

**COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION**

In the Matter of:

Electronic Application Of Kentucky Power Company)	
For Approval of A Certificate of Public Convenience)	
And Necessity For Environmental Project)	
Construction At The Mitchell Generating Station, An)	Case No. 2021-00004
Amended Environmental Compliance Plan, And)	
Revised Environmental Surcharge Tariff Sheets)	

Kentucky Power Company’s Data Requests to Sierra Club

Pursuant to the Commission’s Orders dated February 12, 2021 and March 10, 2021, Kentucky Power Company propounds the following data requests to be answered by Sierra Club and its members who are customers of Kentucky Power Company, including Mimi Pickering:

DEFINITIONS

- “Document” means the original and all copies (regardless of origin and whether or not including additional writing thereon or attached thereto) of memoranda, reports, books, manuals, instructions, directives, records, forms, notes, letters, notices, confirmations, telegrams, pamphlets, notations of any sort concerning conversations, telephone calls, meetings or other communications, bulletins, transcripts, diaries, analyses, summaries, correspondence investigations, questionnaires, surveys, worksheets, and all drafts, preliminary versions, alterations, modifications, revisions, changes, amendments and written comments concerning the foregoing, in whatever form, stored or contained in or on whatever medium, including computerized memory or magnetic media.
- “Study” means any written, recorded, transcribed, taped, filmed, or graphic matter, however produced or reproduced, either formally or informally, a particular issue or situation, in whatever detail, whether or not the consideration of the issue or situation is in a preliminary stage, and whether or not the consideration was discontinued prior to completion.

- “Person” means any natural person, corporation, professional corporation, partnership, association, joint venture, proprietorship, firm, or the other business enterprise or legal entity.
- A request to identify a natural person means to state his or her full name and residence address, his or her present last known position and business affiliation at the time in question.
- A request to identify a document means to state the date or dates, author or originator, subject matter, all addressees and recipients, type of document (e.g., letter, memorandum, telegram, chart, etc.), number of code number thereof or other means of identifying it, and its present location and custodian. If any such document was, but is no longer in the Attorney General’s possession or subject to its control, state what disposition was made of it.
- A request to identify a person other than a natural person means to state its full name, the address of its principal office, and the type of entity.
- “Identify” used in a fashion other than as described above means to provide in detail, including all assumptions, bases, facts considered, and rationale if not called for in another part of the data request, the requested information.
- “And” and “or” should be considered to be both conjunctive and disjunctive, unless specifically stated otherwise.
- “Each” and “any” should be considered to be both singular and plural, unless specifically stated otherwise.
- Words in the past tense should be considered to include the present, and words in the present tense include the past, unless specifically stated otherwise.
- “You” or “your” means the person whose filed testimony is the subject of these interrogatories and, to the extent relevant and necessary to provide full and complete answers to any request, “you” or “your” may be deemed to include any person with information relevant to any interrogatory who is or was employed by or otherwise associated with the witness or who assisted, in any way, in the preparation of the witness’ testimony.
- “PJM” means PJM Interconnection.
- “Company” means Kentucky Power Company.
- “AEP” means American Electric Power Company, Inc.
- “Wheeling Power” means Wheeling Power Company.
- “Appalachian Power” means Appalachian Power Company.
- “Sierra Club” means Sierra Club and its members who are customers of Kentucky Power Company including Mimi Pickering.

- “Ms. Wilson” means Rachel Wilson who filed testimony in this proceeding.
- “Synapse Analysis” means the analysis performed by Synapse Energy Economics, Incorporated on behalf of Sierra that is presented in and that informed the basis for Ms. Wilson’s testimony in this proceeding.

INSTRUCTIONS

1. If any matter is evidenced by, referenced to, reflected by, represented by, or recorded in any document, please identify and produce for discovery and inspection each such document.
2. These interrogatories are continuing in nature, and, without regard to the date created or obtained, information which the responding party later becomes aware of, or has access to, and which is responsive to any request is to be made available to Kentucky Power. Any studies, evaluations, analyses, documents, or other subject matter not yet completed that will be relied upon during the course of this case should be so identified and provided as soon as they are completed. The respondent is obliged to change, supplement and correct all answers to interrogatories to conform to available information, including such information as it first becomes available to the respondent after the answers hereto are served.
3. Unless otherwise expressly provided, each interrogatory should be construed independently and not with reference to any other interrogatory herein for purpose of limitation.
4. The answers provided should first restate the question asked and also identify the person(s) supplying the information.
5. Please answer each designated part of each information request separately. If you do not have complete information with respect to any interrogatory, so state and give as much information as you do have with respect to the matter inquired about, and identify each person whom you believe may have additional information with respect thereto.
6. In the case of multiple witnesses, each interrogatory should be considered to apply to each witness who will testify to the information requested. Where copies of testimony, transcripts or depositions are requested, each witness should respond individually to the information request.
7. The interrogatories are to be answered under oath by the witness(es) responsible for the answer.
8. Please furnish any non-disclosure or other required for disclosure of any information or response for which confidential treatment provided.

DATA REQUESTS

1. Please provide all supporting documents and work papers in machine readable format, with cells unlocked and formulas intact, that were used in the preparation of testimony of Rachel Wilson (“Ms. Wilson”), including all charts and tables, filed by Sierra Club on May 12, 2021.¹
2. Please refer to page 6 and Table 1 of Ms. Wilson’s testimony. Please confirm that, in connection with the Synapse Analysis, the EnCompass model was allowed to optimize the mix of resources to create the lowest cost resource plan in the process of producing the Synapse BAU and Synapse 2028 Retirement cases? If the response is anything other than an unconditional confirmation please identify how in connection with the Synapse Analysis the EnCompass Model selected or identify the sources for these cases, including but not limited to, whether the resources were “forced” into the model?
3. Please confirm that in connection with the Synapse Analysis the EnCompass model optimized the resource mix to meet a user-defined minimum reserve margin requirement? If the response is anything other than an unconditional confirmation please describe in detail the use of minimum reserve margin requirements in the Synapse Analysis.
4. Please confirm that in connection with the Synapse Analysis the EnCompass model had the capability of adding resources once the minimum reserve margin is met if the addition of those resources reduced the plan’s overall cost? If the response is anything other than an unconditional confirmation please describe in detail the use of minimum reserve margin requirements by the Encompass model in connection with the Synapse Analysis.
5. Please confirm that in connection with the Synapse Analysis the EnCompass model dispatched the Mitchell units economically at all loading levels. If the response is anything other than an unconditional confirmation please describe in detail the manner in which the EnCompass model dispatched the Mitchell units, including whether the minimum loading level was required to run (i.e. must-run requirement).
6. Please confirm that in connection with the Synapse Analysis the EnCompass model there was no limitation or restriction on the model’s ability to add both physical resources and market purchases to meet the Company’s energy requirements. If the response is anything other than an unconditional confirmation please describe in detail any such limitation or restriction.
7. Please provide the following information for each new resource type Ms. Wilson elected to make available to the EnCompass model in connection with the Synapse Analysis in each of the two cases presented in her Direct Testimony:
 - a. Any annual limit for the addition of each resource.

¹ Kentucky Power acknowledges the information requested in this data request was provided informally by Sierra Club to Kentucky Power on May 21, 2021 as a courtesy. The Company is repeating the request here to ensure the information is of record in this case.

- b. Any cumulative limits for the addition of each resource.
 - c. If there were any annual or cumulative limit with respect to any resource please provide the basis for the imposition of each limit and the amount of the limit.
8. Please refer to Table 1 “Summary of Synapse modeling results (2050)” on page 6 of Ms. Wilson’s testimony and the workpaper titled Scenario Comparison – KPCO + CT (20210506).xlsx (provided by Sierra Club to Kentucky Power on May 21, 2021 as a courtesy).
- a. On a total system capacity basis, please explain the reasons for the additional resource capacity added in the 2041 to 2050 timeframe for the Synapse BAU case compared to the Synapse 2028 Retirement case under the “Base No Carbon” scenario. For example, additional PPA and Battery capacity is added in the 2041 to 2050 timeframe for the BAU case compared to the 2028 Retirement case.
 - b. In the 2041 to 2050 timeframe, please explain the basis for the additional 700 MW of additional wind resources, 12 MW of Battery and 50 MW to 250 MW of Capacity PPA for the Synapse BAU case compared to the Synapse 2028 Retirement case under “Base With Carbon” scenario.
9. Please refer to Table 9 (identified as Table 8 in the text) “Net present value of revenue requirements, Synapse modeling scenarios” on page 26 of Ms. Wilson’s testimony. Please provide the annual total plan costs that were used to develop the NPVRR for the BAU and Synapse 2028 Retirement Scenarios under both the Base No Carbon and Base with Carbon cases.
10. Please refer to Figure 6 (identified as Figure 5 in the text) “Comparison of nameplate capacity in Synapse modeled scenarios, Base No Carbon” on page 29 of Ms. Wilson’s testimony. Please provide a table of the annual resource additions by type of resource for the BAU and Retirement scenarios.
11. Please refer to Figure 8 (identified as Figure 7 in the text) “Comparison of nameplate capacity in Synapse modeled scenarios, Base with Carbon” on page 31 of Ms. Wilson’s testimony. Please provide a table of the annual resource additions by type of resource for the BAU and Retirement scenarios.
12. Please provide the following inputs in nominal dollar terms as they were entered into the Encompass Model in connection with the Synapse Analysis for each year from 2021 to 2050 by resource type for every resource option available to the model:
- a. Resource block size in megawatts.

- b. Overnight construction costs in \$ per KW. All-in construction costs in \$ per KW. All-in costs are defined as overnight costs plus construction overheads, construction financing costs (i.e. AFUDC), and owners costs.
 - c. Transmission interconnection costs, including the assumed length of any tie-line needed for interconnection.
 - d. Gas interconnection costs.
 - e. Fixed O&M costs in \$/KW by year.
 - f. Variable O&M costs in \$/MWh by year.
 - g. Useful life in years.
 - h. Equivalent Availability Factor as a percentage.
 - i. Equivalent Forced Outage rate percentage.
 - j. Planned Outage factor percentage.
 - k. Annual performance degradation percentage.
13. Please provide the following information regarding the assumptions or inputs for transmission and congestion costs for each resource type available to the EnCompass model in connection with the Synapse Analysis presented in Ms. Wilson's testimony:
- a. Interconnection cost (\$/kW).
 - b. Length of any tie line(s) needed for interconnection.
 - c. Amount of acres of land needed for rights of way for any required transmission.
 - d. The percentage of any required transmission investment allocated to Kentucky Power versus the percentage of required transmission investment allocated to other entities within PJM?
 - e. Please confirm that the fundamental forecasts relied upon by the Synapse Analysis included capital investment for the transmission required and the expected levels of congestion charges in the PJM region that would result from the addition of the wind, solar, and storage resources presented in the Synapse Analysis? If the response is anything other than an unconditional confirmation please provide a detailed explanation of the basis for not including transmission capital investment and congestion charges in the PJM region.
14. Please confirm that the EnCompass model used in connection with the Synapse Analysis computed carrying costs on invested capital using levelized fixed charge rates. If the

response is anything other than an unconditional confirmation please identify and describe in detail the methodology and the bases for using it.

15. Please provide the pre-tax and after-tax cost of capital used in computing the carrying costs on invested capital employed by the EnCompass model in connection with the Synapse Analysis presented in Ms. Wilson's testimony.
16. Please provide the discount rate(s) employed by the EnCompass model in connection with the Synapse Analysis presented in Ms. Wilson's testimony. If the rate(s) is different from the cost of capital used to compute carrying costs on capital investments, please provide a detailed explanation of all bases for using different discount rates.
17. Please provide the following inputs for each year of each scenario presented in Ms. Wilson's direct testimony:
 - a. Hourly energy market prices. If hourly, energy prices were not used, please describe the market energy prices that were used and how they were developed
 - b. Monthly energy prices, segregated into peak and off-peak blocks;
 - c. PJM Capacity market prices;
 - d. Annual Henry Hub natural gas prices.
18. Please provide the annual delivered gas price by year used for the gas employed by the EnCompass model in connection with the Synapse Analysis presented in Ms. Wilson's testimony.
19. Please provide the following information regarding the carbon cost assumptions employed by the EnCompass model in connection with the Synapse Analysis presented in Ms. Wilson's testimony:
 - a. The type and amount of the carbon cost assumed (i.e., an emissions tax or some other type of cost and if so the specific type, cost, and corresponding amounts).
 - b. Please explain whether this carbon cost levied is on only electricity generation, or on the economy as a whole, or some other section of the United States economy?
 - c. Please identify the total amount of the carbon for the coal fired resources by year for each year of each of the cases (BAU and Synapse 2028 Retirement) included in Ms. Wilson's direct testimony?
 - d. Please state whether this carbon cost was expressed in short tons or metric tons.
 - e. Please state the amount of the carbon cost per MWh of output of coal-fired resources?

- f. Please state the amount of the carbon cost per ton (and identify whether metric tons or short tons are used) that was added to the cost of natural gas-fired resources by year for each year of each of the scenarios included in Ms. Wilson's direct testimony?
 - g. The amount of the carbon cost per MWh of output of natural gas-fired simple cycle resources.
 - h. The amount of the carbon cost per MWh of output of natural gas-fired combined cycle resources?
20. Please provide the annual capacity reserve margin percentage (both in terms of ICAP and UCAP) computed for Kentucky Power in each year for both Base No Carbon and Base with Carbon scenarios of the two cases presented in the Synapse Analysis.
21. In the event either of the two scenarios for the Synapse 2028 retirement case presented by Ms. Wilson in her direct testimony resulted in UCAP capacity margins greater than 8.6 percent for more than one consecutive year over the analysis period beginning with 2029 after the Mitchell units were assumed to retire, please provide a detailed explanation of the basis for the UCAP capacity margins in excess of 8.6 percent.
22. Please confirm that the EnCompass model used in connection with the Synapse Analysis sold UCAP capacity in excess of 8.6 percent into the PJM market., please provide the annual number of megawatts sold and capacity revenues modeled for each scenario presented in Ms. Wilson's direct testimony. If capacity revenue was not modeled please state so.
23. Please provide the following information:
- a. The PJM percentage capacity credit that solar, wind, storage, paired solar/storage, paired wind /storage, and gas combustion turbines received each year in the EnCompass model used in connection with the Synapse Analysis presented in Ms. Wilson's testimony.
 - b. Please confirm the percentages presented in the response to subpart (a) were based on the assumed adoption by PJM of the ELCC capacity credit methodology. If the response is anything other than an unconditional confirmation please identify and describe in detail the basis for the PJM percentage capacity credit described in the response to subpart (a).
 - c. Please provide copies of all PJM documents, and the date they were published, that support or were relied on in connection with the assumed adoption by PJM of the ELCC capacity credit methodology.
 - d. If the PJM percentage capacity credit that solar, wind, storage, paired solar/storage, paired wind /storage, and gas combustion turbines received each

year in the EnCompass model used in connection with the Synapse Analysis were not based on publicly available PJM guidance, please provide a detailed explanation for the use of the PJM percentage capacity credit that solar, wind, storage, paired solar/storage, paired wind /storage, and gas combustion turbines, including any documentation.

- e. Please provide the assumed level of penetration of wind, solar, storage, and paired solar and storage resources in PJM in terms of total megawatts placed in service within PJM for each year of the Synapse Analysis presented in Ms. Wilson's testimony. Please provide the source of these forecasts.
 - f. Please provide the UCAP megawatts of every new resource added, by resource, for each year of each scenario presented in Ms. Wilson's direct testimony.
24. Please explain in detail how forecasted PJM capacity market prices were used by the EnCompass model used in connection with the Synapse Analysis presented in Ms. Wilson's testimony.
25. Please provide the following information about any tax credits assumed for each of the following resource types used in Ms. Wilson's analysis:
- a. Percentage credit available each year from 2021-2050.
 - b. Confirm that the assumptions are based on current law. If the response is anything other than an unconditional confirmation please identify and describe in detail the basis for the assumptions regarding the tax credits.
26. Please provide the following information regarding the income tax credit ("ITC") income tax normalization assumptions used by the EnCompass model in connection with the Synapse Analysis presented in Ms. Wilson's testimony:
- a. Confirm that normalization treatment was used for the ITC utilized for all solar, storage or paired resources, and all other resources assumed to be eligible for ITC.
 - b. Please state whether the normalization treatment was based on either an FI or F2 tax election.
 - c. If ITC normalization was used, please provide the annual impacts in terms of both dollars and \$/MWh of the normalization effect on the cost of energy for all resources eligible for ITC.
 - d. If ITC normalization was not used by the EnCompass model in connection with the Synapse Analysis presented in Ms. Wilson's testimony, please provide a detailed explanation for not using it.
 - e. If ITC normalization was not used, please confirm that:

(i) Ms. Wilson is aware that Kentucky Power Company is subject to ITC normalization rules; and

(ii) Ms. Wilson is aware that the required ITC normalization rules affect the regulated cost of service of any resource eligible for the ITC.

f. If ITC normalization was not used by the EnCompass model in connection with the Synapse Analysis presented in Ms. Wilson's testimony, please modify the Synapse Analysis to incorporate FI ITC normalization and present the results.

27. Please provide the following raw EnCompass model outputs for each new resource added in each year of the two cases (BAU and Synapse 2028 Retirement) and both scenarios ("Base No Carbon" and "Base with Carbon") presented in Ms. Wilson's direct testimony:

- a. Energy market revenues;
- b. Capacity market revenues;
- c. Ancillary services revenues;
- d. Any other revenues;
- e. Production tax credits earned;
- f. Investment tax credits earned in in-service year;
- g. Investment tax credits included in the cost of energy each year if ITC amortization was normalized;
- h. Fuel expense;
- i. Variable O&M expense;
- j. Fixed O&M expense;
- k. Property tax expense;
- l. Energy output in MWh;
- m. Energy revenue per MWh; and
- n. Capacity factor %.

28. Please refer to Exhibit RW-3 of Ms. Wilson's testimony. Please separately identify each "financial assumption" in Exhibit RW-3 that Ms. Wilson contends is incorrect, inappropriate, or overstated, and provide all facts supporting Ms. Wilson's contention that the "financial assumption" is incorrect, inappropriate, or overstated.
29. Please provide each year's annual total and cumulative all-in capital investment required to build each of the new resources added for each case (BAU and Synapse 2028 Retirement) for each scenario ("Base No Carbon" and "Base with Carbon") presented in Ms. Wilson's direct testimony.
30. Please provide any analysis prepared by Ms. Wilson in connection with the Synapse Analysis of the impacts (increases or decreases) of the new resource additions on customer rates for any and all years covered by her analysis.
31. The Synapse Analysis resource plans contain no natural gas fired-capacity additions other than those contained in all plans to replace Big Sandy 2 when it retires. Kentucky Power is a winter peaking utility, as are other utilities in that region such as Kentucky Power affiliate Appalachian Power Company and Duke Energy North Carolina. Please explain how Ms. Wilson expects Kentucky Power and these other winter peaking utilities to reliably provide energy to its customers between 7 and 9 am on extremely cold winter mornings in 2029 if the Mitchell units retire in 2028, without additional dispatchable gas-fired resources. In preparing this response, assume all generation located in states throughout PJM is needed to serve load in those states, and that the solar resources added in Ms. Wilson's plan are unable to provide power because it is dark in those hours.
32. Please identify by added wind and solar resource, and the corresponding cost of, the weatherization equipment assumed by the EnCompass model in connection with the Synapse Analysis presented in Ms. Wilson's testimony. If no weatherization equipment is included in the cost of those resources used by the EnCompass model in connection with the Synapse Analysis presented in Ms. Wilson's testimony please provide an estimate of the cost of such equipment?
33. Please provide any publicly available testimony prepared between 2019 and 2021 by Ms. Wilson analyzing resource plans for other winter peaking utilities located in any state within the United States.
34. Please confirm that Ms. Wilson has not provided testimony in any proceeding in which she performed a utility resource plan review similar to the Synapse Analysis in which her modeling results included natural-gas fired resources as a part of the utility's resource plan. If the response is anything other than an unequivocal confirmation please identify the proceeding and either provide a copy of the testimony or a link to it.
35. Please provide an estimate of the acres of land that would be required either for one megawatt, or for one block, of each of the solar, wind, storage, paired solar and storage, and paired wind and storage resources utilized in Ms. Wilson's analysis. Please state if

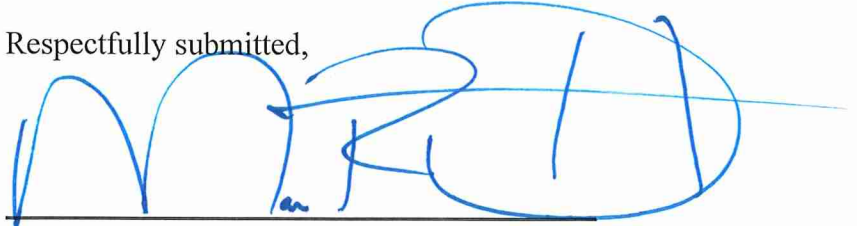
those land estimates include associated transmission interconnection equipment, such as substations or transmission lines.

36. Please provide an estimate of the total acres of land, exclusive of the existing footprint of the Mitchell Generating Station, that would be required for the resources identified in each scenario (“Base No Carbon” and “Base With Carbon”) for the Synapse 2028 Retirement case and the BAU case.

37. Refer to the fixed charge rate (labeled Capital Recovery Factor) of 4.279% in every year of Row 247 of the tab named ATB Utility Solar_SEE found in the file named Renewable LCOE.xlsx provided in Ms. Wilson’s workpapers:
 - a. Please confirm if Ms. Wilson agrees with the statement that in general the use of a fixed charge rate in an analysis of regulated utility cost of service such as this one produced by Ms. Wilson is intended to produce an estimate of the annual nominal costs ratepayers would incur for a given capital investment by the utility. If she does not agree, please provide an explanation of the purpose of the fixed charge rate in her analysis.
 - b. Please confirm that the 4.24% nominal WACC used by Ms. Wilson to develop the 4.279% fixed charge rate referenced here was ultimately sourced from row 776 of the WACC Calc tab in the 2020 ATB Data file provided to the Company with Ms. Wilson’s workpapers.
 - c. Please confirm that the useful life which was assumed for the solar resource used in Ms. Wilson’s analysis is 30 years.
 - d. Please explain why a nominal fixed charge rate on a 30-year investment such as this solar alternative should not be closer to the Company’s 10.95% 30 year value found on page 3 of Ms. Wilson’s direct testimony Exhibit RW-3.
 - e. Please confirm that the 4.279% fixed charge rate which ultimately led to the LCOE’s used to forecast the costs of the solar resources in Ms. Wilson’s analysis was based on the use of NREL’s real WACC of 1.69% rather than NREL’s nominal WACC of 4.24%, both of which were sourced from the ‘2020-ATB-Data’ file.
 - f. Please confirm that in NREL’s ATB source file “2020 ATB Data” the 4.24% nominal WACC is the same value every year from 2018-2050.
 - g. Please explain why, given that Ms. Wilson relied on NREL’s real dollar capital recovery factor every year from 2018-2050 to prepare real dollar LCOE’s on the LCOE Cost Summary worksheet in the Renewable LCOE workpaper file, that she did not also rely on NREL’s nominal capital recovery factor every year from 2018 through 2050 when she converted real dollar LCOE’s to the nominal dollar LCOE’s presented in her testimony and used to forecast the solar resource costs.
 - h. Were depreciation expenses, income taxes, land leases, property taxes and general and administrative expenses included in the forecasted costs of the solar resources in Ms. Wilson’s analysis? If so, provide workpapers that clearly show their inclusion. If not, please explain why not.
 - i. If the solar resources were assumed to be PPA resources in Ms. Wilson’s analysis, would Ms. Wilson agree that a rational PPA counterparty offering a 30-year term

for an asset with a 30-year useful life would seek to recover some amount of depreciation, general and administrative expenses, and income taxes in the PPA price? If not, why not?

Respectfully submitted,



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