**COMMONWEALTH OF KENTUCKY**

**BEFORE THE PUBLIC SERVICE COMMISSION**

**In the Matter of:**

| | | |
|---|---|---|
| **ELECTRONIC APPLICATION OF KENTUCKY UTILITIES COMPANY FOR AN ADJUSTMENT OF ITS ELECTRIC RATES, A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY TO DEPLOY ADVANCED METERING INFRASTRUCTURE, APPROVAL OF CERTAIN REGULATORY AND ACCOUNTING TREATMENTS, AND ESTABLISHMENT OF A ONE-YEAR SUR-CREDIT** | ) | **CASE NO. 2020-00349** |
| **ELECTRONIC APPLICATION OF LOUISVILLE GAS AND ELECTRIC COMPANY FOR AN ADJUSTMENT OF ITS ELECTRIC AND GAS RATES, A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY TO DEPLOY ADVANCED METER INFRASTRUCTURE, APPROVAL OF CERTAIN REGULATORY AND ACCOUNTING TREATMENTS, AND ESTABLISHMENT OF A ONE-YEAR SURCREDIT** | ) | **CASE NO. 2020-00350** |

**RESPONSE OF**
**KENTUCKY UTILITIES COMPANY AND**
**LOUISVILLE GAS AND ELECTRIC COMPANY**
**TO**
**KENTUCKY SOLAR INDUSTRIES ASSOCIATION, INC.'S**
**POST-HEARING REQUEST FOR INFORMATION**
**DATED MAY 5, 2021**

**FILED: MAY 19, 2021**

**VERIFICATION**

**COMMONWEALTH OF KENTUCKY )**
**)**
**COUNTY OF JEFFERSON )**

The undersigned, **Robert M. Conroy**, being duly sworn, deposes and says that he is Vice President, State Regulation and Rates, for Kentucky Utilities Company and Louisville Gas and Electric Company and an employee of LG&E and KU Services Company, and that he has personal knowledge of the matters set forth in the responses for which he is identified as the witness, and the answers contained therein are true and correct to the best of his information, knowledge and belief.

**Robert M. Conroy**

Subscribed and sworn to before me, a Notary Public in and before said County and State, this 13th day of May 2021.

Notary Public

Notary Public ID No. 603967

My Commission Expires:

July 11, 2022

**VERIFICATION**

**STATE OF NORTH CAROLINA** )
)
**COUNTY OF BUNCOMBE** )

The undersigned, **William Steven Seelye**, being duly sworn, deposes and states that he is a Principal of The Prime Group, LLC, and that he has personal knowledge of the matters set forth in the responses for which he is identified as the witness, and the answers contained therein are true and correct to the best of his information, knowledge and belief.

**William Steven Seelye**

Subscribed and sworn to before me, a Notary Public in and before said County and State, this 17 day of May 2021.

(SEAL)
Notary Public

Notary Public ID No. 20191350120

My Commission Expires:
May 12 2024

SARAH D WELLS
NOTARY PUBLIC
HENDERSON COUNTY, NC
MY COMMISSION EXPIRES MAY 12, 2024

**VERIFICATION**

**COMMONWEALTH OF KENTUCKY** )
)
**COUNTY OF JEFFERSON** )

The undersigned, **David S. Sinclair**, being duly sworn, deposes and says that he is Vice President, Energy Supply and Analysis for Kentucky Utilities Company and Louisville Gas and Electric Company and an employee of LG&E and KU Services Company, and that he has personal knowledge of the matters set forth in the responses for which he is identified as the witness, and the answers contained therein are true and correct to the best of his information, knowledge and belief.

**David S. Sinclair**

Subscribed and sworn to before me, a Notary Public in and before said County and State, this 11th day of May 2021.

Notary Public

Notary Public ID No. 603967

My Commission Expires:

July 11, 2022

**VERIFICATION**

**COMMONWEALTH OF KENTUCKY** )
)
**COUNTY OF JEFFERSON** )

The undersigned, **John K. Wolfe**, being duly sworn, deposes and says that he is Vice President, Electric Distribution for Kentucky Utilities Company and Louisville Gas and Electric Company and an employee of LG&E and KU Services Company, and that he has personal knowledge of the matters set forth in the responses for which he is identified as the witness, and the answers contained therein are true and correct to the best of his information, knowledge and belief.

**John K. Wolfe**

Subscribed and sworn to before me, a Notary Public in and before said County and State, this 11th day of May 2021.

Notary Public

Notary Public ID No. 603967

My Commission Expires:

July 11, 2022

**KENTUCKY UTILITIES COMPANY AND**
**LOUISVILLE GAS AND ELECTRIC COMPANY**

**Response to Kentucky Solar Industries Association, Inc.'s**
**Post-Hearing Request for Information**
**Dated May 5, 2021**

**Case No. 2020-00349 / Case No. 2020-00350**

**Question No. 1**

**Responding Witness: William Steven Seelye**

Q-1. Reference: Seelye hearing testimony regarding a lithium-ion battery.

a. State whether it is Mr. Seelye's position that a lithium-ion battery can be discharged or charged at a rate that is below its maximum charging or discharging rate.

b. State whether the duration for which a lithium-ion battery can provide a given amount of continuous capacity is a function of its energy storage capacity and maximum discharge capacity. (For example, that a 5 kW/20kWh battery can provide 5kW for four hours if discharged at the maximum capacity but could provide 2.5 kW for 8 hours if the discharge rate is reduced.) If it is Mr. Seelye's position that duration is not a function of the battery's energy storage capacity and maximum discharge capacity as described above, then state the reason(s) for disagreement.

A-1.

a. A lithium-ion battery can be discharged or charged at a rate below its maximum capacity. In fact, it is generally recommended that lithium-ion batteries operate below their maximum charging rates. Operating lithium-ion batteries at their maximum charging rates will shorten the life of the batteries. To supply high levels of capacity for longer periods of time would require over-sizing battery capacity thereby increasing the cost of energy storage. See the response to part b.

b. Because energy storage adds greater flexibility for the delivery of energy supplied from renewable energy sources, which are intermittent, the combination of solar-plus-storage could potentially provide a capacity value to the grid. Standalone solar is intermittent and fundamentally *as available* and thus ultimately provides little or no capacity value. This underscores the problem with the current net metering framework, which provides the same compensation for stand-alone solar facilities as for managed solar-plus-storage facilities.

Mr. Seelye agrees that additional battery capacity could be added to extend the period over which load could be served by battery storage. However, as stated in Dowling et al., "Role of Long-Duration Energy Storage in Variable Renewable Electricity Systems," *Joule* 4, 1-22, September 16, 2020:

> The combination of [the] longer-duration resource gaps and high reliability standards requires systems that rely solely on wind and solar generation to overbuild generation capacity and/or deploy prodigious amounts of energy storage …
>
> [T]he economics of battery storage are strongly dependent on the use scenario. As more storage gets deployed, the marginal value per kWh of storage falls. In contrast to hourly backfilling of power or smoothing of the daily cycle, meeting multi-day or week-long gaps between supply and demand requires even larger quantities of storage capacity with much lower utilization rates. The levelized cost of battery-related energy storage sufficient to fill longer-duration gaps in solar and wind generation thus remains high. Consequently, to achieve highly reliable wind and solar-only electricity systems, substantially ''overbuilding'' and distributing solar and wind capacity over large areas (perhaps facilitated by high voltage direct current, HVDC, transmission), may still be less costly than the required battery storage. [*Id*.]

It is generally recognized in the industry that lithium-ion batteries do not offer a viable and economical long-term energy storage solution. As stated in Albertus et al., "Long-Duration Electricity Storage Applications, Economics, and Technologies," *Joule* 4, 21-32, January 15, 2020:

> Although current technologies such as lithium-ion batteries are suitable for a number of applications on the grid, they are not suitable for longer duration storage applications.

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**Question No. 2**

**Responding Witness: William Steven Seelye**

Q-2. Reference: Seelye hearing testimony regarding MISO and capacity value.

a. State whether it is Mr. Seelye's position that MISO does not attribute any capacity value to solar resources.

b. State whether it is Mr. Seelye's position that MISO has not conducted a specific study to develop a default solar capacity credit for new resources based on actual solar resources in service in the MISO footprint.

c. Confirm that MISO currently assigns a capacity credit of 50 percent of nameplate to solar facilities within its footprint as a default value for new solar resources. If this assertion is denied, please provide specific references to MISO materials serving as the basis for the denial.

d. Confirm that once a solar facility has an operational history of three years, MISO BPM 11 provides that the capacity credit will be determined by the 3-year historical average output for the hours ending 15, 16, and 17 for June through August.

A-2.

a. Neither KU nor LG&E is a member of an RTO. Therefore, MISO's treatment of solar, wind or other generation resources is irrelevant to KU and LG&E's operations. As a general matter, MISO's attribution of value to generation resources cannot be considered in isolation from all the other attributes, programs, objectives, cost sharing goals, socializations, etc. of MISO and its members (i.e., without regard to all individual "constructs" that form the basis of the MISO markets). Inevitably, with a market or ISO construct, there are various tradeoffs that form the basis of the individual attributes, programs, objectives, cost sharing goals, socializations, etc. of an ISO or energy market. The MISO capacity market cannot be selectively considered in isolation from all other aspects of the ISO.

During the hearing, Mr. Seelye stated that MISO does not conduct an Effective Load Carrying Capability ("ELCC") study for solar resources. Due to the proliferation of wind resources in the MISO footprint, MISO conducts an ELCC study to determine the capacity accreditation for wind resources in MISO's annual Planning Resource Auction ("PRA"). Due to the lack of solar resources in the MISO region, MISO does not perform an ELCC study for new or existing solar resources comparable to what they conduct for wind generation. MISO's plan is that once there is a high enough penetration of solar resources in their footprint, that they would conduct an ELCC study for solar that is comparable to the current ELCC study for wind resources.

MISO's Planning Resource Auction ("PRA") is based on a single summer peak period methodology with a Planning Reserve Margin ("PRM") based on a 50/50 load forecast during the summer season. Due to solar resource operating characteristics, it is reasonable to assume that solar will provide some small capacity value during the summer peaks months, namely June through September. Therefore, MISO gives 50% capacity credit to new resources with less than 30 days operating history and a credit for existing resources based on 3 years of operating history during the peak hours in June, July, and August to coincide with MISO's current PRA construct.

MISO is currently in the process of modifying their PRA structure to a more granular four-season methodology to better align capacity accreditation with generation output during different times of the year. Under this methodology it is expected that solar will retain some capacity credit value during the summer season, but will almost certainly have lower or perhaps no capacity credit value during the other seasons, namely winter where MISO typically peaks early in the morning prior to daylight hours. MISO still has not brought forth a final proposal on this new structure but is planning on filing the PRA construct in September 2021 at the Federal Energy Regulatory Commission.

b. MISO uses the solar generation class average Equivalent Forced Outage Rate demand ("XEFORd") as the basis for the 50% capacity credit for new solar resources. This credit was based on an evaluation of existing solar resources in the US and National Renewable Energy Laboratory data. This was proposed in December 2015 for the 2016/17 PRA due to insufficient solar resources in the MISO footprint to run an Effective Load Carrying Capability ("ELCC") study similar to how MISO accredits wind resources.

c. Confirmed.

d. Confirmed.

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**Question No. 3**

**Responding Witness: William Steven Seelye**

Q-3. Reference: Seelye hearing testimony regarding net metering class cost of service study and class load shapes.

a. Provide the AMI data that Mr. Seelye used in developing the residential net metering class load shapes for each customer, with each customer clearly identified as either a KU or LG&E customer.

b. Provide the workpapers used by Mr. Seelye to develop the KU and LG&E residential net metering class load shapes based on this AMI data. Confirm that Mr. Seelye used statistically valid data for the KU net metering class load shapes based on this AMI data.

c. Provide the formulas, with each variable in the formulas clearly described and explained, used by Mr. Seelye to conduct T Test and Wilcoxon Tests6 to determine the statistical validity of the AMI data used for the net metering class cost of service studies.

d. Identify each of the statistical assumptions that underlie the T Test and Wilcoxon Test that must be satisfied for these tests to provide unbiased and efficient estimators and be relied upon to provide valid results. Explain whether the use of non-random sampling would violate any of the foregoing assumptions.

e. Confirm that Seelye used near-statistically valid data for the LG&E net metering class load shapes. If confirmed, explain the basis for why the LG&E data was not found to be statistically valid.

f. Identify the sampling method (e.g., random sampling, stratified random sampling, etc.) and sample size used by and for KU and LG&E to develop representative class load shapes for each of its classes used in the class cost of service studies.

A-3.

a. See attachment being provided in Excel format.

b. See attachments being provided in Excel format for the workpapers. Regarding whether the data is statistically valid, see responses and attachments to PSC KU 5-15 and PSC LG&E 5-16.

c. T-Test:

Test statistic *t* is computed in a one sample t-test as:

$$t = \frac{\bar{X} - \mu}{\hat{\sigma}/\sqrt{n}}$$

Where $\bar{X}$ is the sample mean, $\mu$ is the population mean, $\hat{\sigma}$ is the estimate of the population standard deviation, and $n$ is the sample size.

See Morris H. DeGroot, *Probability and Statistics* (Fourth Edition, 2012), pp. 576-595; see also Jun Shao, *Mathematical Statistics* (Second Edition, 2007), pp. 25-26.

Wilcoxon Test:

Test statistic $W$ is computed as:

$$W = \sum_{i=1}^{N_r} [sgn(x_{2,i} - x_{1,i}) \cdot R_i]$$

Where a *z* statistic can be computed for confidence intervals as:

$$z = \frac{W}{\sigma_W}$$

$$\sigma_W = \frac{\sqrt{N_r(N_r+1)(2N_r+1)}}{6}$$

Where $sgn$ is the sign function $sgn\ x \coloneqq \begin{cases} -1\ if\ x < 0 \\ 0\ if\ x = 0 \\ 1\ if\ x > 0 \end{cases}$, $R_i$ is the rank of pair *i*, and $N_r$ is the reduced sample size where pairs $|x_{2,i} - x_{1,i}| = 0$ are removed.

See Frank Wilcoxon, "Individual Comparison by Ranking Methods", *Biometrics Bulleting*, Vol. 1, No. 6. (Dec. 1945), pp. 80-83.; see also Norman L. Johnson, Adrienne W. Kemp, and Samuel Kotz, *Univariate Discrete Distributions* (Third Edition, 2005), pp. 476-477.

d. T-Test:

The t-test assumes the sample follows a normal distribution $\bar{X} \sim N\left(\mu, \frac{\sigma^2}{n}\right)$. The sample is also required to be randomly sampled and independently and identically distributed (iid). The use of non-random sampling could introduce bias into the computation of estimators.

Wilcoxon Test:

As a nonparametric test, the Wilcoxon test does not require a normal distribution nor does it rely on the Central Limit Theorem, allowing for smaller sample sizes. The Wilcoxon test does require that pairs are chosen randomly and independently. The use of non-random sampling could introduce bias into the computation of estimators.

e. See responses and attachments to PSC KU 5-15 and PSC LG&E 5-16.

f. The class load profiles were developed using all available 15-minute load data for net metering customers. The number of customers for which this data is available varies by month. On average over the historical period, the Companies have interval data for around 35 KU net metering customers and 55 LG&E net metering customers.

The attachment for Question No. 3(a) is being provided in a separate file in Excel format.

The attachments for Question No. 3(b) are being provided in separate files in Excel format.

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**Question No. 4**

**Responding Witness: William Steven Seelye**

Q-4. Reference:Seeley workpaper "2020_Rebuttal_Testimony_Seelye_Workpapers_-_KU_LGE_Residential_Class_Shapes_20210326.xlsx,"worksheet LGE_Consumption_Shape," column J "NM_Residential,".

a. Confirm that these values are the actual values measured by the AMI meter and aggregated for the residential net metering customer class for which LG&E has AMI data. If your response is anything other than an unqualified confirmation, please explain where these values came from and/or how they were derived.

b. When this column is sorted from the highest value to the lowest value, there appear to be repetitions in the data that would be extremely unlikely to occur when measuring and aggregating total net metering customer net usage, as there are fluctuations in net consumption across customers across time. For example, the highest three values (occurring on 8/11 at hour 18, 8/12 at hour 18, and 8/17 at hour 18) are all exactly "4315.12173380257" (i.e., identical to 11 decimal places). The next three highest values (occurring on 8/11 at hour 19, 8/12 at hour 19, and 8/17 at hour 19) are all exactly "4096.50106476733" -- identical to 11 decimal places. Similar repeating patterns are evident throughout this data.

   i. Please explain why these patterns are evident in the underlying data, and

   ii. Whether these patterns are a cause of concern as to the reliability of the data used, given that it would seem to be statistically impossible for net metering customers to have exactly the same measured net peak load to 11 decimal places on three separate days in a given month in a given year.

A-4.

a. Not confirmed. Column J in Attachment 1 to Question No. 3b contains forecasted hourly consumption from the grid for net metering customers over the forecasted test period (July 2021 through June 2022). In each hour of the forecast period, hourly consumption from the grid is computed as the product of (a) an hourly multiplier and (b) forecasted monthly consumption from the grid for all net metering customers. Hourly multipliers are computed over a historical period using actual metered consumption from the grid for each company's sample of net metering customers[1]. See Attachment to Filing Requirement Tab 16 – 807 KAR 5:001 Sec. 16(7)(c) E for a more detailed discussion of the class load profile forecast process. For a given hour in the historical period, the hourly multiplier is that hour's proportion of monthly consumption from the grid.

To forecast monthly consumption from the grid for all net metering customers, monthly consumption from the grid in the historical period is computed for all net metering customers as a proportion of monthly energy requirements for all residential customers and grossed up by the ratio of net metering customers in the forecasted test period and historical period. Then, this grossed up proportion is multiplied by the forecast of monthly energy requirements for all residential customers.

The goal of the forecasting process is to develop profiles that reflect hourly energy requirements under normal weather conditions. Therefore, the forecast for a given weekday or weekend day is developed based on a weekday or weekend day in the historical period with similar weather.[2] The hourly multipliers for some days in the historical period are used more than once in creating the forecast. A final step in the forecast process ensures the sum of hourly consumption from the grid by month equals forecasted monthly consumption from the grid.

b.

i. See response to part a. To create profiles that reflect normal weather, the hourly multipliers for some historical days are used more than once.

ii. See the responses to parts a and b-i. The repeated values do not create cause for concern.

[1] The historical period used (January 2019, February 2020, March through December 2019) matches that of the original cost of service study for consistency.
[2] The forecast of hourly consumption from the grid for net metering customers and the forecast of energy requirements for all residential customers are based on the same days in the historical period.

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**Dated May 5, 2021**

**Case No. 2020-00349 / Case No. 2020-00350**

**Question No. 5**

**Responding Witness: Robert M. Conroy**

Q-5. Reference: Conroy hearing testimony. Is it Mr. Conroy's position that the Companies are storing the solar generation from net metering facilities using batteries and/or other energy storage technologies and providing the same electricity back to the net metering customer when the customer needs it? If Mr. Conroy's response is anything but an unqualified confirmation, explain how customers can be using the grid as a battery if the Companies are not in fact storing the excess generation and are instead using it to meet the instantaneous demand of other customers.

A-5. Mr. Conroy's testimony remains that current net metering customers use the Companies' grid *as* or *like* a battery, not that there is literally a battery in place to store each net metering customer's excess energy. The analogy is not new or unique to Mr. Conroy; for example, EnergySage, a popular site that advocates for solar generation,[3] states, "In essence, net metering is like having the grid serve as a giant solar battery."[4]

From a current net metering customer's perspective, net metering is exactly like having a battery—a perfect, lossless, costless battery—to store excess generation and return it to the customer later. Indeed, from a net metering customer's perspective, this arrangement is much better than having an actual battery, which tends to be expensive, incurs roundtrip energy losses, and has performance limitations. For example, a single Tesla Powerwall unit costs at least $7,000, has 10% roundtrip energy losses (i.e., for each 10 kWh stored, a user can expect to withdraw 9 kWh), and is limited to 5 kW output and 13.5 kWh of usable

[3] According to EnergySage, "Millions of people use EnergySage each year to research and shop for solar through our network of pre-screened, local installers." https://www.energysage.com/ (accessed May 6, 2021; archived at https://web.archive.org/web/20210506132812/https://www.energysage.com/).

[4] EnergySage, "Net metering for home solar panels" (updated 2/11/2021), available at https://www.energysage.com/solar/101/net-metering-for-home-solar-panels/ (accessed May 6, 2021; archived at https://web.archive.org/web/20210506132151/https://www.energysage.com/solar/101/net-metering-for-home-solar-panels/).

capacity.[5] Therefore, a current net metering customer avoids thousands of dollars of capital cost, 10% losses, and performance limitations on withdrawals simply by the way the Companies' current net metering tariff provisions are structured (as required by law).

What actually occurs is that the Companies are effectively buying each kWh of excess generation from an RS or GS net metering customer at the full retail rate (about $0.10/kWh), energy the Companies can produce and transmit to customers for less than $0.03/kWh. The actual revenue the Companies will receive for each such kWh will be less than the full retail rate because the energy incurs losses across the system, even if they are only $I^2R$ losses across service drops and transformer contacts. (There could be more losses depending on the configuration of the distribution system and energy produced and locally consumed.)

Yet the net metering customer is unaffected; for each kWh that flows through the customer's meter onto the grid, the customer receives a 100% kWh credit for energy consumed from the grid at other times. From the net metering customer's perspective, it is as though the customer had a perfect, lossless, practically limitless battery—all at no additional capital cost—provided by the Companies and paid for nearly exclusively by other customers.

[5] https://news.energysage.com/tesla-powerwall-battery-complete-review/ (accessed May 6, 2021; archived at https://web.archive.org/web/20210506134451/https://news.energysage.com/tesla-powerwall-battery-complete-review/).

**KENTUCKY UTILITIES COMPANY AND**
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**Dated May 5, 2021**

**Case No. 2020-00349 / Case No. 2020-00350**

**Question No. 6**

**Responding Witness: Robert M. Conroy**

Q-6. In the event that a customer taking service under the proposed NMS I tariff (a customer with legacy rights) suffers an interruption of service for the customer's eligible electric generating facility through an event such as storm damage, vandalism, or other casualty loss, will the Companies consider the interruption of service a termination of service and forfeiture or loss of legacy rights? Fully explain.

A-6. No, the Companies will not consider an interruption of service due to an event such as storm damage, vandalism, or other casualty loss to be a termination of service resulting in forfeiture or loss of legacy rights under Rider NMS-1. The Companies' current and proposed Net Metering Interconnection Guidelines state, "Repair and replacement of existing generating facility components with like components that meet UL 1741 certification requirements for Level 1 facilities and not resulting in increases in net metering generator capacity is allowed without approval." Therefore, a damaged or destroyed generating facility served under Rider NMS-1 that a customer repairs or replaces to the facility's pre-damage specifications, including capacity, will continue to be served at that premise under Rider NMS-1 for the remainder of the original 25-year legacy rights term.

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**Case No. 2020-00349 / Case No. 2020-00350**

**Question No. 7**

**Responding Witness: Robert M. Conroy**

Q-7. Reference: Conroy hearing testimony regarding the Economic Development Rider.

a. Clarify what role job creation or retention has in the eligibility, applicability, and benefits provided to customers taking service under this rider.

b. Clarify whether Mr. Conroy believes job creation and/or retention are factors the Commission can consider in developing fair, just, and reasonable rates.

A-7.

a. Job creation or retention has no role in the eligibility, applicability, and benefits provided to customers taking service under this rider. Only in the highly unlikely event that two identically situated applicants sought EDR benefits at the same time and when only one could be accommodated due to available generating capacity would the Companies take into account job creation or retention, and then only to break a tie. That situation has never occurred and is highly unlikely ever to occur. The Companies request job creation or retention information from applicants solely for informational and reporting purposes consistent with the Commission's final order in Administrative Case No. 327.[6]

b. Job creation or retention *per se* are externalities to the Companies' cost structures and therefore do not bear directly on whether the Companies' rates are fair, just, and reasonable.

In the EDR context, the Commission has stated, "Increased economic activity is the major objective of EDRs. Two key indicators of economic activity are job creation and capital investment."[7] The Commission went on in the same order to state its determination that "monitoring the job creation and capital

[6] *An Investigation into the Implementation of Economic Development Rates by Electric and Gas Utilities*, Admin. Case No. 327, Order at 10-12 (Ky. PSC Sept. 24, 1990).
[7] *Id*. at 10.

investment performance of EDRs would provide it with important information with which to measure the effectiveness of its EDR program."[8] Sustained economic activity—and preferably economic growth—is beneficial for utility rates if it helps existing customers remain in business and maintain their loads while also using existing capacity more fully and efficiently. That is precisely what the other EDR requirements are meant to do: ensure EDR customers at least cover all of their marginal costs while making a contribution to existing fixed costs, which is a benefit to all customers. To the best of the Companies' knowledge, the Commission has never stated that EDRs are justified if they stimulate jobs or economic growth irrespective of whether they result in net beneficial rate impacts; EDR credits have always been tied to at least a reasonable expectation of beneficial rate impacts, and they have always required that customers receiving EDR credits pay at least the incremental costs they impose on the utility system.

Unlike EDR, net metering *reduces* load, making use of existing facilities less efficient. Also unlike EDR, net metering can go on indefinitely, whereas EDR's temporary demand discounts end after five years (and the load should remain for at least an addition five years but will most likely be permanent). Therefore, adding a job-creation component to net metering compensation would effectively accomplish the opposite of what EDRs are designed to do: it would require the vast majority of customers to pay more so other customers can make less efficient use of the Companies' system.

The Companies are aware that the Commission has recently issued an order in Kentucky Power Company's rate case that "directs Kentucky Power to evaluate job benefits and economic development as an [NMS II] export rate component for Kentucky Power's next rate case filing."[9] The Companies believe any such evaluation would need to consider other job-related impacts, such as the possible loss of jobs related to displaced fossil-fueled generation and generating resources, as well as whether encouraging job creation in an inefficient sector of the economy justifies subsidies paid by other customers. Regarding the latter point, see the Companies' response to PSC 6-32, which shows it is about twice as costly per kW to install residential solar as it is to install utility-scale solar.

[8] *Id*. at 12.
[9] Case No. 2020-00174, Order at 38 (May 14, 2021).

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**Question No. 8**

**Responding Witness: John K. Wolfe**

Q-8. Reference: Wolfe and/or Conroy hearing testimony regarding the Companies' consideration of Distributed Energy Resource Management Systems (DERMS).

a. Explain how the benefits of DERMS realized by the Companies would be impacted if the proposed NMS II tariffs are approved.

b. Clarify if the Companies believe that DERMS will still be needed and provide significant value to the Companies if the proposed NMS II tariffs are approved and there is a substantial decrease in the rate of customers taking service through a net metering rider, as shown under the Companies' forecasts of net metering adoption under NMS II.

A-8.

a. The Companies do not expect any impact on the benefits of a DERMS system if the proposed compensation rate under Rider NMS 2 is approved. DERMS systems are designed to monitor DER production and potentially provide dynamic control of inverter setpoints in instances where DER hosting capacity is limited. Regardless of the compensation rate for excess energy supplied to the grid by the NMS customer, the DERMS would still perform the same functionality. DERMS will continue to be evaluated by the Companies as a potential solution.

b. DERMS is a critical function of the distribution management system because DER does affect voltage and power flows on the distribution grid, therefore justifying the need for a DERMS. As DER interconnections continue to increase, the need for a DERMS increases. DERMS provides a way to optimize control and more accurately predict power flows throughout the grid. Power flow prediction is critical for several DMS functions including, but not limited to: feeder load management (FLM), fault location analysis (FLA), fault location isolation and service restoration (FLISR), distribution automation and switching, volt/VAR optimization (VVO), and conservation voltage reduction (CVR).

**KENTUCKY UTILITIES COMPANY AND**
**LOUISVILLE GAS AND ELECTRIC COMPANY**

**Response to Kentucky Solar Industries Association, Inc.'s**
**Post-Hearing Request for Information**
**Dated May 5, 2021**

**Case No. 2020-00349 / Case No. 2020-00350**

**Question No. 9**

**Responding Witness: William Steven Seelye**

Q-9. Reference:Seelye workpaper "2020_Rebuttal_Testimony_Seelye_Workpapers_-_KU_LGE_Residential_Class_Shapes_20210326.xlsx," worksheet.

a. Confirm that the tabs titled KU_Overgeneration_Shape and LGE_Overgeneration_Shape refer to hourly exports to the grid from net metering customers. If not, please explain in detail what "overgeneration" refers to for these tabs.

b. Confirm that Column N (NM_Residential) in the tabs referring to KU_Consumption_Shape and LGE_Consumption_Shape present hourly load data that excludes exports reflected in the KU_Overgeneration_Shape and LGE_Overgeneration_Shape tabs, such that exports to the grid do not reduce the hourly load values in Column N.

c. Confirm that if a net metering customer was induced to undertake actions that reduce the amount of electricity the customer exports to the grid during one or more hours, the Consumption Shape would reflect an increase in consumption during those hours.

d. Confirm that an increase in the Consumption Shape in one or more hours would represent an increase in the cost to serve a net metering customer and the collective hypothetical class of net metering customers.

A-9.

a. Confirmed.

b. Confirmed. Net metering meters have two channels: one measures energy consumed from the grid, and the other measures energy pushed to the grid. Due to the variability of customer generation and customer load, while power in any given instant can flow in only one direction, it is possible to have both energy consumed from the grid and energy pushed back to the grid in the same hour. For the consumption shapes, only the first channel measuring

energy consumed from the grid was used. For the overgeneration shapes, only the energy pushed back to the grid was used.

c. Denied. Reducing the amount of electric energy that a customer-generator exports to the grid will not necessarily result in an increase in consumption by the net metering customer during those hours. To increase the customer-generators consumption, in this scenario, the customer-generators energy production would have to be decreased to a level below which the customer-generator is no longer supplying energy to the grid.

d. The impact on cost of service of increases in load for one or more hours would depend on when the increases occur. For example, increasing loads during off-peak periods would not likely increase fixed production, transmission, or distribution costs. However, an increase in load during peak hours would likely increase the cost of service to net metering customers.

**KENTUCKY UTILITIES COMPANY AND**
**LOUISVILLE GAS AND ELECTRIC COMPANY**

**Response to Kentucky Solar Industries Association, Inc.'s**
**Post-Hearing Request for Information**
**Dated May 5, 2021**

**Case No. 2020-00349 / Case No. 2020-00350**

**Question No. 10**

**Responding Witness: William Steven Seelye / David S. Sinclair**

Q-10. Reference: Mr. Seelye's statement at page 48 of his rebuttal testimony that the "market value" of solar energy is represented by the 20-year fixed price contract at $27.82/MWh associated with the Rhudes Creek solar project.

a. Is the price associated with a single transaction typically considered representative of the market value of a product in any other market that Mr. Seelye is aware of? If yes, please specifically identify any other "market" where this would be true and provide specific citations and references indicating that this market is considered competitive and well-functioning by generally accepted metrics of market competitiveness.

b. Confirm that the "market value" or "price" is not synonymous with "economic value" in economic theory. If your response is anything other than an unqualified confirmation, please explain in detail with specific references to economic theory and citations to applicable peer-reviewed literature.

c. Confirm that the PPA price of $27.82/MWh was contingent on the availability of a fixed price contract with a 20-year term, and that the price would have been higher if the contract was executed for a shorter term. If your response is anything other than an unqualified confirmation that this is true, please provide supporting evidence and a detailed explanation of why the Company selected this project and this specific contract term as the least-cost option.

d. Provide a complete copy of the request for proposals associated with the solicitation that produced the contract for the Rhudes Creek solar project.

e. Provide the simple average and weighted average of bid prices for the solicitation that produced the contract for the Rhudes Creek solar project. The weighted average should be calculated according to forecasted annual delivered energy.

f. Provide a complete listing of the individual project sizes for all bids provided in response to the solicitation that produced the contract for the Rhudes Creek solar project. For the purposes of this request, the individual projects may be deidentified or otherwise identified anonymously as Project #1, Project #2, etc.

g. Provide the simple average and weighted average price of bids if the Company selected the most competitive bids totaling at least 400 MW of solar capacity from the solicitation that produced the Rhudes Creek solar project. The weighted average should be calculated according to forecasted annual delivered energy.

A-10.

a. Yes. The best examples of where a single transaction represents the market value of a product are organized stock, bond, options, and commodity futures markets where every transaction represents at that moment in time the market value of the particular security as agreed to by a willing buyer and seller. See for example, the New York Stock Exchange at https://www.nyse.com/index for a discussion of the various markets they administer.

b. Agree. Economic value is the value placed on a good or service by an individual consumer, which is greater than the price paid for the good or service. The extra value derives from the individual's tastes, preferences and perceived benefits of the product/service that are not reflected in the price. For example, a person installing solar panels on their home may place a value on such attributes as doing something to "help the environment", reducing their reliance on energy from the local utility, and exploring "new" technology. This particular consumer might be willing to pay $25,000 for the solar panels yet the price of their installation is only $20,000. This $5,000 difference between what this customer was willing to pay and what they actually had to pay is their economic value. Because economic value results from an individual's unique tastes and preferences, it will not be the same for all consumers.

c. The $27.82 /MWh for the Rhudes Creek solar PPA was the result of a competitive RFP process and negotiations between the parties. As stated in Mr. Sinclair's testimony in Case No. 2020-00016 on page 12, lines 10-11, one of the lessons learned from the Companies' renewable RFP was, "A longer contract term (20 years) was less expensive than a shorter contract term (15 years)…"

d. See attached.

e. The Companies have not performed the requested analysis. See attached for relevant data filed with the Commission in Case No. 2020-00016. Certain

information requested is confidential and proprietary and is being provided under seal pursuant to a petition for confidential protection.

f. See the response to part e.

g. See the response to part e.


**LG&E and KU Energy LLC**
Power Supply
220 West Main Street
Louisville, KY 40202
www.lge-ku.com

Chuck Schram
Director, Power Supply
502-627-3250

February 4, 2019

**Subject: Request for Proposals (RFP) to Sell Renewable Electrical Power and Energy**

Dear Colleague in the Development and Marketing of Renewable Electrical Power,

Louisville Gas and Electric Company ("LG&E") and Kentucky Utilities Company ("KU") (jointly the "Companies") are evaluating alternatives to provide additional least-cost renewable electrical power and energy to our customers, strengthening our renewable power supply portfolio and reducing the Companies' $CO_2$ emissions. The Companies are exploring adding up to 200 MW of renewable electrical power and energy, starting no later than January 1, 2022, that will qualify as a Designated Network Resource (DNR) through a Power Purchase Agreement. Preference will be given to new assets. The Companies will consider proposals that are reliable, feasible, and represent the least-cost means, including the cost for transmission service and required transmission upgrades, of meeting customers' requests for renewable electric power and energy. The respondent should make its proposal(s) as comprehensive as possible so that the Companies may make a definitive and final evaluation of the proposal's benefits to customers without further contact with the respondent. However, the Companies reserve the right to request additional information. Any failures to supply the information requested will be taken into consideration relative to the Companies' internal evaluation of cost, risk, and value.

This inquiry is not a commitment to purchase and shall not bind the Companies or any subsidiaries of LG&E and KU Energy LLC in any manner. The Companies in their sole discretion will determine which respondent(s), if any, they wish to engage in negotiations that may lead to a binding contract. The Companies shall not be liable for any expenses respondents incur in connection with preparation of a response to this RFP. The Companies will not reimburse respondents for their expenses under any circumstances, regardless of whether the RFP process proceeds to a successful conclusion or is abandoned by the Companies at their sole discretion.

1. **Background** – The Companies are issuing this RFP in order to evaluate renewable power as a means to provide least-cost power and energy to our customers in the future while meeting all laws and regulations. All proposals for renewable power (including any of the Companies' self-build options) will be evaluated in the context of meeting customers' load in a least-cost manner, with a preference for new assets. If the Companies determine that a proposal may be in the best interest of the Companies' customers, the Companies will enter into negotiations which may lead to the execution of definitive agreements. The Companies will consider all applicable factors in evaluating proposals, including, but not limited to, the following to determine the least-cost proposal(s): (i) the terms of the purchased power proposal; (ii) seller's creditworthiness; (iii) if applicable, the operating history or the development status of seller's generation facility, including, but not limited to, the site chosen, permitting, and the status of an interconnection to the transmission grid; (iv) the anticipated availability of the power; and (v) all other factors such as the cost of interconnection or transmission that may affect the Companies' cost to serve their customers.

2. **Requirements** - The Companies are interested in Power Purchase Agreements ("PPA"), for minimum quantities of 10 MW up to a total of 200 MW of nameplate power and associated energy from facilities in Kentucky or surrounding states. The power must be generated from a defined source, a specific unit or units that will qualify as a DNR. The delivery of power and energy should start no later than January 1, 2022. The Companies are interested in proposals ranging from five to twenty years. The Companies may procure less than 200 MW and may aggregate power and energy from multiple sellers. A seller offering power from a resource connected directly to the Companies' transmission system must conform to the Companies' Open Access Transmission Tariff (OATT) and must obtain an Interconnection Agreement for the facility in a timely manner.

3. **Key Terms and Conditions** - The respondent's proposal should include the proposed terms and conditions, including, where applicable to the respondent's proposal, among other things:

   3.1. Respondent will provide all pricing and terms that affect pricing, such as, but not limited to, escalators, transmission costs (if applicable), operation and maintenance cost, etc.

   3.2. Respondent will provide the annual and seasonal equipment availability, performance standards, and describe the required maintenance outage schedule.

   3.3. Respondent should address in their proposal its remedies for failure to meet any proposed performance standards and any production and other guarantees, if applicable.

   3.4. After the evaluation of proposals is completed, the Companies will enter into negotiations on a timely basis if the Companies determine that a proposal is in their

customers' best interests. Any subsequent contracts will be contingent on obtaining the necessary regulatory approvals.

3.5. The Companies termination of any contract rights will include, but may not be limited to: (i) failure to obtain all required regulatory approvals, (ii) failure to post or maintain required financial credit requirements, (iii) failure to meet key development and implementation milestones, (iv) failure to meet reliability requirements, and (v) failure to cure a material breach under the PPA.

4. **Metering and Monitoring** (Required Proposal Content) - The Companies may require real time metering and monitoring of the renewable generation resource. If so, the Companies desire, at the Companies' expense, to install equipment at the generator site to facilitate real time metering and monitoring. The respondent should state its desire and willingness to allow and cooperate with the Companies in establishing real-time monitoring and metering of generation.

5. **Ancillary Services** (Required Proposal Content) - Under a PPA, the Companies desire to have the unrestricted right to the renewable electric power and energy associated with the renewable generation being sold by the seller. Any sale of any ancillary service by the seller must not hinder the capacity availability of the facility and the facility's production of energy. The respondent should describe the ancillary service capabilities of the generation facility in its proposal, e.g. voltage support, how it plans on providing such services to another party, and how the sale of such service will not impact the capacity and associated energy in its proposal. If applicable, the respondent should describe any ancillary services, including, but not limited to, load following, spinning reserve, supplemental reserve, black start capability, frequency response, etc., that is being included in its proposal to the Companies.

6. **Pricing** (Required Proposal Content) - The pricing must be a delivered price to the Companies' transmission system. The Companies will be responsible only for Network Integrated Transmission Service (NITS) on the Companies transmission system. Prices must be clear and quoted in U.S. dollars. If pricing involves escalation or indexing, the details of such pricing, including the specific indices or escalation rates, must be included for evaluation.

6.1. The proposal must provide the product description and generation characteristics on the attached form. Pricing information can be provided on the form or separately in another format that is appropriate for the offer. If applicable, a projected hourly electric energy production profile for a typical year over the term of the proposal shall be provided electronically in an Excel spreadsheet. The respondent is encouraged to provide as much information as possible to aid in the evaluation of the offer. These attached data forms may be utilized in any filings with regulatory agencies (such as the Kentucky Public Service Commission) related to this RFP.

7. **Delivery** (Required Proposal Content) - The delivery point is the Companies' transmission system. Under a PPA, seller(s) will be responsible for providing firm transmission to the Companies' transmission system. The seller is responsible for all costs associated with transmission interconnections to the grid and point-to-point ("PTP") service to the delivery point. The seller will provide all studies, Interconnection Agreements, and PTP Transmission Reservations/Agreements. The seller is responsible for all transmission reservations, losses to the delivery point, and costs, including system upgrades up to the delivery point. TranServ International, Inc., 2300 Berkshire Lane North, Minneapolis, Minnesota 55441, is the Independent Transmission Organization that administers the Companies' OATT. Tennessee Valley Authority ("TVA") serves as the Companies' Reliability Coordinator ("RC"). For purposes of the Companies' evaluation of the proposals, the Companies may estimate any transmission costs that are not supported by the appropriate studies including the cost for deliverability and the associated voltage support to the Designated Network Load ("DNL") of the Companies. If all required transmission studies have not been completed, it is essential that the following information be provided in order for the Companies to evaluate the proposal:
    - Size of the unit(s)
    - Point of interconnection to the grid
    - Impedance of the generator step-up transformer
    - Transient and sub transient characteristics of the generator

8. **Environmental** - For the sale of renewable power to the Companies under a PPA, the seller will be responsible for obtaining all necessary permits and complying with their requirements for the life of the agreement, where permits are applicable for the product being sold. Failure to obtain or comply with any environmental permit or governmental consent would not excuse nonperformance by seller.

9. **Development Status** – Respondent shall provide a comprehensive narrative of the status of the development of any generation project intended to be used in a PPA with the Companies. Respondent's narrative shall include the following.
    - A comprehensive development and construction schedule,
    - A listing of all required permits and governmental approvals and their status,
    - A listing of all required electric interconnection and transmission agreements and their status,
    - A financing plan, and
    - A summary of key contracts (construction, major equipment, etc.), to the extent that they exist.

10. **Renewable Energy Certificates** – For the purpose of this RFP, renewable power is that electricity generated from renewable sources, including, but not limited to: solar, wind, hydroelectric, geothermal, landfill gas, biomass, biodiesel used to generate electricity, agricultural crops or waste, all animal and organic waste, all energy crops, and other renewable resources. The locations of these sources are limited to Kentucky and the

surrounding states: Indiana, Tennessee, Ohio, West Virginia, Virginia, Missouri, and Illinois. Sources must be certified for the creation of Renewable Energy Certificates as described below.

- A Renewable Energy Certificate ("REC") is the tradable unit which represents the commodity formed by unbundling the environmental-benefit attributes of a unit of green power from the underlying electricity. One REC is equivalent to the environmental benefits and attributes of one MWh of energy from a renewable resource. Eligible proposals must produce REC from facilities located in Kentucky, Indiana, Tennessee, Ohio, West Virginia, Virginia, Missouri, and Illinois.
- Eligible proposals must include RECs that are created from renewable facilities verified and approved by the proven renewable asset tracking systems associated with the major regional Independent System Operators ("ISO") operators. Applicable tracking systems are the PJM's Generation Attribute Tracking System ("GATS") or MISO's Midwest Renewable Energy Tracking System ("MRETS"). The legal ownership of every REC so created is recorded and tracked by GATS or MRETS to assure its authenticity and single ownership.
- The PPA will require the seller to create and transfer to the Companies the REC associated with the renewable power being sold. The respondent should also provide any additional information the respondent deems necessary or useful to the Companies relevant to the renewable power being sold to assist the Companies in making a definitive and final evaluation of the benefits of the respondent's proposal without further interaction between the Companies and respondent.

11. **Financial Capability** - Should the Companies elect to enter into an agreement with a seller who later fails to meet its obligations at any point in time, the Companies' customers may be exposed to the risk of higher costs. Therefore, the sellers will be required to demonstrate, in a manner acceptable to the Companies, the seller's ability to meet all financial obligations to the Companies throughout the applicable development, construction and operations phases for the term of the PPA. Under no circumstances, should the Companies' customers be exposed to increased costs relative to the cost defined in an agreement between the seller and the Companies.

    - At all times, the seller will be required to maintain an investment grade credit rating with either S&P or Moody's or have a parent guarantee from an investment grade entity that meets the approval of the Companies.

    - Upon execution of the PPA, the seller will be required to post a letter of credit ("LOC") to protect the Companies' customers in the event of default by the seller. The exact amount of a LOC will be subject to approval by the Companies based upon the Companies' models. If the Companies draw down the LOC amount at any time, the seller must replace the LOC to the original value within five days.

12. **RFP Schedule** - All proposals must be complete in all material respects and be received no later than 4 P.M. EDT on Friday, March 29, 2019. Email proposals must be followed up with a signed original within two business days.

| | |
|---|---|
| RFP Issued | Monday, February 4, 2019 |
| Proposals Due | Friday, March 29, 2019, 4 P.M. EDT |
| Evaluation Completed | Monday, May 20, 2019 |

Proposals will not be viewed until 4 P.M. EDT on Friday, March 29, 2019. After the evaluation of proposals is completed, the Companies will enter into negotiations on a timely basis if the Companies determine that a proposal is in their customers' best interests. Any subsequent contracts will be contingent on obtaining the necessary regulatory approvals.

**13. Treatment of Proposals**

13.1. The Companies reserve the right, without qualification, to select or reject any or all proposals and to waive any formality, technicality, requirement, or irregularity in the proposals received. The Companies also reserve the right to modify the RFP or request further information, as necessary, to complete their evaluation of the proposals received.

13.2. Respondents who submit proposals do so without recourse against the Companies for either rejection by the Companies or failure to execute an agreement for purchase of power and/or energy for any reason. Respondents are responsible for any and all costs incurred in the preparation and submission of a proposal and/or any subsequent negotiations regarding a proposal.

14. **Confidentiality** - As regulated utilities, it is expected that the Companies will be required to release proposal information to various government agencies and/or others as part of a regulatory review or legal proceeding. The Companies will use reasonable efforts to request confidential treatment for such information to the extent it is labeled in the proposal as "Confidential." Please note that confidential treatment is more likely to be granted if limited amounts of information are designated as confidential rather than large portions of the proposal. However, the Companies cannot guarantee that the receiving agency, court, or other party will afford confidential treatment to this information. Subject to applicable law and regulations, the Companies also reserve the right to disclose proposals to their officers, employees, agents, consultants, and the like (and those of its affiliates) for the purpose of evaluating proposals. Otherwise, the Companies will not disclose any information contained in the respondent's proposal that is marked "Confidential," to another party except to the extent that (i) such disclosures are required by law or by a court or governmental or regulatory agency having appropriate jurisdiction, or (ii) the Companies subsequently obtain the information free

of any confidentiality obligations from an independent source, or (iii) the information enters the public domain through no fault of the Companies.

15. **Contacts** - All responses should be emailed to: Feb2019RFP@lge-ku.com

Mailed responses should be sent to:

Chuck Schram, Director, Power Supply
LG&E and KU Energy LLC
Power Supply
220 West Main Street
Louisville, KY 40202

Phone: 502-627-3250

In closing, I look forward to your response by 4 P.M. EDT on March 29, 2019, and the possibility of doing business to meet the Companies' future power needs. Please contact me if you have any questions and would like to discuss further. For immediate concerns in my absence, please contact Linn Oelker, 502-627-3245.

Sincerely,

Chuck Schram
Director, Power Supply

# LG&E and KU Renewable RFP Data Form

*Note to respondent: Provide a separate term sheet for each different proposal or "Term of Contract". MW will be stated as an AC value at the delivery point.*

**Respondent** _____

**Product and Generation Characteristics:**

Proposal Description_____
_____
_____
_____
Generation Source Description _____
Transmission Interconnection Point of the Source _____
Point of interconnection to the grid _____
Start Date and Term of Contract _____
Nameplate Amount _____ MW
Summer Capacity Amount _____ MW
Summer Maximum Dispatch Capacity Amount (if applicable) _____MW
Summer Minimum Dispatch Capacity Amount (if applicable) _____ MW
Winter Capacity Amount _____ MW
Winter Maximum Dispatch Capacity Amount (if applicable) _____MW
Winter Minimum Dispatch Capacity Amount (if applicable) _____MW
Annual production capacity factor _____ percent
Output in 10 minutes _____MW (if applicable)
Guaranteed minimum Ramp capability _____MW/minute (if applicable)
Control of Ramp capability: min ramp rate up: ___ MW/minute and min ramp rate down___MW/minute (if applicable)
Start-up time to minimum capability (if applicable) _____
Start-up time to maximum capability (if applicable) _____
Minimum run time (if applicable) _____
Minimum down time (if applicable) _____
Constraints on production time (if applicable) _____
Forced Outage Rate _____%
Guaranteed Availability _____
Planned Outage Schedule _____
Annual Production Factor _____
Projected hourly electric energy production profile for a typical year over the term provided electronically. Yes ___ No___

**Pricing Information (provide a separate pricing form if applicable):**

Pricing (Provide pricing in one of the following formats)

Power and Energy

1. Fixed price over the term _____($/unit)
2. Escalating Price Over Term_____ ($/unit) escalating at ____ % per year

Other charges, if any, for delivery to the LG&E and KU transmission system.

## 1.1. All Proposals Received

| | Respondent | Tech-nology | Term (Years) | Nameplate Capacity (MW) | Start Year (Dec.) | Capacity Factor | Level Price ($/MWh) | Escalating Price ($/MWh) | Price Escalation Rate |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Vendor 1 | [redacted] | | | | | | | |
| 2 | Vendor 1 | | | | | | | | |
| 3 | Vendor 2 | | | | | | | | |
| 4 | Vendor 2 | | | | | | | | |
| 5 | Vendor 2 | | | | | | | | |
| 6 | Vendor 2 | | | | | | | | |
| 7 | Vendor 2 | | | | | | | | |
| 8 | Vendor 2 | | | | | | | | |
| 9 | Vendor 2 | | | | | | | | |
| 10 | Vendor 2 | | | | | | | | |
| 11 | Vendor 2 | | | | | | | | |
| 12 | Vendor 2 | | | | | | | | |
| 13 | Vendor 2 | | | | | | | | |
| 14 | Vendor 2 | | | | | | | | |
| 15 | Vendor 2 | | | | | | | | |
| 16 | Vendor 2 | | | | | | | | |
| 17 | Vendor 2 | | | | | | | | |
| 18 | Vendor 3 | | | | | | | | |
| 19 | Vendor 4 | | | | | | | | |
| 20 | Vendor 4 | | | | | | | | |
| 21 | Vendor 4 | | | | | | | | |
| 22 | Vendor 4 | | | | | | | | |
| 23 | Vendor 4 | | | | | | | | |
| 24 | Vendor 4 | | | | | | | | |
| 25 | Vendor 5 | | | | | | | | |
| 26 | Vendor 5 | | | | | | | | |
| 27 | Vendor 5 | | | | | | | | |
| 28 | Vendor 5 | | | | | | | | |

**CONFIDENTIAL INFORMATION REDACTED**

| | Respondent | Tech-nology | Term (Years) | Nameplate Capacity (MW) | Start Year (Dec.) | Capacity Factor | Level Price ($/MWh) | Escalating Price ($/MWh) | Price Escalation Rate |
|---|---|---|---|---|---|---|---|---|---|
| 29 | Vendor 6 | | | | | | | | |
| 30 | Vendor 6 | | | | | | | | |
| 31 | Vendor 6 | | | | | | | | |
| 32 | Vendor 6 | | | | | | | | |
| 33 | Vendor 7 | | | | | | | | |
| 34 | Vendor 7[1] | | | | | | | | |
| 35 | Vendor 7 | | | | | | | | |
| 36 | Vendor 8 | | | | | | | | |
| 37 | Vendor 8 | | | | | | | | |
| 38 | Vendor 9 | | | | | | | | |
| 39 | Vendor 9 | | | | | | | | |
| 40 | Vendor 9 | | | | | | | | |
| 41 | Vendor 9 | | | | | | | | |
| 42 | Vendor 9 | | | | | | | | |
| 43 | Vendor 9 | | | | | | | | |
| 44 | Vendor 9 | | | | | | | | |
| 45 | Vendor 10 | | | | | | | | |
| 46 | Vendor 10 | | | | | | | | |
| 47 | Vendor 10 | | | | | | | | |
| 48 | Vendor 10 | | | | | | | | |
| 49 | Vendor 10 | | | | | | | | |
| 50 | Vendor 10 | | | | | | | | |
| 51 | Vendor 11 | | | | | | | | |
| 52 | Vendor 11 | | | | | | | | |
| 53 | Vendor 11 | | | | | | | | |
| 54 | Vendor 12 | | | | | | | | |
| 55 | Vendor 12 | | | | | | | | |
| 56 | Vendor 12 | | | | | | | | |
| 57 | Vendor 12 | | | | | | | | |
| 58 | Vendor 12 | | | | | | | | |
| 59 | Vendor 12 | | | | | | | | |
| 60 | Vendor 12 | | | | | | | | |
| 61 | Vendor 12 | | | | | | | | |
| 62 | Vendor 12 | | | | | | | | |

[1] Vendor 7 and Vendor 11 updated their initial responses with new pricing. Updated prices are shown.

**CONFIDENTIAL INFORMATION REDACTED**

| | Respondent | Tech-nology | Term (Years) | Nameplate Capacity (MW) | Start Year (Dec.) | Capacity Factor | Level Price ($/MWh) | Escalating Price ($/MWh) | Price Escalation Rate |
|---|---|---|---|---|---|---|---|---|---|
| 63 | Vendor 12 | | | | | | | | |
| 64 | Vendor 12 | | | | | | | | |
| 65 | Vendor 12 | | | | | | | | |
| 66 | Vendor 12 | | | | | | | | |
| 67 | Vendor 12 | | | | | | | | |
| 68 | Vendor 12 | | | | | | | | |
| 69 | Vendor 12 | | | | | | | | |
| 70 | Vendor 12 | | | | | | | | |
| 71 | Vendor 12 | | | | | | | | |
| 72 | Vendor 13 | | | | | | | | |
| 73 | Vendor 13 | | | | | | | | |
| 74 | Vendor 14 | | | | | | | | |
| 75 | Vendor 14 | | | | | | | | |
| 76 | Vendor 14 | | | | | | | | |
| 77 | Vendor 14 | | | | | | | | |
| 78 | Vendor 14 | | | | | | | | |
| 79 | Vendor 14 | | | | | | | | |
| 80 | Vendor 14 | | | | | | | | |
| 81 | Vendor 14 | | | | | | | | |
| 82 | Vendor 14 | | | | | | | | |
| 83 | Vendor 14 | | | | | | | | |
| 84 | Vendor 14 | | | | | | | | |
| 85 | Vendor 14 | | | | | | | | |
| 86 | Vendor 14 | | | | | | | | |
| 87 | Vendor 14 | | | | | | | | |
| 88 | Vendor 14 | | | | | | | | |
| 89 | Vendor 14 | | | | | | | | |
| 90 | Vendor 15 | | | | | | | | |
| 91 | Vendor 15 | | | | | | | | |
| 92 | Vendor 16 | | | | | | | | |
| 93 | Vendor 16 | | | | | | | | |
| 94 | Vendor 16 | | | | | | | | |

**CONFIDENTIAL INFORMATION REDACTED**

Screening Analysis Results – All Initial Proposals

| Category | Group | Respondent | Tech-nology | Term (Years) | Nameplate Capacity (MW) | Start Year (Dec.) | Capacity Factor | Level Price ($/MWh) | Escalating Price ($/MWh) | Price Escalation Rate |
|---|---|---|---|---|---|---|---|---|---|---|
| Technology Type | Solar | Vendor 9 | [redacted] | | | | | | | |
| | | Vendor 10 | | | | | | | | |
| | | Vendor 14 | | | | | | | | |
| | | Vendor 14 | | | | | | | | |
| | | Vendor 11 | | | | | | | | |
| | | Vendor 6 | | | | | | | | |
| | | Vendor 9 | | | | | | | | |
| | | Vendor 2 | | | | | | | | |
| | | Vendor 15 | | | | | | | | |
| | | Vendor 14 | | | | | | | | |
| | | Vendor 2 | | | | | | | | |
| | | Vendor 14 | | | | | | | | |
| | | Vendor 2 | | | | | | | | |
| | | Vendor 15 | | | | | | | | |
| | | Vendor 9 | | | | | | | | |
| | | Vendor 2 | | | | | | | | |
| | | Vendor 7 | | | | | | | | |
| | | Vendor 4 | | | | | | | | |
| | | Vendor 6 | | | | | | | | |
| | | Vendor 4 | | | | | | | | |
| | | Vendor 6 | | | | | | | | |
| | | Vendor 2 | | | | | | | | |
| | | Vendor 8 | | | | | | | | |
| | | Vendor 8 | | | | | | | | |
| Technology Type | Solar | Vendor 4 | | | | | | | | |
| | | Vendor 4 | | | | | | | | |
| | | Vendor 12 | | | | | | | | |
| | | Vendor 4 | | | | | | | | |
| | | Vendor 4 | | | | | | | | |
| | | Vendor 6 | | | | | | | | |
| | | Vendor 2 | | | | | | | | |
| | | Vendor 12 | | | | | | | | |
| | | Vendor 12 | | | | | | | | |
| | | Vendor 12 | | | | | | | | |
| | | Vendor 12 | | | | | | | | |

**CONFIDENTIAL INFORMATION REDACTED**

| Category | Group | Respondent | Tech-nology | Term (Years) | Nameplate Capacity (MW) | Start Year (Dec.) | Capacity Factor | Level Price ($/MWh) | Escalating Price ($/MWh) | Price Escalation Rate |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Vendor 12 | | | | | | | | |
| | | Vendor 12 | | | | | | | | |
| | | Vendor 12 | | | | | | | | |
| | | Vendor 12 | | | | | | | | |
| | | Vendor 5 | | | | | | | | |
| | | Vendor 5 | | | | | | | | |
| | | Vendor 12 | | | | | | | | |
| | | Vendor 7 | | | | | | | | |
| | | Vendor 12 | | | | | | | | |
| | | Vendor 5 | | | | | | | | |
| | | Vendor 5 | | | | | | | | |
| | | Vendor 12 | | | | | | | | |
| | | Vendor 1 | | | | | | | | |
| Technology Type | Solar | Vendor 13 | | | | | | | | |
| | | Vendor 13 | | | | | | | | |
| | | Vendor 1 | | | | | | | | |
| | | Vendor 2 | | | | | | | | |
| | | Vendor 2 | | | | | | | | |
| | | Vendor 2 | | | | | | | | |
| | | Vendor 3 | | | | | | | | |
| | Wind | Vendor 12 | | | | | | | | |
| | | Vendor 12 | | | | | | | | |
| | | Vendor 16 | | | | | | | | |
| | | Vendor 16 | | | | | | | | |
| | | Vendor 16 | | | | | | | | |
| | Battery | Vendor 12 | | | | | | | | |
| | | Vendor 14 | | | | | | | | |
| | | Vendor 14 | | | | | | | | |
| | | Vendor 14 | | | | | | | | |
| | | Vendor 14 | | | | | | | | |
| Name plate Capac ity | 0-25 | Vendor 3 | | | | | | | | |
| | | Vendor 12 | | | | | | | | |

**CONFIDENTIAL INFORMATION REDACTED**

| Category | Group | Respondent | Tech-nology | Term (Years) | Nameplate Capacity (MW) | Start Year (Dec.) | Capacity Factor | Level Price ($/MWh) | Escalating Price ($/MWh) | Price Escalation Rate |
|---|---|---|---|---|---|---|---|---|---|---|
| | 26-50 | Vendor 7 | [redacted] | | | | | | | |
| | | Vendor 12 | | | | | | | | |
| | | Vendor 7 | | | | | | | | |
| | | Vendor 12 | | | | | | | | |
| Nameplate Capacity (MW) | 26-50 | Vendor 2 | | | | | | | | |
| | | Vendor 2 | | | | | | | | |
| | | Vendor 2 | | | | | | | | |
| | 51 - 75 | Vendor 12 | | | | | | | | |
| | | Vendor 12 | | | | | | | | |
| | 76-100 | Vendor 9 | | | | | | | | |
| | | Vendor 11 | | | | | | | | |
| | | Vendor 6 | | | | | | | | |
| | | Vendor 9 | | | | | | | | |
| | | Vendor 15 | | | | | | | | |
| | | Vendor 15 | | | | | | | | |
| | | Vendor 9 | | | | | | | | |
| | | Vendor 6 | | | | | | | | |
| | | Vendor 6 | | | | | | | | |
| | | Vendor 8 | | | | | | | | |
| | | Vendor 8 | | | | | | | | |
| | | Vendor 4 | | | | | | | | |
| | | Vendor 4 | | | | | | | | |
| | | Vendor 6 | | | | | | | | |
| | | Vendor 12 | | | | | | | | |
| | | Vendor 12 | | | | | | | | |
| | | Vendor 12 | | | | | | | | |
| | | Vendor 5 | | | | | | | | |
| | | Vendor 5 | | | | | | | | |
| | | Vendor 12 | | | | | | | | |
| | | Vendor 5 | | | | | | | | |
| | | Vendor 5 | | | | | | | | |
| | | Vendor 1 | | | | | | | | |
| Nameplate Capacity (MW) | 76-100 | Vendor 13 | | | | | | | | |
| | | Vendor 13 | | | | | | | | |
| | | Vendor 1 | | | | | | | | |
| | 101-125 | Vendor 14 | | | | | | | | |
| | | Vendor 14 | | | | | | | | |

**CONFIDENTIAL INFORMATION REDACTED**

| Category | Group | Respondent | Tech-nology | Term (Years) | Nameplate Capacity (MW) | Start Year (Dec.) | Capacity Factor | Level Price ($/MWh) | Escalating Price ($/MWh) | Price Escalation Rate |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Vendor 14 | | | | | | | | |
| | | Vendor 14 | | | | | | | | |
| | | Vendor 16 | | | | | | | | |
| | | Vendor 16 | | | | | | | | |
| | | Vendor 16 | | | | | | | | |
| | 126-150 | Vendor 4 | | | | | | | | |
| | | Vendor 4 | | | | | | | | |
| | | Vendor 14 | | | | | | | | |
| | | Vendor 14 | | | | | | | | |
| | | Vendor 14 | | | | | | | | |
| | | Vendor 14 | | | | | | | | |
| | 151-175 | Vendor 2 | | | | | | | | |
| | | Vendor 2 | | | | | | | | |
| | | Vendor 2 | | | | | | | | |
| | 176-200 | Vendor 10 | | | | | | | | |
| Nameplate Capacity (MW) | 176-200 | Vendor 12 | | | | | | | | |
| | | Vendor 12 | | | | | | | | |
| | | Vendor 2 | | | | | | | | |
| | | Vendor 4 | | | | | | | | |
| | | Vendor 4 | | | | | | | | |
| | | Vendor 2 | | | | | | | | |
| | | Vendor 12 | | | | | | | | |
| | | Vendor 2 | | | | | | | | |
| | | Vendor 12 | | | | | | | | |
| | | Vendor 12 | | | | | | | | |
| | | Vendor 12 | | | | | | | | |
| Contact Term (Years) | 10 | Vendor 2 | | | | | | | | |
| | | Vendor 9 | | | | | | | | |
| | | Vendor 2 | | | | | | | | |
| | | Vendor 2 | | | | | | | | |
| | 1 2 | Vendor 16 | | | | | | | | |
| | 15 | Vendor 10 | | | | | | | | |
| | | Vendor 12 | | | | | | | | |

**CONFIDENTIAL INFORMATION REDACTED**

| Category | Group | Respondent | Tech-nology | Term (Years) | Nameplate Capacity (MW) | Start Year (Dec.) | Capacity Factor | Level Price ($/MWh) | Escalating Price ($/MWh) | Price Escalation Rate |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Vendor 9 | [redacted] | | | | | | | |
| | | Vendor 14 | | | | | | | | |
| | | Vendor 2 | | | | | | | | |
| | | Vendor 14 | | | | | | | | |
| | | Vendor 15 | | | | | | | | |
| | | Vendor 2 | | | | | | | | |
| | | Vendor 6 | | | | | | | | |
| | | Vendor 6 | | | | | | | | |
| | | Vendor 16 | | | | | | | | |
| | | Vendor 2 | | | | | | | | |
| Contact Term (Years) | 15 | Vendor 14 | | | | | | | | |
| | | Vendor 14 | | | | | | | | |
| | 20 | Vendor 9 | | | | | | | | |
| | | Vendor 14 | | | | | | | | |
| | | Vendor 14 | | | | | | | | |
| | | Vendor 11 | | | | | | | | |
| | | Vendor 12 | | | | | | | | |
| | | Vendor 6 | | | | | | | | |
| | | Vendor 15 | | | | | | | | |
| | | Vendor 7 | | | | | | | | |
| | | Vendor 4 | | | | | | | | |
| | | Vendor 6 | | | | | | | | |
| | | Vendor 8 | | | | | | | | |
| | | Vendor 8 | | | | | | | | |
| | | Vendor 4 | | | | | | | | |
| | | Vendor 12 | | | | | | | | |
| | | Vendor 2 | | | | | | | | |
| | | Vendor 4 | | | | | | | | |
| | | Vendor 2 | | | | | | | | |
| | | Vendor 12 | | | | | | | | |
| | | Vendor 12 | | | | | | | | |
| | | Vendor 12 | | | | | | | | |
| | | Vendor 12 | | | | | | | | |
| | | Vendor 12 | | | | | | | | |
| | | Vendor 12 | | | | | | | | |

**CONFIDENTIAL INFORMATION REDACTED**

| Category | Group | Respondent | Tech-nology | Term (Years) | Nameplate Capacity (MW) | Start Year (Dec.) | Capacity Factor | Level Price ($/MWh) | Escalating Price ($/MWh) | Price Escalation Rate |
|---|---|---|---|---|---|---|---|---|---|---|
| Contact Term (Years) | 20 | Vendor 12 | [redacted] | | | | | | | |
| | | Vendor 12 | | | | | | | | |
| | | Vendor 12 | | | | | | | | |
| | | Vendor 7 | | | | | | | | |
| | | Vendor 12 | | | | | | | | |
| | | Vendor 5 | | | | | | | | |
| | | Vendor 5 | | | | | | | | |
| | | Vendor 12 | | | | | | | | |
| | | Vendor 13 | | | | | | | | |
| | | Vendor 13 | | | | | | | | |
| | | Vendor 1 | | | | | | | | |
| | | Vendor 2 | | | | | | | | |
| | | Vendor 3 | | | | | | | | |
| | | Vendor 12 | | | | | | | | |
| | | Vendor 14 | | | | | | | | |
| | | Vendor 14 | | | | | | | | |
| | | Vendor 16 | | | | | | | | |
| | 25 | Vendor 4 | | | | | | | | |
| | | Vendor 4 | | | | | | | | |
| | | Vendor 4 | | | | | | | | |
| | | Vendor 1 | | | | | | | | |
| Contact Term (Years) | 30 | Vendor 5 | | | | | | | | |
| | | Vendor 5 | | | | | | | | |
| Other <$30/MWh | | Vendor 9 | | | | | | | | |
| | | Vendor 10 | | | | | | | | |
| | | Vendor 14 | | | | | | | | |
| | | Vendor 14 | | | | | | | | |
| | | Vendor 11 | | | | | | | | |
| | | Vendor 12 | | | | | | | | |