COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

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
LOUISVILLE GAS AND ELECTRIC COMPANY
TO
COMMISSION STAFF'S FOURTH REQUEST FOR INFORMATION
DATED FEBRUARY 26, 2021

FILED: MARCH 12, 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

Robert M. Conroy

Subscribed and sworn to before me, a Notary Public in and before said County and State, this 8th day of March 2021.

Judy Schooler

Notary Public

Notary Public ID No. 603967

My Commission Expires:

July 11, 2022

VERIFICATION

COMMONWEALTH OF KENTUCKY)
)
COUNTY OF JEFFERSON)

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

Eileen L. Saunders
Eileen L. Saunders

Subscribed and sworn to before me, a Notary Public in and before said County and State, this 8th day of March 2021.

Judy Schooler
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 10th day of March 2021.

_____________________(SEAL)
Notary Public

Notary Public ID No. 201821300096

My Commission Expires:
7/29/2023

Kyle Mello
NOTARY PUBLIC
BUNCOMBE COUNTY, NC
MY COMMISSION EXPIRES 7/29/2023

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

David S. Sinclair

Subscribed and sworn to before me, a Notary Public in and before said County and State, this 8th day of March 2021.

Judy Schooler

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.

JK Wolfe
John K. Wolfe

Subscribed and sworn to before me, a Notary Public in and before said County and State, this 8th day of March 2021.

Judy Schooler
Notary Public

Notary Public ID No. 603967

My Commission Expires:

July 11, 2022

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Commission Staff's Fourth Request for Information
Dated February 26, 2021

Case No. 2020-00350

Question No. 1

Responding Witness: Robert M. Conroy / John K. Wolfe

Q-1. Refer to the Application, Tab 4, P.S.C. Electric No. 13, Original Sheet No. 108 through Original Sheet No. 108.5, Net Metering Service Interconnection Guidelines. Explain the reasons for the additions to and deletions from the Net Metering Service Interconnection Guidelines.

A-1. For ease of reference, the Company has performed a redlined comparison of the text (without headers and footers) of its current Net Metering Service Interconnection Guidelines from Sheet Nos. 57.1 through 57.5 to its proposed Net Metering Service Interconnection Guidelines at Sheet Nos. 108 through 108.5; see attached. In the attachment, all substantive revisions are contained in numbered red-outlined boxes to which the discussion below refers. The few remaining revisions, which can be seen in the redlined attachment, are non-substantive corrections to spelling or grammatical or stylistic improvements.

- Change 1: This paragraph currently appears as the first paragraph in the Metering and Billing Section of Rider NMS, Sheet No. 57. Rather than repeat this paragraph in both new proposed net metering riders (Riders NMS-1 and NMS-2), the Company moved this paragraph to the Net Metering Service Interconnection Guidelines, where it is stated only once. Moreover, this paragraph concerns metering for net metering installations, which the Company believes is appropriately placed in the Interconnection Guidelines rather than the more rate-oriented rider text.

- Change 2: The added text is a verbatim quote from KRS 278.465(1).

- Change 3: Anti-islanding is a safety feature required by UL 1741 and IEEE 1547 that serves to protect customers and Company personnel by cutting off power from distributed generators if a distribution line segment or circuit is otherwise de-energized.

- Change 4: The Company's current Interconnection Guidelines for Level 2 generators at Sheet No. 57.2 refer to the "Company's technical interconnection requirements" and state that "[t]hose requirements are available on line at www.lge-ku.com and upon request." The Commission has previously approved the Company's tariff with substantively identical text.[2] Also, the current text is largely identical to the relevant text the Commission approved for all utilities in Administrative Case No. 2008-00169, which refers to the "Utility's technical interconnection requirements," and states, "The Utility shall make its technical interconnection requirements available online and upon request."[3] The Company's proposed change would move the text forward in the Interconnection Guidelines and make the provision applicable to both Level 1 and Level 2 generating systems. The purpose of the change is to ensure that the latest safety and technical requirements, including those promulgated by UL and IEEE, are available to net metering customers and to help ensure safe and reliable service to all the Company's customers without filing a tariff revision for each and every safety or technical standard change made by a relevant authority. The Company's collection of these requirements is its Interconnection Requirements for Customer-Sited Generation.

- Change 5: This addition gives the Company the right to have its systems communicate with and obtain data from net metering customers' generating systems to help ensure the safe and reliable operation of the Company's distribution grid for all customers. Obtaining such data will allow the Company to operate its current distribution system efficiently and safely, and it will allow the Company to better plan its system in the future.

- Change 6: If a customer begins taking service from the Company with a certain set of electrical requirements and subsequently installs significant self-generating capacity while also growing its load—load the customer does not ask the Company to serve—and then the customer's self-generating assets fail, the Company might not be able to serve all of the customer's load with the Company's previously installed facilities. The need to install additional facilities or the increase in demand charges such a customer might incur as a result of the failure of the customer's self-generation (or both) could cause increased costs to the affected customer. This proposed provision puts customers on notice concerning that potential outcome.

---

[2] *See Development of Guidelines for Interconnection and Net Metering for Certain Generators with Capacity up to Thirty Kilowatts*, Admin. Case No. 2008-00169, Order at 3 (Ky. PSC Aug. 17, 2009); *Application of Kentucky Utilities Company for an Adjustment of Base Rates*, Case No. 2009-00549, Order (Ky. PSC July 30, 2010); *Application of Kentucky Utilities Company for an Adjustment of Its Electric Rates*, Case No. 2012-00222, Order (Ky. PSC Dec. 20, 2012); *Application of Kentucky Utilities Company for an Adjustment of Its Electric Rates*, Case No. 2014-00372, Order (Ky. PSC June 30, 2015); *Electronic Application of Kentucky Utilities Company for an Adjustment of Its Electric Rates and for Certificates of Public Convenience and Necessity*, Case No. 2016-00371, Order (Ky. PSC June 22, 2017); *Electronic Application of Kentucky Utilities Company for an Adjustment of Its Electric Rates*, Case No. 2018-00295, Order (Ky. PSC Apr. 30, 2019).

[3] Admin. Case No. 2008-00169, Order Appx. A at 5 (Ky. PSC Jan. 8, 2009).

- Changes 7, 9, 12, 13, and 15: All of these changes involve updating references to the relevant UL, IEEE, NFPA, and NEC safety and technical requirements, as well as referring to the Company's Interconnection Requirements for Customer-Sited Generation that the Company proposes be applicable to both Level 1 and Level 2 customer generating facilities.

- Changes 8 and 11: These changes are necessary to ensure the Company is fully apprised of the details of customers' generating systems being interconnected to the Company's grid and to ensure the Company has the authority to deny interconnection after an initial approval if a customer's system changes in ways that could create safety or reliability concerns. In addition, for legacy Rider NMS-1 customers, it is the Company's position that modifying generating capacity after Rider NMS-2 goes into effect causes such facilities to lose their legacy status, which Change 8 reflects for Level 1 installations. Change 11 should also reflect that position for Level 2 installations; the Company will include similar text for Level 2 installations if the Commission approves the provision.

- Change 10: The Company deleted the first sentence shown in Change 10 because it is inconsistent with a sentence later in the same paragraph, which states, "Approval is contingent upon an initial inspection and witness test at the discretion of Company." The Company deleted the second sentence shown in Change 10 because the Company moved the sentence to an earlier provision of the Interconnection Guidelines; it was not necessary to repeat it.

- Change 14: This addition reflects the lack of need for an external disconnect switch ("EDS") for certain net metering installations if they meet the relevant safety requirements. The purpose of this provision is to ensure safety while also avoiding unnecessary cost and redundancy; if an EDS would be superfluous, the Company does not intend to require a customer to bear the expense of installing one.

1 Net metering service shall be measured using a single meter or, as determined by Company, additional meters and shall be measured in accordance with standard metering practices by metering equipment capable of registering power flow in both directions for each time period defined by the applicable rate schedule. This net metering equipment shall be provided without any additional cost to Customer. This provision does not relieve Customer's responsibility to pay metering costs embedded in Company's Commission-approved base rates. Additional meters, requested by Customer, will be provided at Customer's expense.

Customer shall operate the generating facility in parallel with Company's system under the following conditions and any other conditions required by Company where unusual circumstances arise not covered herein:

2 1. Customer to own, operate, and maintain all generating facilities on their premises for the primary purpose of supplying all or part of the customer's own electricity requirements. Such facilities shall include, but not be limited to, necessary control equipment to synchronize frequency, voltage, etc., between Customer's and Company's system as well as adequate protective equipment between the two systems. Customer's voltage at the point of interconnection will be the same as Company's system voltage.

3 2. Customer will be responsible for ensuring an anti-islanding safety feature is in place as required by applicable codes and standards.

4 3. Customer will ensure that all generating facilities comply with the Company's Interconnection Requirements for Customer-Sited Distributed Generation. Those requirements are available on line at www.lge-ku.com and upon request.

5 ~~2~~4. Customer shall allow data communications between the Customer's distributed generation equipment and the Company's control systems or other assets, where required by the Company for planning, coordination, reliability, or power quality purposes.

5. Customer will be responsible for operating all generating facilities owned by Customer, except as specified hereinafter. Customer will maintain its system in synchronization with Company's system.

~~3~~6. Customer will be responsible for any damage done to Company's equipment due to failure of Customer's control, safety, or other equipment.

~~4~~7. Customer agrees to inform Company of any changes it wishes to make to its generating or associated facilities that differ from those initially installed and described to Company in writing ~~and~~to obtain ~~prior~~ approval from Company.

~~5~~8. Company will have the right to inspect and approve Customer's facilities described herein, and to conduct any tests necessary to determine that such facilities are installed and operating properly; however, Company will have no obligation to inspect, witness tests, or in any manner be responsible for Customer's facilities or operation thereof.

~~6~~9. Customer assumes all responsibility for the electric service on Customer's premises at and from the point of delivery of electricity from Company and for the wires and equipment used in connection therewith, and will protect and save Company harmless from all claims for injury or damage to persons or property occurring on Customer's premises or at and from the point of delivery of electricity from Company, occasioned by such electricity or said wires and equipment, except where said injury or damage will be shown to have been occasioned solely by the negligence or willful misconduct of Company.

6 10. Customer recognizes that Company may or may not have adequate facilities to serve customer's total load at the time of any partial or full failure of customer's self-generation. Company will work with the customer to serve their load requirements which may be at additional cost to the customer.

Level 1 – A Level 1 installation is defined as an inverter-based generator certified as meeting the
7 requirements of Institute of Electrical and Electronics Engineers (IEEE) Standard 1547, Underwriters Laboratories (UL) Standard 1741, and meeting the following conditions:

1. The aggregated net metering generation on a radial distribution circuit will not exceed 15% of the line section's most recent one hour peak load. A line section is the smallest part of the primary distribution system the generating facility could remain connected to after operation of any sectionalizing devices.

2. The aggregated net metering generation on a shared singledsingle-phase secondary will not exceed 20 kVA or the nameplate rating of the service transformer.
3. A single-phase net metering generator interconnected on the center tap neutral of a 240 volt service shall not create an imbalance between the two sides of the 240 volt service of more than 20% of the nameplate rating of the service transformer.
4. A net metering generator interconnected to Company's three-phase, three-wire primary distribution lines, shall appear as a phase-to-phase connection to Company's primary distribution line.
5. A net metering generator interconnected to Company's three-phase, four-wire primary distribution lines, shall appear as an effectively grounded source to Company's primary distribution line.
6. A net metering generator will not be connected to an area or spot network.
7. There are no identified violations of the applicable provisions of IEEE 1547, "Standard for Interconnecting Distributed Resources with Electric Power Systems".
8. Company will not be required to construct any facilities on its own system to accommodate the net metering generator.

Customer desiring a Level 1 interconnection shall submit a "LEVEL 1 - Application for Interconnection and Net Metering." Company shall notify Customer within 20 business days as to whether the request is approved or, if denied, the reason(s) for denial. If additional information is required, Company will notify Customer, and the time between notification and submission of the information shall not be counted towards the 20 business days. Approval is contingent upon an initial inspection and witness test at the discretion of Company. Following Company approval of an application, any deviations in the installation from the submitted plan must be re-submitted to the Company for approval. This includes, but is not limited to: modifications in generation capacity, equipment selection, installation methods, and installation of additional equipment. Any modification in generation capacity related to existing customers taking service under NMS-1 will cause their service to be transitioned to NMS-2.

8

9 **Level 2** – A Level 2 installation is defined as generator that ~~is not inverter-based; that uses equipment not certified as meeting the requirements of Underwriters Laboratories Standard 1741, or that~~ does not meet one or more of the conditions required of a Level 1 net metering generator~~. A Level 2~~; that is not inverter-based; or that uses equipment not certified as meeting the requirements of IEEE 1547 and UL 1741.

10 ~~Application will be approved if the generating facility meets Company's technical interconnection requirements. Those requirements are available on line at www.lge-ku.com and upon request.~~

Customer desiring a Level 2 interconnection shall submit a "LEVEL 2 - Application for Interconnection and Net Metering." Company shall notify Customer within 30 business days as to whether the request is approved or, if denied, the reason(s) for denial. If additional information is required, Company will notify Customer, and the time between notification and submission of the information shall not be counted towards the 30 business days. Approval is contingent upon an initial inspection and witness test at the discretion of Company. Following Company approval of an application, any deviations in the installation from the submitted plan must be re-submitted to the Company for approval. This includes, but is not limited to: modifications in generation capacity, equipment selection, installation methods, and installation of additional equipment.

11

Customer submitting a "Level 2 - Application for Interconnection and Net Metering" will provide a non-refundable inspection and processing fee of $100, and in the event that Company determines an impact study to be necessary, shall be responsible for any reasonable costs of up to $1,000 of documented costs for the initial impact study.

Additional studies requested by Customer shall be at Customer's expense.

Customer may operate ~~his~~ net metering generator(s) in parallel with Company's system when complying with the following conditions:

1. Customer shall install, operate, and maintain, at Customer's sole cost and expense, any control, protective, or other equipment on Customer's system required by Company's

12 ~~technical interconnection requirements based on IEEE 1547, NEC~~ Interconnection Requirements for Customer-Sited Distributed Generation, applicable codes and standards, accredited testing laboratories, and the manufacturer's suggested practices for safe, efficient and reliable operation of the net metering generating facility in parallel with Company's system. Customer bears full responsibility for the installation, maintenance and safe operation of the net metering generating facility. Upon reasonable request from Company, Customer shall demonstrate compliance.

2. Customer shall represent and warrant compliance of the net metering generator with:
a. any applicable safety and power standards established by IEEE, UL and other accredited testing laboratories;
13 ~~laboratories;~~
b. NFPA 70, National Electric Code (NEC~~,~~), as may be revised from time-to-time;
c. Company's Interconnection Requirements for Customer-Sited Distributed Generation;
d. Company's rules and regulations and Terms and Conditions, as may be revised by time-to-time by the Kentucky Public Service Commission;
~~d~~e. the rules and regulations of the Kentucky Public Service Commission, as may be revised by time-to-time by the Kentucky Public Service Commission:
~~e~~f. all other local, state, and federal codes and laws, as may be in effect from time-to-time.

3. Any changes or additions to Company's system required to accommodate the net metering generator shall be Customer's financial responsibility and Company shall be reimbursed for such changes or additions prior to construction.

4. Customer shall operate the net metering generator in such a manner as not to cause undue fluctuations in voltage, intermittent load characteristics or otherwise interfere with the operation of Company's electric system. Customer shall so operate the generating facility in such a manner that no adverse impacts will be produced thereby to the service quality rendered by Company to any of its other Customers or to any electric system interconnected with Company's electric system.

5. Customer shall be responsible for protecting, at Customer's sole cost and expense, the net metering generating facility from any condition or disturbance on Company's electric system, including, but not limited to, voltage sags or swells, system faults, outages, loss of a single phase of supply, equipment failures, and lightning or switching surges, except that Company shall be responsible for repair of damage caused to the net metering generator resulting solely from the negligence or willful misconduct on the part of Company.

6. Following the initial testing and inspection of the generating facility and upon reasonable advance notice to Customer, Company shall have access at reasonable times to the generating facility to perform reasonable on-site inspections to verify that the installation, maintenance and operation of the net metering generator comply with the requirements of this rider.

7. Where required by Company, Customer shall furnish and install on Customer's side of the point of interconnection a safety disconnect switch which shall be capable of fully disconnecting Customer's net metering generator from Company's electric service under the full rated conditions of Customer's net metering generator. The external disconnect switch (EDS) shall be located adjacent to Company's meters or the location of the EDS shall be noted by placing a sticker on the meter, and shall be of the visible break type in a metal enclosure which can be secured by a padlock. If the EDS is not located directly adjacent to the meter, Customer shall be responsible for ensuring the location of the EDS is properly and legibly identified for so long as the net metering generator is operational.

14 The disconnect switch shall be accessible to Company personnel at all times. Certain installations meeting a list of requirements specified in the Company's Interconnection Requirements for Customer-Sited Distributed Generation may be exempt from the EDS requirement. Company may waive the requirement for an external disconnect switch for a net metering generator at its sole discretion, and on a case by case basis.

8. Company shall have the right and authority at Company's sole discretion to isolate the

generating facility or require Customer to discontinue operation of the net metering generator if Company believes that:

a. continued interconnection and parallel operation of the net metering generator with Company's electric system creates or contributes (or may create or contribute) to a system emergency on either Company's or Customer's electric system;

b. the net metering generator is not in compliance with the requirements of this rider~~,~~ and the non-compliance adversely affects the safety, reliability or power quality of Company's electric system; or

c. the net metering generator interferes with the operation of Company's electric system.

In non-emergency situations, Company shall give Customer notice of noncompliance including a description of the specific noncompliance condition and allow Customer a reasonable time to cure the noncompliance prior to isolating the Generating Facilities. In emergency situations, where Company is unable to immediately isolate or cause Customer to isolate only the net metering generator, Company may isolate Customer's entire facility.

9. Customer agrees that, without the prior written permission from Company, no changes shall be made to the generating facility as initially approved. Increases in net metering generator capacity will require a new "Application for Interconnection and Net Metering" which will be evaluated on the same basis as any other new application. Repair and replacement of existing generating facility components with like components that meet ~~UL 1741~~all applicable codes and standards certification
15 requirements, including but not limited to IEEE 1547 and UL 1741, for Level 1 facilities and not resulting in increases in net metering generator capacity is allowed without approval.

10. Customer shall protect, indemnify and hold harmless Company and its directors, officers, employees, agents, representatives and contractors against and from all loss, claims, actions or suits, including costs and attorneys' fees, for or on account of any injury or death of persons or damage to property caused by Customer or Customer's employees, agents, representatives and contractors in tampering with, repairing, maintaining or operating Customer's net metering generator or any related equipment or any facilities owned by Company, except where such injury, death or damage was caused or contributed to by the fault or negligence of Company or its employees, agents, representatives or contractors. The liability of Company to Customer for injury to person and property shall be governed by the tariff(s) for the class of service under which Customer is taking service.

11. Customer shall maintain general liability insurance coverage (through a standard homeowner's, commercial or other policy) for generating facilities. Customer shall upon request provide Company with proof of such insurance at the time that application is made for net metering.

12. By entering into an Interconnection Agreement, or by inspection, if any, or by non-rejection, or by approval, or in any other way, Company does not give any warranty, express or implied, as to the adequacy, safety, compliance with applicable codes or requirements, or as to any other characteristics, of the generating facility equipment, controls, and protective relays and equipment.

13. Customer's generating facility is transferable to other persons or service locations only after notification to Company has been made and verification that the installation is in compliance with this tariff. Upon written notification that an approved generating facility is being transferred to another person, Customer, or location, Company will verify that the installation is in compliance with this tariff and provide written notification to the Customer(s) within 20 business days. If the installation is no longer in compliance with this tariff, Company will notify Customer in writing and list what must be done to place the facility in compliance.

14. Customer shall retain any and all Renewable Energy Credits (RECs) generated by Customer's generating facilities.

TERMS AND CONDITIONS

Except as provided herein, service will be furnished under Company's Terms and Conditions applicable hereto.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Commission Staff's Fourth Request for Information
Dated February 26, 2021

Case No. 2020-00350

Question No. 2

Responding Witness: Robert M. Conroy

Q-2. Refer to the Application, Tab 4, P.S.C. Electric No. 13, Original Sheet No. 108, Net Metering Service Interconnection Guidelines, Terms and Conditions number 3. Explain why LG&E's Interconnection Requirements for Customer-Sited Distributed Generation are only available online and upon request and are not included in LG&E's tariffs or filed with the Commission in some other manner.

A-2. See the response to Question No. 1 concerning Change 4.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Commission Staff's Fourth Request for Information
Dated February 26, 2021

Case No. 2020-00350

Question No. 3

Responding Witness: Robert M. Conroy

Q-3. Refer to the questions propounded by Strategen Consulting, LLC, which are attached as an Appendix to this information request, and provide responses to those questions.[4]

A-3. The Company has provided responses below.

[4] Note that the questions propounded by Strategen Consulting, LLC, in the instant case are the same questions that are propounded in Case No. 2020-00349, Electronic Application of Kentucky Utilities Company for an Adjustment of its Electric Rates, A Certificate of Public Convenience and Necessity to Deployment Advanced Metering Infrastructure, Approval of Certain Regulatory and Accounting Treatments, and Establishment of a One-Year Surcredit (Application filed Nov. 25, 2020).

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Commission Staff's Fourth Request for Information
Dated February 26, 2021

Case No. 2020-00350

Strategen Question No. 1

Responding Witness: William Steven Seelye

Q-1. Reference Seelye Direct. Provide all associated schedules, exhibits, and workpapers in live, unlocked Excel spreadsheets with all links and formula intact.

A-1. See the response and attachments to PSC 1-56 and PSC 1-57.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Commission Staff's Fourth Request for Information
Dated February 26, 2021

Case No. 2020-00350

Strategen Question No. 2

Responding Witness: Eileen L. Saunders

Q-2. Reference Seelye Direct, page 44, lines 1-2. Provide the nameplate capacity and the generation technology (e.g., PV, hydro, etc.) of each facility currently taking service under rider SQF, distinguishing between facilities that are cogen vs "small production" QFs.

A-2. See table below for a listing of capacity, generation technology, and type of facility, for each facility currently taking service under Rider SQF as of March 1, 2021.

Facility	Capacity kW	Generation Technology	Facility Type
1	73.44	Photovoltaic	Small Production

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Commission Staff's Fourth Request for Information
Dated February 26, 2021

Case No. 2020-00350

Strategen Question No. 3

Responding Witness: Eileen L. Saunders

Q-3 Reference Seelye Direct, page 43, lines 8-12. Explain if customer-generators will need any new or different metering infrastructure under the proposed NMS-2 schedule? If alternative metering is required, explain the functionality that the Company is proposing (e.g., how many TOU periods will the meter be capable of accommodating).

A-3. New or different metering infrastructure will not be needed under the proposed Rider NMS-2. Also, see the responses to KSIA 1-15 and KSIA 1-17.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Commission Staff's Fourth Request for Information
Dated February 26, 2021

Case No. 2020-00350

Strategen Question No. 4

Responding Witness: William Steven Seelye / Counsel

Q-4. Reference Seelye Direct, page 44, lines 10-15.

a. Is Mr. Seelye familiar with PJM's effective load carrying capability (ELCC) construct[1]?

b. Explain how the ELCC methodology is consistent with the conclusion drawn in the referenced testimony.

A-4.

a. Yes.

b. Neither LG&E nor KU is a member of PJM. Therefore, the PJM's use of ELCC has no direct relevance to LG&E and KU. As a general matter, PJM's use of ELCC cannot be considered in isolation from all the other attributes, programs, objectives, cost sharing goals, socializations, etc. of PJM and its members (i.e., without regard to all individual "constructs" that form the basis of the PJM 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 PJM capacity market cannot be selectively considered in isolation from all other aspects of PJM. Furthermore, an individual utility's policies and practices cannot be expected to mirror those of a regional transmission organization and energy and capacity market such as PJM, to which LG&E and KU do not belong.

ELCC modelling is based on the loss-of-load probability (LOLP) concept, which is used in the Companies' electric cost of service studies. However, ELCC can be based on a number of other reliability measures, such as Loss of Load Expectation (LOLE), Loss of Load Hours (LOLH), Expected Unserved Energy (EUE), etc. It calculates the approximate ELCC value using LOLP or one of these other metrics for each hour of the year, focusing particularly on periods of high LOLP. If ELCC modelling incorporates a

[1]See e.g., https://www.pjm.com/directory/etariff/FercDockets/5832/20201030-er21-278-000.pdf

sufficient amount of historical data reflecting the possible occurrence of extreme weather events, ELCC modelling can be a useful tool for measuring the capacity value of generation resources.

In PJM, ELCC modelling is not performed for roof-top solar applications or net metering customers. Only large-scale wind farms and solar farms are currently modelled using ELCC. There are several reasons for this, but one of them is that a net metering customer's solar panels or other generation facilities supply energy to meet the customer's own energy needs first; only when the energy from the customers' generation facilities exceeds the customer's own energy needs does energy flow to the grid. This is entirely unlike any other generating resource the Companies might use; no other generator the Companies deploy necessarily serves one customer first before being available to serve all other customers. Therefore, it would be entirely inappropriate to use ELCC to calculate the capacity value of net metering facilities, at least if that value is to be used to compensate net metering customers for capacity that by its very nature cannot be used to serve all customers.

Moreover, because a residential customer's own utilization of energy will generally closely mirror other residential customers on the system, a net metering customer will likely not be supplying energy to the grid at the time of the utility's system peak but will be supplying the excess energy to the grid when capacity is not needed by the utility to meet peak demands.[2] Consequently, even if it could be calculated in some meaningful manner, the ELCC value of net metering energy supplied to the grid from a net metering customer would not correspond to the value of capacity from a large-scale solar farm that supplies all of its generation to the grid. The energy supplied from a net metering customer with roof-top solar panels would have a much lower ELCC value than a stand-alone solar farm.

Additionally, ELCC modelling requires multiple years of hourly production data for each resource, and preferably many years of data. Multiple years of data are necessary to evaluate the performance of generating resources during extreme weather conditions, such as what recently occurred in Texas in February 2021 and such as the weather conditions that occurred in Kentucky in January 1994. See response to Question No. 14. Modelling ELCCs using

[2] This is an observable phenomenon related to the load pattern that has been seen in the California ISO (CAISO), which has been called the "Duck Curve". In California, the system peak will often occur during the evening hours around 9 PM. Therefore, when the system peak demand is ramping up, solar is no longer generating power. This results in excess generation by distributed generation facilities during daylight hours and an insufficiency of energy during peak hours that occur during the evening. See Paul Denholm, et al "Overgeneration from Solar Energy in California: A Field Guide to the Duck Chart," National Renewable Energy Laboratory, November 2015, at page 3. This contributed to the California blackouts that occurred in 2020. See California ISO, "Preliminary Root Cause Analysis: Mid-August 2020 Heat Storm," October 6, 2020.

just of few years of data, without considering extreme weather events, could overstate the capacity value of particular resources. Failure to consider extreme weather conditions over a sufficiently long period of time could lead to risks of power outages such as have been recently experienced in Texas and California.

PJM performs ELCC modeling for wind and solar farms based only on three years of data for each generation resource. A clear concern with PJM's approach is that using just a few years of production data would not be adequate for modelling extreme weather events such as what recently occurred in Texas. Using only a few years of data would not likely capture an extreme weather event that might only occur every 50 to 100 years. Electric utilities must plan their systems to serve customers even during extreme weather conditions – i.e., during periods in which customer demands for energy are at record levels because of high or low temperatures, when solar panels are covered in snow, when wind turbines are covered in ice, or when fuel delivery systems fail or are diminished because of low temperatures. It is unlikely that PJM's ELCC approach, which relies on only a few years of operating data for solar and wind resources, adequately takes into consideration extreme weather events that are likely to occur over long periods of time. The failure to give appropriate consideration to extreme weather conditions appears to be a root cause of the recent power outages in Texas.

It is also important to note that MISO currently does not calculate ELCC for solar resources. The reason for this is that MISO has determined that it does not have a sufficient amount of operating data from solar resources to model ELCC.[3] It would also be inappropriate to extrapolate ELCC values from other regions of the country to LG&E and KU, particularly for the energy supplied to the grid by net metering customers. As explained earlier, the value of the energy supplied to the grid by net metering customers does not reflect the ELCC value of a solar or wind farm. Also, the performance and the amount of generation capacity in those regions would differ from those in Kentucky.

Finally, KRS 278.465 and 278.466 do not contemplate compensation for net metering customers' capacity value even if such a value existed, making capacity calculations like ELCC inapplicable to these proceedings. Kentucky's net metering statutes repeatedly and exclusively use the term "electricity" to mean energy, not capacity. For example:

[3] *See* MISO Planning Year 2021-2022 Wind & Solar Capacity Credit, December 2020 DRAFT, available at https://cdn.misoenergy.org/DRAFT%202021%20Wind%20&%20Solar%20Capacity%20Credit%20Report503411.pdf; MISO Planning Year 2020-2021 Wind & Solar Capacity Credit, December 2019, available at https://cdn.misoenergy.org/2020%20Wind%20&%20Solar%20Capacity%20Credit%20Report408144.pdf. *See also* "MISO Solar Capacity Credit calculation comes out in November 2020," available at https://energycentral.com/c/tr/miso-solar-capacity-credit-calculation-comes-out-november-2020.

- KRS 278.465(3) defines "kilowatt hour" to be "a measure of electricity defined as a unit of work of energy …."

- KRS 278.465(4) defines "net metering" to be the difference between the dollar value of "all electricity generated by an eligible customer-generator that is fed back to the electric grid" and the dollar value of "all electricity consumed …."

- KRS 278.466(2) requires an electric utility to supply a net metering customer with "a standard kilowatt-hour meter capable of registering the flow of electricity in two (2) directions."

- KRS 278.466(3) requires an electric utility to compensate a net metering customer for "all electricity produced by the customer's eligible electric generating facility that flows to the retail electric supplier …."

Plainly stated, capacity cannot be "generated," "fed back to the electric grid," "consumed," or "produced," and it cannot "flow." That Kentucky's net metering statutes refer to energy when they use term "electricity" is clear.

Moreover, the General Assembly knows how to refer to capacity when it intends to do so: KRS 278.466(1), which limits utilities' obligation to offer net metering, explicitly refers to the "cumulative generating capacity" of net metering customers.

Therefore, whatever the merits of calculating ELCC in PJM, the concept has no basis in Kentucky law, which does not contemplate compensating net metering customers for capacity, no matter how it is calculated.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Commission Staff's Fourth Request for Information
Dated February 26, 2021

Case No. 2020-00350

Strategen Question No. 5

Responding Witness: Robert M. Conroy

Q-5. Reference Seelye Direct, page 44, line 19 to page 45, line 2. Explain whether the Companies intend to update NMS 2 rates every two years, when rider SQF avoided costs are updated every two years.

A-5. Yes. See the response to KSIA 1-1c.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Commission Staff's Fourth Request for Information
Dated February 26, 2021

Case No. 2020-00350

Strategen Question No. 6

Responding Witness: Eileen L. Saunders / David S. Sinclair

Q-6. Reference Seelye Direct, page 47, lines 16-17. Do the Companies have a plan for gathering load data for distributed generation customers? If so, provide the Companies plan.

A-6. The Companies anticipate a full deployment of AMI will provide more data around the load shapes of distributed generation customers. If the Commission approves Rider NMS-2 as proposed but does not approve AMI deployment, the Companies will use interval meters for Rider NMS-2 customers, which will also provide more data around the load shapes of distributed generation customers. The Companies do not have any current plans to deploy production meters for net metering customers, so the load data gathered will necessarily be net data.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Commission Staff's Fourth Request for Information
Dated February 26, 2021

Case No. 2020-00350

Strategen Question No. 7

Responding Witness: William Steven Seelye

Q-7. Reference Seelye Direct, page 54, Graph 3. Provide all associated workpapers. Provide your response in a live, unlocked Excel spreadsheet with all links and formula intact.

A-7. See the responses and attachments to KSIA 1-12 and KSIA 2-3.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Commission Staff's Fourth Request for Information
Dated February 26, 2021

Case No. 2020-00350

Strategen Question No. 8

Responding Witness: David S. Sinclair

Q-8. Reference Seelye Direct, page 54. Provide all residential net metering customer load profiles for the Companies for the most recent 5 years. Provide your response in a live, unlocked Excel spreadsheet with all links and formula intact.

A-8. The Companies do not have a load profile for net metering customers. See the responses to KSIA 1-10 and KSIA 2-3.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Commission Staff's Fourth Request for Information
Dated February 26, 2021

Case No. 2020-00350

Strategen Question No. 9

Responding Witness: David S. Sinclair

Q-9. Reference Seelye Direct. Provide the actual residential load profile (8760 hours) for each of the last 5 years available.

A-9. See attachment being provided in Excel format. The Companies prepare historical load profiles only to support rate cases. The attached file contains the residential load profile for July 2015 through June 2016, May 2017 through April 2018, January 2019, March 2019 through December 2019, and February 2020.

The attachment is being provided in a separate file in Excel format.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Commission Staff's Fourth Request for Information
Dated February 26, 2021

Case No. 2020-00350

Strategen Question No. 10

Responding Witness: David S. Sinclair

Q-10. Reference Seelye Direct. Provide the actual system load profile (8760 hours) for each of the last 5 years available. Provide your response in a live, unlocked Excel spreadsheet with all links and formula intact.

A-10. See attachment being provided in Excel format, which contains actual hourly loads for LG&E, KU, and the Combined Companies ("CC") for the last 5 years. For 2019 and 2020, this data was also provided in response to AG/KIUC 1-115. Note that after April 2019, the departed municipal customer loads are no longer reflected in the KU and CC data.

The attachment is being provided in a separate file in Excel format.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Commission Staff's Fourth Request for Information
Dated February 26, 2021

Case No. 2020-00350

Strategen Question No. 11

Responding Witness: David S. Sinclair

Q-11. Reference Seelye Direct. Provide the most recent 10-year load forecast at the total system level and disaggregated by customer class for the Joint Companies. Provide your response in a live, unlocked Excel spreadsheet with all links and formula intact.

A-11. See attachment being provided in Excel format for hourly load through 2030 for the combined Companies as well as each individual Company. See attachment to the response to AG-KIUC 1-165 for a breakdown of monthly sales by class. See attachment to the response to AG-KIUC 1-114 for the hourly forecast by class in the forecasted test period.

The attachment is being provided in a separate file in Excel format.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Commission Staff's Fourth Request for Information
Dated February 26, 2021

Case No. 2020-00350

Strategen Question No. 12

Responding Witness: William Steven Seelye

Q-12. Reference Seelye Direct, page 56, Graph 4. Provide all associated workpapers. Provide your response in a live, unlocked Excel spreadsheet with all links and formula intact.

A-12. See the responses and attachments to KSIA 1-12 and KSIA 2-3.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Commission Staff's Fourth Request for Information
Dated February 26, 2021

Case No. 2020-00350

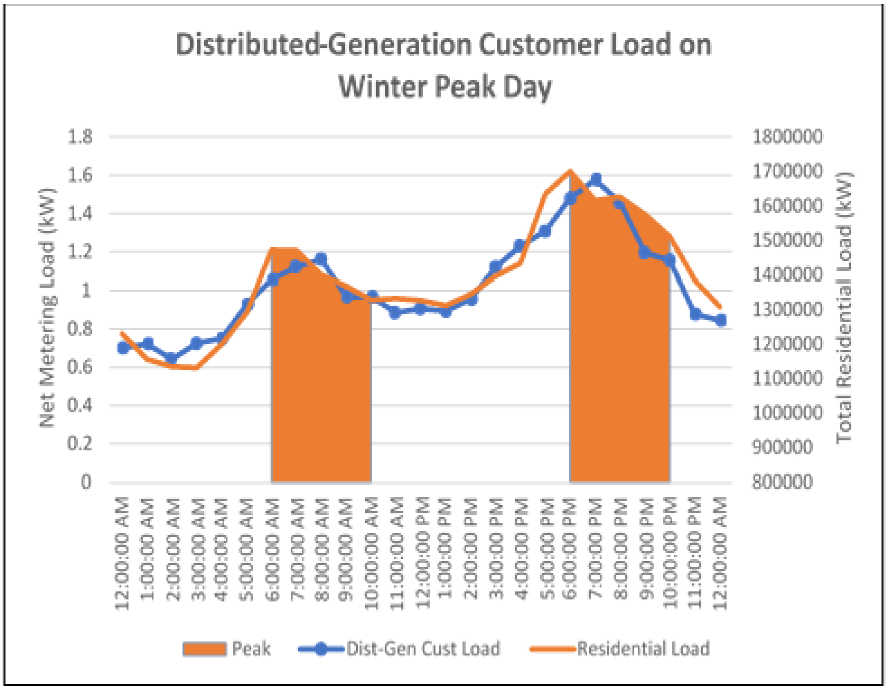
Strategen Question No. 13

Responding Witness: William Steven Seelye

Q-13. Reference Seelye Direct, page 56, stating, "The distributed generation facilities do not appear to result in any fixed cost savings to the customers." Please provide the definition of "fixed costs" and the time period considered. Include in your response, but do not limit it to, the generation, transmission, and distribution related FERC accounts, or classified costs in the Company's cost study, considered as fixed costs. Additionally, identify and define "fixed costs" as they related to the PJM market.

A-13. The statement on page 56 of the Direct Testimony of William Steven Seelye refers to the difference in the load shape between distributed generation customers and residential customers on the Winter System Peak Day. As seen in Graph 4 shown on page 56 (see below), there is no appreciable difference in the load shape between distributed generation customers and residential customers:

GRAPH 4



Based on the close similarity between the two load shapes, it would not be expected that distributed generation customers would achieve any fixed cost reductions. During the winter months, the Companies' peak occurs during the early morning hours or during the evening hours, when solar panels are typically not producing significant amounts of power. Therefore, it is not anticipated that power produced from solar panels during the winter system peak would result in any fixed cost savings.

As used in the referenced statement from Mr. Seelye's Direct Testimony, the term "fixed costs" refers to depreciation expenses, cost of capital, income taxes, property taxes and demand-related operations and maintenance expenses. Such fixed costs would relate to generation, transmission and distribution-related costs.

These fixed costs refer to costs incurred by the Company. The Company is not a member of PJM or any other independent system operator (ISO); therefore, these fixed costs referred to by Mr. Seelye do not relate in any way to "fixed costs" as they may be defined by PJM. The way that PJM defines "fixed costs" does not have any direct bearing on LG&E and KU's planning processes.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Commission Staff's Fourth Request for Information
Dated February 26, 2021

Case No. 2020-00350

Strategen Question No. 14

Responding Witness: William Steven Seelye / John K. Wolfe / Counsel

Q-14. Reference Seelye Direct, pages 46-64. Witness Seelye's analysis relies heavily on examples of the grid services provided by individual solar and solar plus storage systems. Does the aggregation of multiple solar or solar plus storage facilities change the grid services that can be provided to the grid? Provide references to support your answer. Include in your response, but do not limit it to, a discussion of how wholesale markets and utility planning processes are evolving to integrate high penetrations of distributed energy resources throughout the United States (or other countries such as the United Kingdom and Australia).

A-14. Mr. Seelye does not use the term "grid services" in his testimony. Furthermore, "grid services" is not a term or phrase that is defined or otherwise used in KRS 278.465 – 278.467. Also, continuing to add DERs will complicate grid operations, including the possible need to add Distributed Energy Resources Management Systems (DERMS). Whether DERs will be able to provide grid services to address issues other than the complications they create is unclear.

With respect to the aggregation of multiple solar or solar plus storage facilities, an essential distinction must be made between (1) the aggregation of individual solar or solar-plus-storage installations <u>*by the utility*</u> and (2) the aggregation of individual solar or solar-plus-storage installations *across the utility's distribution system* by a third party or by a customer or customers.

Regarding the first type of aggregation, LG&E and KU are actively studying applications for optimizing the utilization and management of individual solar and solar-plus-storage installations on their systems. This currently involves studying the possible installation and use of Distributed Energy Resources Management Systems (DERMS). Potential objectives of a DERMS would include voltage support management, optimization of power flows within the grid, possible control of inverters to provide reactive volt-amp (VAR) support for the system, and monitoring the state and operability of distributed generation facilities.

As to the aggregation of individual solar or solar-plus-storage installation *across the utility's distribution system* by a third party or by a customer or group of customers, such aggregation is not permissible in Kentucky. KRS 278.465 - 278.467, which are the statutes governing net metering, do not address or otherwise permit the aggregation of multiple solar facilities across the Company's distribution grid. Also, 807 KAR 5:041 Section 9(2) generally prohibits meter aggregation, including aggregating to obtain a more favorable rate. Allowing customer-generators to aggregate resources across a utility's distribution system would be impermissible under the Territorial Boundary Act for electric service, KRS 278.016 - 278.018. Aggregating generation resources across a utility's distribution system would constitute retail wheeling.

If "aggregation" as used in the question refers to a third-party or customers forming a group to aggregate solar or solar-plus-solar facilities to sell capacity into an Independent ISO Capacity Market, it must also be observed that neither LG&E nor KU is a member of PJM, MISO or any other ISO. Thus, there is no Capacity Market into which an aggregator on LG&E and KU's system could sell capacity. Even if behind-the-meter solar or solar-plus-storage facilities could *arguendo* sell capacity in a market either individually or in aggregate, then the capacity could not be used by retail customers to meet their own power or capacity needs, thus they would not be a customer-generator in the sense defined by KRS 278.465 – 278.467. In other words, aggregated behind-the-meter solar or solar-plus-storage facilities would not be the same as net metering customers.

LG&E and KU plan their generation, transmission and distribution systems to meet the demand and energy needs of their customers. In their planning processes, LG&E and KU currently consider the amount of energy that customer-generators supply to the grid. If there are opportunities for the Companies to aggregate multiple solar or solar-plus-storage facilities through the use of DERMS or other systems that enhance the reliability or cost effectiveness of providing electric service to their customers, then the Companies will certainly explore those opportunities.

Regarding the evolution in the United States to integrate high penetrations of distributed energy resources, it is unlikely that wholesale markets and utility planning processes will -- or should -- evolve in one particular direction. Inevitably, there are regional economic factors that must be considered by policymakers, such as the number of jobs created or destroyed by the replacement of old technologies with new technologies. But key concerns for LG&E and KU are to ensure that they can continue to provide safe, reliable and economical service. As more renewables and energy storage technologies are integrated into the generation supply mix, careful consideration must be given to integrating those resources following sound and robust practices that will not undermine the reliability of service to customers. The same is true with the adoption of energy markets.

California and Texas have been in the forefront of introducing competitive energy markets and encouraging the development of renewable resources. California and Texas have the most wind and solar capacity in the country.[7] Both states have recently experienced major power outage events.[8] If these states are the leading examples in our country of how wholesale markets and utility planning processes are "evolving to integrate high penetrations of distributed energy resources," then the recent outage events should give us pause.

California and Texas provide recent lessons in these regards. While there has been a considerable amount of finger pointing about the recent blackouts in both California and Texas, there is little doubt that the recent blackouts in those states were the result of fundamental failures in power markets, the ability of those markets to introduce appropriate safeguards for installing and maintaining reliable resources, and the inability to integrate renewable resources properly and reliably into their resource mixes.

The markets in Texas and California placed greater emphasis on the availability of energy, with less emphasis on capacity. Texas has an "energy only" market in which customers are paid only for the energy they supply to the grid.[9] While this has encouraged low cost wind and solar, it has arguably created major reliability problems. Although PJM and MISO have developed capacity markets and are stricter with respect to reserve margin requirements, the reliance on solar and wind has been less significant than in Texas and California.

European countries have been extremely active in developing large-scale renewable projects. Wind makes up the vast majority of renewable capacity in Europe, and most of that capacity comprises large-scale wind farms. These wind farms are quite evident when travelling across Europe, particularly in Germany, Spain, United Kingdom and Sweden. Solar farms and roof-top solar panels are less common than large-scale wind farms in Europe. These wind farms are typically owned by large energy companies and utilities such as Iberdrola, Enel, and Orsted.

Behind-the-meter distributed generation facilities present their own challenges. In the short term, it is unlikely that behind-the-meter technologies will be able to provide the level of reliability needed for a modern electric grid. While distributed generation will certainly play a role in supplying energy to the grid, renewable generation in the U.S. could possibly follow the path seen in Europe,

---

[7] California has the most solar capacity of any state, and Texas has the third largest amount of solar capacity. Texas has the most wind capacity of any state and California has the sixth largest amount of wind capacity. Energy Information Administration, *Electric Power Monthly*, February 2021.
[8] See response to KSIA 1-18.
[9] For example, see Katherine Blunt and Russell Gold, "The Texas Freeze: Why the Power Grid Failed", *The Wall Street Journal*, February 19, 2021.

with most renewable capacity being owned and operated by large energy companies and utilities.

There are many reasons for this. For instance, residential-grade solar panels or residential energy storage equipment will not likely be able to provide the same level of reliability as coal-fired generating stations, combined cycle gas turbines, large scale solar panels or large-scale energy storage facilities.[10] Consider a rooftop solar system compared to a utility grade solar array. If there were a major snowstorm followed by a significant drop in temperature, such as occurred in Kentucky on January 17, 1994,[11] roof-top solar panels would be practically useless in supplying power to the grid, precisely when the utility would be realizing its winter system peak. In a situation like this, it is extremely unlikely that residential customers with roof-top solar panels would be willing or able to climb on their roofs and clear 16 to 22 inches of snow from the solar panels, so that the solar panels could operate during daylight hours. A utility or energy company operating a large-scale solar array, on the other hand, would almost certainly be in a much better position to clear the snow and clean the solar panels to operate during daylight hours. Furthermore, such utility grade solar panels would likely be located in areas with easier access for maintenance.

While LG&E and KU are actively studying the use of DERMs to integrate distributed generations into the distribution grid, with current technologies, it is not currently possible for LG&E and KU to have reliable information on the availability factors of customer-owned behind-the-meter distributed generation facilities necessary to ensure that it has sufficient capacity to reliably meet customer needs in extreme weather situations. Until DERMS is in place, utilities will not be able to monitor the working condition and operability of behind-the-meter distribution resources on their systems.

Behind-the-meter energy storage systems pose other challenges. For example, Lithium-ion (Li-ion) batteries cannot withstand extreme temperatures.[12] They should not be exposed to extreme hot or cold temperatures. In extremely low

---

[10] For example, BloombergNEF,, "How PV-Plus-Storage Will Compete With Gas Generation in the U.S.", November 23, 2020, at page 25 states that, "Fully displacing combined-cycle plants with PVS [photo-voltaic plus solar] is likely to be difficult even with the cost reductions from both PV and batteries, if gas capacity factors and prices remain stable. Southwest is the only market that shows some cost overlaps by 2040." The report also states that "co-located PV-plus-storage projects (at a single site) need to have nameplate capacity sized at many times that of a CCGT plant in order to displace it. For example … a 100MW CCGT in CAISO operating at 70% capacity factor could be displaced by a system consisting of 960MW of PV plus 710MW/2,822MWh of batteries." Id. at page 22.

[11] On January 17, 1994, 16 to 22 inches of snow fell in cities in Kentucky, followed by a significant a drop in temperature from the low 30s the to 22 degrees below zero °F the following two days. See Kim Kolaric, "Louisville's 1994 Winter Storm was Something for the Record Books", *Courier Journal*, January 17, 2004.

[12] See Shuai Ma et al, "Temperature Effect and Thermal Impacts in Lithium-ion Batteries: A Review", Progress in Natural Science: Materials International, December 2018, pages 53-666. Also see "Li-ion Battery Operating Temperature", August 14, 2019, https://www.large.net/news/8cu43px.html.]

temperatures, Li-ion batteries exhibit voltage drops and decreased capacity. High temperatures can damage the cells. Periods of high and low temperatures are precisely when utilities such as LG&E and KU realize their system peaks. Consequently, during extreme weather conditions are precisely when customer-owned are likely to either fail or realize diminished voltage and capacity. Based on current technologies, if residential and small-commercial customers install energy storage capacity, they are most likely to install Li-ion batteries. However, there are utility-grade energy storage facilities that perform much better than Li-ion batteries and offer much longer life cycles. For example, redux-flow battery technologies, such as vanadium flow and zinc-bromine flow batteries, can operate over wider temperature ranges with more cycles and greater reliability over the much longer lives of the systems.

To integrate behind-the-meter distributed generation and energy storage facilities, utilities will have to have detailed information on the health, availability, and operability of customer-owned battery storage facilities, especially during extreme weather conditions. Many potentially cost-effective battery storage technologies are in the early stages of development and testing. Because of the high upfront investment likely to be necessary for high-quality battery technologies, residential and small commercial customers may not be able to afford highly reliable battery storage facilities such vanadium flow, zinc-flow, or Li-metal batteries[13], or address the safety concerns with those technologies.

[13] Small-scale solid-state Li-metal battery technologies are showing promise but could be years away from being offered commercially, particularly for grid storage applications. Zhang et al., "Designing composite solid-state electrolytes for high performance lithium ion or lithium metal batteries", Chemical Science, 2020. 11, 8686.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Commission Staff's Fourth Request for Information
Dated February 26, 2021

Case No. 2020-00350

Strategen Question No. 15

Responding Witness: William Steven Seelye

Q-15. Reference Seelye Direct, page 53 stating, "Over the past decade, a small but growing number of utilities have implemented demand rates for all their residential customers … ." Please provide each and every utility referenced and the final order approving the demand rate for all residential customers. Please indicate whether each tariff is a default, mandatory, or optional residential tariff

A-15. See the response to KSIA 1-9, part b.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Commission Staff's Fourth Request for Information
Dated February 26, 2021

Case No. 2020-00350

Strategen Question No. 16

Responding Witness: William Steven Seelye / David S. Sinclair

Q-16. Reference Seelye Direct, pages 61-62. Provide the average resident's kW requirement annually and during the peak winter and summer months. Explain the method used to calculate the average, and provide associated workpapers in a live, unlocked Excel spreadsheet with all links and formula intact.

A-16. The table below shows the average residential customer's kW demand for the Winter and Summer peaks, the Residential class maximum demand, and the maximum demand average for each residential customer.

Louisville Gas and Electric Company	
Average Residential Demand kW per Customer in Forecasted Cost of Service Study	
Winter Peak	2.10
Summer Peak	3.14
Class Maximum	3.74
Individual Customer Maximum	8.35

The Winter Peak demand kW per customer is derived by taking the Winter Peak demand as shown in the hourly load data provided in response to AG-KIUC 1-173 divided by 377,599 customers which represent the annual average number of forecasted Residential customers in the Cost-of-Service study and also in Schedule M-2.3-E of the Company's application.

The Summer Peak demand kW per customer is derived by taking the Summer Peak demand divided by 377,599 customers.

The Class Maximum demand kW per customer is derived by taking the Residential Class maximum demand during the forecasted period divided by 377,599 customers.

The Individual Customer Maximum demand kW per customer is derived by taking the Residential Sum of Individual Customer maximum demands calculated for the forecasted period divided by 377,599 customers.

The Summer, Winter, Class Maximum, and Sum of Individual Customer demands can be found in the attachment provided in response to AG-KIUC Question 173 parts (a) and (b).

The average number of Residential customers, 377,599, can be derived by taking the sum of RS and RTOD customers shown on pages 1 and 2 of Schedule M-2.3-E of the Company's Application divided by 365.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Commission Staff's Fourth Request for Information
Dated February 26, 2021

Case No. 2020-00350

Strategen Question No. 17

Responding Witness: Eileen L. Saunders

Q-17. Reference Seelye Direct, pages 61-62. Provide the nameplate capacity of all residential PV systems currently operational on the Companies' systems.

A-17. Customer owned and operated renewable energy system information including system capacity, storage capacity, and renewable energy type are provided to the Company by the customer or the customer's representative at the time of initial application for Net Metering Service. See attachment for a listing of the capacity of all residential net metering PV systems currently operational on the Company's system as of March 1, 2021. Also, see the response to MHC-KFTC-KSES 1-1(d) for similarly requested information by customer at November 30, 2020. Customer numbers in response to MHC-KFTC-KSES 1-1(d) do not correlate with facility numbers in this response.

Louisville Gas and Electric Company
Residential Net Metering
Photovoltaic Systems

Facility	Capacity kW	Generation Technology
1	3.25	Photovoltaic
2	1.05	Photovoltaic
3	4.14	Photovoltaic
4	9.24	Photovoltaic
5	1.792	Photovoltaic
6	6.05	Photovoltaic
7	11.4	Photovoltaic
8	1.6	Photovoltaic
9	10.5	Photovoltaic
10	6.72	Photovoltaic
11	4.96	Photovoltaic
12	1.41	Photovoltaic
13	1.5	Photovoltaic
14	1.05	Photovoltaic
15	1.89	Photovoltaic
16	9.75	Photovoltaic
17	8.64	Photovoltaic
18	1.05	Photovoltaic
19	7.2	Photovoltaic
20	1.05	Photovoltaic
21	2.24	Photovoltaic
22	10.56	Photovoltaic
23	5.5	Photovoltaic
24	3.96	Photovoltaic
25	5.76	Photovoltaic
26	7.6	Photovoltaic
27	7.12	Photovoltaic
28	3.72	Photovoltaic
29	3	Photovoltaic
30	5.44	Photovoltaic
31	10.56	Photovoltaic
32	11.9	Photovoltaic
33	4.05	Photovoltaic
34	7.2	Photovoltaic
35	19.35	Photovoltaic
36	9.57	Photovoltaic
37	8.64	Photovoltaic

Louisville Gas and Electric Company
Residential Net Metering
Photovoltaic Systems

Facility	Capacity kW	Generation Technology
38	3	Photovoltaic
39	2.5	Photovoltaic
40	3	Photovoltaic
41	7.6	Photovoltaic
42	2.04	Photovoltaic
43	11.34	Photovoltaic
44	1.05	Photovoltaic
45	1.05	Photovoltaic
46	12.69	Photovoltaic
47	5.76	Photovoltaic
48	4.8	Photovoltaic
49	3.1	Photovoltaic
50	1.41	Photovoltaic
51	6.27	Photovoltaic
52	3.96	Photovoltaic
53	3.136	Photovoltaic
54	8.25	Photovoltaic
55	19.38	Photovoltaic
56	10.45	Photovoltaic
57	13.515	Photovoltaic
58	1.3	Photovoltaic
59	1.41	Photovoltaic
60	1.05	Photovoltaic
61	1.02	Photovoltaic
62	4.76	Photovoltaic
63	1.41	Photovoltaic
64	3.24	Photovoltaic
65	1.05	Photovoltaic
66	5.83	Photovoltaic
67	4	Photovoltaic
68	1.41	Photovoltaic
69	5.31	Photovoltaic
70	16.96	Photovoltaic
71	4	Photovoltaic
72	4	Photovoltaic
73	6.72	Photovoltaic
74	9.9	Photovoltaic

Louisville Gas and Electric Company
Residential Net Metering
Photovoltaic Systems

Facility	Capacity kW	Generation Technology
75	0.64	Photovoltaic
76	1.05	Photovoltaic
77	2.85	Photovoltaic
78	3.92	Photovoltaic
79	8.64	Photovoltaic
80	3.5	Photovoltaic
81	12.8	Photovoltaic
82	5.04	Photovoltaic
83	30	Photovoltaic
84	14.49	Photovoltaic
85	3.68	Photovoltaic
86	2.04	Photovoltaic
87	11.28	Photovoltaic
88	5.31	Photovoltaic
89	3.1	Photovoltaic
90	2.5	Photovoltaic
91	0.52	Photovoltaic
92	2.5	Photovoltaic
93	4.48	Photovoltaic
94	7.54	Photovoltaic
95	9.2	Photovoltaic
96	5.76	Photovoltaic
97	21.5	Photovoltaic
98	5.3	Photovoltaic
99	1.11	Photovoltaic
100	6.27	Photovoltaic
101	2.04	Photovoltaic
102	4.34	Photovoltaic
103	9.9	Photovoltaic
104	13	Photovoltaic
105	10	Photovoltaic
106	17	Photovoltaic
107	3.36	Photovoltaic
108	3.36	Photovoltaic
109	5.98	Photovoltaic
110	3.225	Photovoltaic
111	1.05	Photovoltaic

Louisville Gas and Electric Company
Residential Net Metering
Photovoltaic Systems

Facility	Capacity kW	Generation Technology
112	6.4	Photovoltaic
113	1.41	Photovoltaic
114	2.2	Photovoltaic
115	6.84	Photovoltaic
116	11.48	Photovoltaic
117	1.41	Photovoltaic
118	1.11	Photovoltaic
119	6.44	Photovoltaic
120	6.27	Photovoltaic
121	4.8	Photovoltaic
122	7.29	Photovoltaic
123	8.47	Photovoltaic
124	1.75	Photovoltaic
125	5.2	Photovoltaic
126	7.28	Photovoltaic
127	15.34	Photovoltaic
128	2.76	Photovoltaic
129	7.14	Photovoltaic
130	1.9	Photovoltaic
131	9.88	Photovoltaic
132	16.74	Photovoltaic
133	14.56	Photovoltaic
134	6.45	Photovoltaic
135	2.16	Photovoltaic
136	1.4	Photovoltaic
137	3.84	Photovoltaic
138	12.26	Photovoltaic
139	10.4	Photovoltaic
140	6.38	Photovoltaic
141	3.92	Photovoltaic
142	5.98	Photovoltaic
143	9.15	Photovoltaic
144	10.075	Photovoltaic
145	2.88	Photovoltaic
146	1.5	Photovoltaic
147	7.7	Photovoltaic
148	6.93	Photovoltaic

Louisville Gas and Electric Company
Residential Net Metering
Photovoltaic Systems

Facility	Capacity kW	Generation Technology
149	17.6	Photovoltaic
150	2.8	Photovoltaic
151	2.2	Photovoltaic
152	0.35	Photovoltaic
153	1.41	Photovoltaic
154	8.125	Photovoltaic
155	2.3	Photovoltaic
156	7.02	Photovoltaic
157	10.78	Photovoltaic
158	5.8	Photovoltaic
159	4.68	Photovoltaic
160	10.68	Photovoltaic
161	6.4	Photovoltaic
162	9.6	Photovoltaic
163	6.05	Photovoltaic
164	9.23	Photovoltaic
165	1.05	Photovoltaic
166	7.8	Photovoltaic
167	5.3	Photovoltaic
168	2.5	Photovoltaic
169	5.76	Photovoltaic
170	7.15	Photovoltaic
171	12.3	Photovoltaic
172	2.695	Photovoltaic
173	3.2	Photovoltaic
174	7.5	Photovoltaic
175	11.56	Photovoltaic
176	9.92	Photovoltaic
177	12	Photovoltaic
178	5.8	Photovoltaic
179	1.05	Photovoltaic
180	3.71	Photovoltaic
181	3.42	Photovoltaic
182	8.25	Photovoltaic
183	1.4	Photovoltaic
184	12.455	Photovoltaic
185	25.45	Photovoltaic

Louisville Gas and Electric Company
Residential Net Metering
Photovoltaic Systems

Facility	Capacity kW	Generation Technology
186	3.52	Photovoltaic
187	2.46	Photovoltaic
188	4.16	Photovoltaic
189	14.96	Photovoltaic
190	8.28	Photovoltaic
191	6.72	Photovoltaic
192	6.16	Photovoltaic
193	7.02	Photovoltaic
194	3	Photovoltaic
195	7.26	Photovoltaic
196	5.4	Photovoltaic
197	5.58	Photovoltaic
198	1.05	Photovoltaic
199	12.48	Photovoltaic
200	8.14	Photovoltaic
201	1.05	Photovoltaic
202	1.41	Photovoltaic
203	2.14	Photovoltaic
204	3.1	Photovoltaic
205	5.76	Photovoltaic
206	5.13	Photovoltaic
207	5.94	Photovoltaic
208	11.56	Photovoltaic
209	4.68	Photovoltaic
210	6.21	Photovoltaic
211	16.2	Photovoltaic
212	11.375	Photovoltaic
213	17.02	Photovoltaic
214	9.28	Photovoltaic
215	13.8	Photovoltaic
216	1.05	Photovoltaic
217	1.9	Photovoltaic
218	19.75	Photovoltaic
219	2.1	Photovoltaic
220	5.1	Photovoltaic
221	7.92	Photovoltaic
222	2.45	Photovoltaic

Louisville Gas and Electric Company
Residential Net Metering
Photovoltaic Systems

Facility	Capacity kW	Generation Technology
223	12.54	Photovoltaic
224	18.75	Photovoltaic
225	1.41	Photovoltaic
226	1.05	Photovoltaic
227	7.72	Photovoltaic
228	6.84	Photovoltaic
229	5.04	Photovoltaic
230	7.8	Photovoltaic
231	8.5	Photovoltaic
232	9.01	Photovoltaic
233	4.2	Photovoltaic
234	5.13	Photovoltaic
235	8.64	Photovoltaic
236	9.28	Photovoltaic
237	13.26	Photovoltaic
238	16.43	Photovoltaic
239	4.32	Photovoltaic
240	8.14	Photovoltaic
241	6.05	Photovoltaic
242	5.75	Photovoltaic
243	9.35	Photovoltaic
244	10.56	Photovoltaic
245	1.05	Photovoltaic
246	6.57	Photovoltaic
247	60	Photovoltaic
248	10	Photovoltaic
249	3.2	Photovoltaic
250	13.8	Photovoltaic
251	6	Photovoltaic
252	10.24	Photovoltaic
253	2.88	Photovoltaic
254	1.98	Photovoltaic
255	5.355	Photovoltaic
256	8.77	Photovoltaic
257	6.89	Photovoltaic
258	7.9	Photovoltaic
259	6.7	Photovoltaic

Louisville Gas and Electric Company
Residential Net Metering
Photovoltaic Systems

Facility	Capacity kW	Generation Technology
260	4.24	Photovoltaic
261	6.08	Photovoltaic
262	3.6	Photovoltaic
263	9.13	Photovoltaic
264	2.07	Photovoltaic
265	1.41	Photovoltaic
266	3	Photovoltaic
267	3.85	Photovoltaic
268	1.4	Photovoltaic
269	12.6	Photovoltaic
270	5.3	Photovoltaic
271	8.6	Photovoltaic
272	16.64	Photovoltaic
273	13.68	Photovoltaic
274	5.12	Photovoltaic
275	4.4	Photovoltaic
276	3.465	Photovoltaic
277	14.4	Photovoltaic
278	4.46	Photovoltaic
279	2.04	Photovoltaic
280	6.27	Photovoltaic
281	8.06	Photovoltaic
282	9.3	Photovoltaic
283	5.94	Photovoltaic
284	30	Photovoltaic
285	0.36	Photovoltaic
286	5.67	Photovoltaic
287	6.6	Photovoltaic
288	1.05	Photovoltaic
289	6.16	Photovoltaic
290	1.11	Photovoltaic
291	6.8	Photovoltaic
292	6.48	Photovoltaic
293	8.27	Photovoltaic
294	4.5	Photovoltaic
295	3.96	Photovoltaic
296	1.05	Photovoltaic

Louisville Gas and Electric Company
Residential Net Metering
Photovoltaic Systems

Facility	Capacity kW	Generation Technology
297	2.52	Photovoltaic
298	9.6	Photovoltaic
299	1.05	Photovoltaic
300	2.85	Photovoltaic
301	9.6	Photovoltaic
302	12.43	Photovoltaic
303	5.76	Photovoltaic
304	1.05	Photovoltaic
305	6.88	Photovoltaic
306	17.48	Photovoltaic
307	6.96	Photovoltaic
308	3.1	Photovoltaic
309	7.67	Photovoltaic
310	7.56	Photovoltaic
311	6.96	Photovoltaic
312	12.16	Photovoltaic
313	8.06	Photovoltaic
314	8.7	Photovoltaic
315	12.84	Photovoltaic
316	5.67	Photovoltaic
317	13.8	Photovoltaic
318	3.744	Photovoltaic
319	7.68	Photovoltaic
320	8	Photovoltaic
321	5.92	Photovoltaic
322	22.5	Photovoltaic
323	8.64	Photovoltaic
324	8.64	Photovoltaic
325	7.28	Photovoltaic
326	21.7	Photovoltaic
327	8.93	Photovoltaic
328	9.6	Photovoltaic
329	11	Photovoltaic
330	7.93	Photovoltaic
331	7.25	Photovoltaic
332	15.37	Photovoltaic
333	6.08	Photovoltaic

Louisville Gas and Electric Company
Residential Net Metering
Photovoltaic Systems

Facility	Capacity kW	Generation Technology
334	13.75	Photovoltaic
335	7.92	Photovoltaic
336	7.24	Photovoltaic
337	3.06	Photovoltaic
338	28.33	Photovoltaic
339	12.8	Photovoltaic
340	8.7	Photovoltaic
341	3.78	Photovoltaic
342	8.55	Photovoltaic
343	5.12	Photovoltaic
344	8.4	Photovoltaic
345	2.28	Photovoltaic
346	5.04	Photovoltaic
347	5.4	Photovoltaic
348	12.8	Photovoltaic
349	10.89	Photovoltaic
350	10.56	Photovoltaic
351	4.05	Photovoltaic
352	9.12	Photovoltaic
353	3.3	Photovoltaic
354	4.48	Photovoltaic
355	8	Photovoltaic
356	5	Photovoltaic
357	0.75	Photovoltaic
358	10.78	Photovoltaic
359	5.76	Photovoltaic
360	9.75	Photovoltaic
361	3.9	Photovoltaic
362	1.92	Photovoltaic
363	11.1	Photovoltaic
364	8.91	Photovoltaic
365	1.05	Photovoltaic
366	12.96	Photovoltaic
367	10.24	Photovoltaic
368	2.95	Photovoltaic
369	11.84	Photovoltaic
370	5.4	Photovoltaic

Louisville Gas and Electric Company
Residential Net Metering
Photovoltaic Systems

Facility	Capacity kW	Generation Technology
371	1.41	Photovoltaic
372	12	Photovoltaic
373	8.96	Photovoltaic
374	3.12	Photovoltaic
375	2.28	Photovoltaic
376	7.8	Photovoltaic
377	4.95	Photovoltaic
378	4.18	Photovoltaic
379	14	Photovoltaic
380	8.7	Photovoltaic
381	7.36	Photovoltaic
382	4.76	Photovoltaic
383	8.58	Photovoltaic
384	5.44	Photovoltaic
385	17.1	Photovoltaic
386	3.1	Photovoltaic
387	6.27	Photovoltaic
388	6	Photovoltaic
389	9.76	Photovoltaic
390	20.88	Photovoltaic
391	6.4	Photovoltaic
392	7.02	Photovoltaic
393	8.64	Photovoltaic
394	9.9	Photovoltaic
395	7.56	Photovoltaic
396	5.4	Photovoltaic
397	6.2	Photovoltaic
398	8.4	Photovoltaic
399	2.56	Photovoltaic
400	9.86	Photovoltaic
401	2.4	Photovoltaic
402	5.23	Photovoltaic
403	3.96	Photovoltaic
404	37.62	Photovoltaic
405	10.56	Photovoltaic
406	5.13	Photovoltaic
407	9.9	Photovoltaic

Louisville Gas and Electric Company
Residential Net Metering
Photovoltaic Systems

Facility	Capacity kW	Generation Technology
408	29.9	Photovoltaic
409	10.23	Photovoltaic
410	6	Photovoltaic
411	10.08	Photovoltaic
412	8.48	Photovoltaic
413	15.68	Photovoltaic
414	17.3	Photovoltaic
415	10.71	Photovoltaic
416	3.85	Photovoltaic
417	1.05	Photovoltaic
418	9.24	Photovoltaic
419	8.8	Photovoltaic
420	1.05	Photovoltaic
421	8.64	Photovoltaic
422	7.36	Photovoltaic
423	9.72	Photovoltaic
424	7.36	Photovoltaic
425	20.44	Photovoltaic
426	6.2	Photovoltaic
427	6.48	Photovoltaic
428	1.05	Photovoltaic
429	13.65	Photovoltaic
430	5.89	Photovoltaic
431	5.99	Photovoltaic
432	12.83	Photovoltaic
433	27.5	Photovoltaic
434	7.56	Photovoltaic
435	9.6	Photovoltaic
436	4.09	Photovoltaic
437	7.04	Photovoltaic
438	8.25	Photovoltaic
439	3.72	Photovoltaic
440	14.045	Photovoltaic
441	2.14	Photovoltaic
442	4.225	Photovoltaic
443	12.8	Photovoltaic
444	11.84	Photovoltaic

Louisville Gas and Electric Company
Residential Net Metering
Photovoltaic Systems

Facility	Capacity kW	Generation Technology
445	4.56	Photovoltaic
446	2.4	Photovoltaic
447	10.2	Photovoltaic
448	12.025	Photovoltaic
449	3.2	Photovoltaic
450	7.125	Photovoltaic
451	7.6	Photovoltaic
452	24.36	Photovoltaic
453	8.55	Photovoltaic
454	6.6	Photovoltaic
455	7.36	Photovoltaic
456	5.44	Photovoltaic
457	12.8	Photovoltaic
458	18.59	Photovoltaic
459	4.6	Photovoltaic
460	9.6	Photovoltaic
461	6.08	Photovoltaic
462	9.6	Photovoltaic
463	4.56	Photovoltaic
464	10.85	Photovoltaic
465	8.64	Photovoltaic
466	20.8	Photovoltaic
467	10.98	Photovoltaic
468	5.12	Photovoltaic
469	11.89	Photovoltaic
470	2.82	Photovoltaic
471	2.29	Photovoltaic
472	3.84	Photovoltaic
473	5.58	Photovoltaic
474	2.8	Photovoltaic
475	5.28	Photovoltaic
476	8.09	Photovoltaic
477	3.15	Photovoltaic
478	10.36	Photovoltaic
479	6.2	Photovoltaic
480	2.8	Photovoltaic
481	25.5	Photovoltaic

Louisville Gas and Electric Company
Residential Net Metering
Photovoltaic Systems

Facility	Capacity kW	Generation Technology
482	7.04	Photovoltaic
483	5.035	Photovoltaic
484	3.46	Photovoltaic
485	11.47	Photovoltaic
486	12.16	Photovoltaic
487	8.96	Photovoltaic
488	7.48	Photovoltaic
489	17.3	Photovoltaic
490	1.88	Photovoltaic
491	3.99	Photovoltaic
492	10.4	Photovoltaic
493	9.92	Photovoltaic
494	4.41	Photovoltaic
495	5.4	Photovoltaic
496	5.92	Photovoltaic
497	0.69	Photovoltaic
498	16.32	Photovoltaic
499	6.72	Photovoltaic
500	8.25	Photovoltaic
501	13.8	Photovoltaic
502	7.6	Photovoltaic
503	6.09	Photovoltaic
504	16.7	Photovoltaic
505	21	Photovoltaic
506	0.875	Photovoltaic
507	7.7	Photovoltaic
508	8.7	Photovoltaic
509	5.58	Photovoltaic
510	1.53	Photovoltaic
511	5.32	Photovoltaic
512	0.6	Photovoltaic
513	7.28	Photovoltaic
514	9	Photovoltaic
515	1.41	Photovoltaic
516	2.16	Photovoltaic
517	11.6	Photovoltaic
518	2.2	Photovoltaic

Louisville Gas and Electric Company
Residential Net Metering
Photovoltaic Systems

Facility	Capacity kW	Generation Technology
519	15.2	Photovoltaic
520	3.71	Photovoltaic
521	4.8	Photovoltaic
522	9.15	Photovoltaic
523	4.16	Photovoltaic
524	3.78	Photovoltaic
525	9.28	Photovoltaic
526	22.15	Photovoltaic
527	7.68	Photovoltaic
528	4	Photovoltaic
529	3.72	Photovoltaic
530	6.81	Photovoltaic
531	9.6	Photovoltaic
532	21.54	Photovoltaic
533	11.88	Photovoltaic
534	4.32	Photovoltaic
535	8.25	Photovoltaic
536	7.04	Photovoltaic
537	3.1	Photovoltaic
538	11.5	Photovoltaic
539	14.8	Photovoltaic
540	7.98	Photovoltaic
541	3.78	Photovoltaic
542	5.76	Photovoltaic
543	8.32	Photovoltaic
544	7.68	Photovoltaic
545	12.21	Photovoltaic
546	4.2	Photovoltaic
547	9.24	Photovoltaic
548	2.04	Photovoltaic
549	7.04	Photovoltaic
550	5.36	Photovoltaic
551	1.05	Photovoltaic
552	2.24	Photovoltaic
553	7.92	Photovoltaic
554	9.75	Photovoltaic
555	5.44	Photovoltaic

Louisville Gas and Electric Company
Residential Net Metering
Photovoltaic Systems

Facility	Capacity kW	Generation Technology
556	1.53	Photovoltaic
557	9.01	Photovoltaic
558	10.88	Photovoltaic
559	8	Photovoltaic
560	7.36	Photovoltaic
561	9.45	Photovoltaic
562	9.24	Photovoltaic
563	5.8	Photovoltaic
564	11.5	Photovoltaic
565	5.13	Photovoltaic
566	5.13	Photovoltaic
567	3.84	Photovoltaic
568	4.8	Photovoltaic
569	11.2	Photovoltaic
570	16.2	Photovoltaic
571	9.24	Photovoltaic
572	1.05	Photovoltaic
573	2.88	Photovoltaic
574	12.24	Photovoltaic
575	10.8	Photovoltaic
576	3.5	Photovoltaic
577	12.48	Photovoltaic
578	7.2	Photovoltaic
579	6.4	Photovoltaic
580	3.05	Photovoltaic
581	3.2	Photovoltaic
582	9.3	Photovoltaic
583	14.155	Photovoltaic
584	9.6	Photovoltaic
585	3.5	Photovoltaic
586	17	Photovoltaic
587	6.48	Photovoltaic
588	12.48	Photovoltaic
589	3.52	Photovoltaic
590	7.02	Photovoltaic
591	4.62	Photovoltaic
592	10.88	Photovoltaic

Louisville Gas and Electric Company
Residential Net Metering
Photovoltaic Systems

Facility	Capacity kW	Generation Technology
593	6.2	Photovoltaic
594	1.53	Photovoltaic
595	3.84	Photovoltaic
596	10.08	Photovoltaic
597	5.95	Photovoltaic

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Commission Staff's Fourth Request for Information
Dated February 26, 2021

Case No. 2020-00350

Strategen Question No. 18

Responding Witness: Eileen L. Saunders

Q-18. Reference Seelye Direct, pages 61-62. Provide the nameplate capacity of all residential energy storage systems currently operational on the Companies' systems

A-18. Customers are not obligated to report residential energy storage system installations to the Company, so the Company is not necessarily aware of the nameplate capacity of all residential energy storage systems currently operational on the Company's system. Customer owned and operated renewable energy system information including system capacity, storage capacity, and renewable energy type are provided to the Company by the customer or the customer's representative at the time of initial application for Net Metering Service. The table below lists the capacity of all residential energy storage systems currently operational on the Company's system as of March 1, 2021, of which the Company has been notified. Facility numbers correlate with the facility numbers in the response to Question No. 17.

Facility	Capacity (kW)
39	19.2
279	11.76
504	3.8
531	5
586	8.208

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Commission Staff's Fourth Request for Information Dated February 26, 2021

Case No. 2020-00350

Strategen Question No. 19

Responding Witness: William Steven Seelye

Q-19. Reference Seelye Direct, page 63, stating "With a two-part rate design, consisting of only a customer charge and an energy charge, there is no economic benefit for installing battery storage. With a two-part rate, the only benefit for adding battery storage is increased reliability." Confirm that an underlying assumption of this statement is that the volumetric portion of the two-part tariff does not vary based on time of day.

A-19. Not confirmed. A time-differentiated energy charge would not fully address the demand-related costs required to serve a distributed generation customer. For example, the utility must install distribution capacity to serve a customer's maximum demand. A time-differentiated energy charge is thus unable to reflect the demand-related cost necessary to serve a distributed generation customer. A demand charge applied to the customer's maximum demand would be required to reflect the actual costs imposed by a customer-generator.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Commission Staff's Fourth Request for Information
Dated February 26, 2021

Case No. 2020-00350

Strategen Question No. 20

Responding Witness: William Steven Seelye

Q-20. Reference Seelye Direct, pages 64-76. Please explain how the Companies can collect all demand related costs through the referenced EV tariffs without the use of a demand charge.

A-20. The Companies cannot collect all demand-related costs of serving an electric vehicle customer without the use of a demand charge. See the testimony of Mr. Seelye at pages 64-65.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Commission Staff's Fourth Request for Information
Dated February 26, 2021

Case No. 2020-00350

Strategen Question No. 21

Responding Witness: William Steven Seelye

Q-21. Reference Seelye Direct, pages 64-76. Under the Companies EV rate proposals could EV's charge during summer and winter system peaks?

A-21. It is the Companies' expectation that most charging of electric vehicles will be done at home during off-peak hours. However, it is necessary for Fast Charging Stations to be available as a backup resource for customers who adopt electric vehicle technologies. It is the Companies' expectation that Fast Charging Stations would be utilized whenever electric vehicle customers need to charge their vehicles quickly, including during peak periods.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Commission Staff's Fourth Request for Information
Dated February 26, 2021

Case No. 2020-00350

Strategen Question No. 22

Responding Witness: William Steven Seelye

Q-22. Reference Seelye Direct. Please explain, in detail, how the Companies incur transmission charges (e.g., what load characteristics are the Companies transmission charges based on – monthly coincident or another characteristic?).

A-22. LG&E and KU are not members of an Independent System Operator (ISO) and do not typically incur transmission charges for delivery of power across their transmission system. However, the Companies do have a transmission rate schedule for wholesale power transmitted through their systems. As with traditional open access transmission tariffs (OATTs), the pricing depends on the type of transaction for transmission service. For network customers, the service is priced based on the load ratio share of monthly coincident peak demands. For point-to-point service, the transaction is based on reserved capacity.

LOUISVILLE GAS AND ELECTRIC COMPANY

Response to Commission Staff's Fourth Request for Information
Dated February 26, 2021

Case No. 2020-00350

Strategen Question No. 23

Responding Witness: Robert M. Conroy

Q-23. Reference Seelye Direct. Does the Companies' proposed Net Metering Service-2 tariff prohibit the use of behind the meter energy storage?

A-23. No. Energy storage installations are not part of the net metering statutes or tariffs. See the responses to KYSEIA 1-4(b), 1-5(e), 1-11(a)(iv) and (v), and 1-15(a) and MHC-KFTC-KSES 2-8 and 2-26.