federal Department of Energy's Weatherization Assistance Program measures can be completed.

48. Explain whether the modeled DSM impacts should be revised due to the COVID-19 impact. If so, provide an update.

49. Refer to the IRP, Appendix D, Environmental Regulations. Provide a list and corresponding explanation of any environmental regulation changes that impact Duke Kentucky.

50. Refer to the IRP, page 158. Explain whether any of Duke Kentucky customers indicated an interest in a Combined Heat and Power project since the filing of the IRP.

51. Recently, natural gas prices have seen a significant increase. Explain the impact this will have on Duke's generation portfolio.



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cc: Parties of Record

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