VERIFICATION

STATE OF NORTH CAROLINA)
) **SS:**
COUNTY OF MECKLENBURG)

The undersigned, Benjamin Passty, Lead Load Forecasting Analyst, being duly sworn, deposes and says that he has personal knowledge of the matters set forth in the foregoing data requests, and that the answers contained therein are true and correct to the best of his knowledge, information and belief.

Benjamin W B Passty
Benjamin Passty, Affiant

Subscribed and sworn to before me by Benjamin Passty on this 15 day of April, 2019.

PATRICIA C. ROSS
NOTARY PUBLIC
Mecklenburg County
North Carolina

Patricia C Ross
NOTARY PUBLIC

My Commission Expires: 10-17-2019

VERIFICATION

STATE OF NORTH CAROLINA)
) **SS:**
COUNTY OF MECKLENBURG)

The undersigned, Scott Park, Director IRP & Analytics-Midwest, being duly sworn, deposes and says that he has personal knowledge of the matters set forth in the foregoing data requests, and that the answers contained therein are true and correct to the best of his knowledge, information and belief.

Scott Park, Affiant

Subscribed and sworn to before me by Scott Park on this 10th day of April, 2019.

NOTARY PUBLIC

My Commission Expires: Oct. 20, 2023

KyPSC Case No. 2018-00195
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Duke Energy Kentucky
Case No. 2018-00195
Attorney General's Second Set Data Requests
Date Received: March 28, 2019

AG-DR-02-001

REQUEST:

Reference the response to AG 1-1. The request sought the projected remaining lifespan of the Woodsdale CT units by unit, and the East Bend facility. The response that the stations are expected to run through the IRP planning period is non-responsive to the request. Provide a response to the request sought: Provide the projected remaining lifespan of the Woodsdale CT units by unit and of the East Bend facility.

RESPONSE:

The most recent Depreciation Study completed December 31, 2016 assigned a life span estimate of 60 years for East Bend 2 which would imply an end of life date of 2041 based on the in-service date of 1981. A lifespan of 40 years was assigned to the CT units at Woodsdale implying an end of life date of 2032 for each of the Woodsdale units based on the in-service date of 1992. The remaining lifespan of any of these units can be extended through additional capital expenditure if deemed economically prudent at the time the additional investment is required by the physical condition of the unit.

PERSON RESPONSIBLE: Scott Park

Duke Energy Kentucky
Case No. 2018-00195
Attorney General's Second Set Data Requests
Date Received: March 28, 2019

AG-DR-02-002

REQUEST:

Reference the response to AG 1-14.

a. Provide details regarding the source of the model for industrial customers, including who developed it.

b. Confirm that the model's time frame (2006-present), includes the financial crisis and recession of 2008 and subsequent years.

c. Given that the model does include the 2008 financial crisis and recession, explain whether this biases the model. If so, how did DEK correct of mitigate the bias?

d. Explain whether a timeframe of 2012-present would be more accurate.

e. Explain whether a different timeframe than 2006-present would be more accurate.

RESPONSE:

a. The model for industrial customers was based on three auto-regressive terms, manufacturing employment for the Cincinnati MSA, and a January indicator variable. The dependent variable for this model is a monthly series of industrial customers.

b. According to the National Bureau of Economic Research (NBER), the recession associated with the financial crisis of 2008 lasted from December 2007 through June 2009. Those months are reflected in the data for this model.

c. The bias described in posing this question would best be termed as "omitted variable bias." Indeed, Duke Energy Kentucky tests models with a variety of

different economic factors to try to minimize the impact of this. Manufacturing employment was selected as the best performing out of a series of weak choices. Even with this measure of industrial activity in the model, some months during the recession still showed a very different number of customers than predicted by the model. Those observations were treated as outliers and removed from the estimation. This was true for both January and February of 2008 and for March of 2009. Estimating the model with these observations included does not alter the parameter estimates meaningfully, although it slightly increases the impact of manufacturing employment on customers. The model forecast changes less than one customer with this change.

d. There are several problems associated with a model in which only observations from 2012-2017 are used: First, the R^2 statistic is substantially reduced, from 0.943 to 0.839. The mean absolute percent error does improve slightly, from 0.46% to 0.41%. The most major consideration however, is the coefficient in this model, which is -0.128 (the coefficient is a positive 0.011 in the original model). Duke Kentucky believes a model that implies a positive relationship between manufacturing activity and industrial energy usage makes theoretical sense. These reasons would lead the Company to recommend that a forecast using the model based on observations from 2012-2017 would be less accurate. In fact, when the two models are compared to the actual customer numbers from 2018 (which were not available when Duke Kentucky originally developed the models), you see exactly this: the model based on 2006-2017 data predicts monthly customer totals with a MAPE of 0.50% (versus 0.51% for the 2012-2017 model). The average forecast error is also lower.

e. Changing the starting point for the estimation from 2006 to any of the nearby years (2004, 2005, or 2007) doesn't change the accuracy of the forecast for 2018 by much.

PERSON RESPONSIBLE: Benjamin W. Passty

Duke Energy Kentucky
Case No. 2018-00195
Attorney General's Second Set Data Requests
Date Received: March 28, 2019

AG-DR-02-003

REQUEST:

Explain where in the Company's IRP it modeled customer-generated supply options and whether it modeled them as supply-side or demand-side.

a. Any response should include a citation to the IRP where the Company details the type of each assumed customer-generated supply option (e.g. wind, solar, PV, battery, etc.), the penetration of each option, the imputed capacity value for each option and any other relevant information necessary to model the resources.

b. If the Company failed to model customer-generated supply, such as roof-top or net-metered solar PV, explain why.

RESPONSE:

a. The load forecast incorporates the impact of solar net metering customers. As such, the customer generated supply is modeled as a demand side variable.

b. Not Applicable: Roof-top solar is considered in the load forecast.

PERSON RESPONSIBLE: Benjamin W. Passty

Duke Energy Kentucky
Case No. 2018-00195
Attorney General's Second Set Data Requests
Date Received: March 28, 2019

AG-DR-02-004

REQUEST:

Reference the response to AG 1-3 (c) and AG 1-7 (a). Provide the justification, support and/or cost basis for the assumed interconnection costs provided.

RESPONSE:

Costs are derived from a combination of company experience and third-party consultants' market surveys and analysis. Our consultants for unit characteristics and costs are Burns & McDonnell and Navigant.

- The basis for the $10MM transmission adder is the assumption of a five-mile line using a per-mile cost estimate from the 2014 EPRI Technical Assessment Guide (TAG) Power Generation and Storage Technology Options document (Document #: 3002004002, Tables A-11 to A-12.) the costs from the EPRI TAG are inflated to 2018 dollars at 2.5% p.a. Actual transmission costs will vary considerably by project and location.
- Solar interconnection costs of $100/kW are based on the average costs incurred for nine solar projects of varying sizes within Duke Energy's service territory. This figure also matches the recommended value from Navigant based on their collected industry data.
- For batteries, the Company has limited internal data on interconnection costs due to the small numbers of projects completed thus far. As a result, the Company

utilizes the recommended values from Navigant based on their collected industry data.

- For wind, the Company utilizes the recommended values from Navigant based on their collected industry data.

PERSON RESPONSIBLE: Scott Park