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**

AND

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 METERING INFRASTRUCTURE, APPROVAL OF CERTAIN REGULATORY AND ACCOUNTING TREATMENTS AND ESTABLISHMENT OF A ONE YEAR SUR-CREDIT	)	**Case No. 2020-00350**

REVISED DIRECT TESTIMONY OF KARL R. RÁBAGO ON BEHALF OF JOINT INTERVENORS

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INTRODUCTION AND OVERVIEW

Q. Please state your name, business address, and affiliation.

A. My name is Karl R. Rábago. I am principal of Rábago Energy LLC, a Colorado limited liability company. My address is 2025 East 24th Avenue, Denver, Colorado.

Q. On whose behalf are you appearing today?

A. My testimony is filed on behalf of Joint Intervenors ("JI"), Mountain Association, Kentuckians for the Commonwealth, and Kentucky Solar Energy Society.

Q. Please provide a summary of your background, experience, and qualifications.

A. I have worked for more than thirty years in the electricity industry and related fields. I am actively involved in a wide range of electric utility issues across the United States. My previous employment experience includes Commissioner with the Public Utility Commission of Texas, Deputy Assistant Secretary with the U.S. Department of Energy, Vice President with Austin Energy, Executive Director of the Pace Energy and Climate Center, Managing Director with the Rocky Mountain Institute, and Director with AES Corporation, among others. I have earned a bachelor's degree in management, a law degree, and two post-doctoral law degrees in military and environmental law. A detailed resume is attached as JI Exhibit 1.

Q. Do you have specific experience relating to distributed energy resources, including distributed solar generation?

A. Yes. I have extensive experience working in the field of distributed energy resources, a category of energy resources that includes distributed solar generation, energy efficiency, energy management, energy storage, and other technologies and related services. That experience includes regulation of electric utilities in Texas, including review and approval of rates, tariffs, plans, and programs proposed by electric utilities. I co-authored the seminal treatise on distributed energy resource value, entitled "Small Is Profitable,"[1] when I was a managing director at the Rocky Mountain Institute. I have also published several articles and essays relating to the topic, as detailed in my resume. As a vice president for Distributed Energy Services for Austin Energy, I had responsibility for all of the utility's customer-facing programs relating to distributed solar generation, energy efficiency, demand management, low-income weatherization, energy storage, electric transportation, building energy ratings and codes, and the utility's electric vehicle initiatives. While with Austin Energy, one of the largest municipal electric utilities in the nation, I developed and implemented the nation's first distributed solar tariff based on objective and comprehensive valuation of solar generation and avoided system energy costs, often referred to as the "Value of Solar Tariff." At the U.S. Department of Energy, I was the federal executive responsible for the nation's research, development, and deployment programs relating to renewable energy, energy efficiency, energy storage, and other advanced energy technologies in the Department's Office of Utility Technologies. In my position with the Pace Energy and Climate Center, based at the Pace University Elisabeth Haub School of Law in White Plains, New York, I led a team actively engaged as a public interest intervenor in the ground-breaking "Reforming the Energy Vision" process administered by the New York Public Service Commission. I have engaged as an advisor and expert witness in more than 100 regulatory proceedings across the country, including many relating to distributed energy resources of all kinds, rates and tariffs, low-income energy issues, grid modernization, return on equity, and

[1] Amory B. Lovins, et al., "*Small is Profitable: The Hidden Economic Benefits of Making Electrical Resources the Right Size,"* Rocky Mountain Institute (2003). Witness Rábago was a co-author of the book.

other issues. I served as a contributing author and advisor in the writing and publication of the National Standard Practice Manual for Benefit-Cost Analysis of Distributed Energy Resources ("NSPM-DER"), published by the National Energy Screening Project.[2] The NSPM-DER sets out detailed guidance for establishing a benefit-cost analysis framework that can support jurisdictionally-specific evaluations of all manner of distributed energy resources ("DER"), which includes distributed generation ("DG"), demand response, energy efficiency, distributed storage, and others. The NSPM-DER compiled best practices guidance through an intentionally inclusive process of drafting, commenting, and revising supported by a range of authors and reviewers. I also play a leading role in the Local Solar for All[3] coalition, on behalf of the Coalition for Community Solar Access, a trade association for providers and developers of community solar services and facilities across the U.S. Local Solar for All has members from solar businesses and advocacy organizations. Most notably, Local Solar for All published the "Local Solar Roadmap" in December of 2020.[4] The Roadmap study relied upon a modern, high-resolution analysis of the electric grid in the continental United States. The study, conducted by Vibrant Clean Energy using its powerful WIS:dom-P® model, found that by coordinating and optimizing DERs in production cost and capacity expansion analysis, the added deployment of 273 GW of local solar and storage could yield nearly $500 billion in savings and create more than two million incremental jobs over the kind

[2] T. Woolf, et al, *National Standard Practice Manual for Benefit-Cost Analysis of Distributed Energy Resources*, National Energy Screening Project (Aug. 2020). Available at: https://www.nationalenergyscreeningproject.org/national-standard-practice-manual/. While the NSPM-DER was published recently, it reflects best practices articulated in a prior NSPM for efficiency resources and generally recognized in the industry. Witness Rábago was a co-author of the manual.
[3] Local Solar for All. More information at https://www.localsolarforall.org.
[4] Local Solar for All, Local Solar Roadmap (Dec. 2020), available at: https://www.localsolarforall.org/roadmap.

of business-as-usual approaches typically favored by monopoly utilities, all while eliminating 95% of carbon emissions from the grid by 2050. I am a frequent speaker, author, and commentator on issues relating to electric utility regulation, distributed energy resource markets and technologies, and electricity sector market reform.

Q. Have you previously testified before the Kentucky Public Service Commission ("Commission") or other regulatory agencies?

A. I provided supplemental testimony in Commission Case No. 2020-00174 on behalf of Joint Intervenors, and appeared before the Commission and submitted public comments on behalf of Kentuckians for the Commonwealth and MACED (now Mountain Association) in Case No. 2019-00256.[5] In the past nine years, I have submitted testimony, comments, or presentations in proceedings in Alabama, Arkansas, Arizona, California, Colorado, Connecticut, District of Columbia, Florida, Georgia, Guam, Hawaii, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Massachusetts, Michigan, Minnesota, Missouri, Nevada, New Hampshire, New York, North Carolina, Ohio, Pennsylvania, Puerto Rico, Rhode Island, Vermont, Virginia, Washington, and Wisconsin. I have also testified before the U.S. Congress and have been a participant in comments and briefs filed at several federal agencies and courts. A listing of my previous testimony is attached as JI Exhibit 2.

Q. What is the purpose of your testimony?

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[5] In a December 18, 2019 Order in Case No. 2019-00256, the Commission directed that the record of that proceeding be incorporated by reference into all initial net metering ratemaking proceedings filed by retail electric utilities to implement rates pursuant to the Net Metering Act, which amended KRS 278.456.458 and was signed into law on March 26, 2019. I restate and adopt my comments from that case, which by that 2019 Commission Order is *already* a part of the record in this case.

A. My testimony addresses material deficiencies in the evidence and justifications submitted by Kentucky Utilities ("KU") and Louisville Gas and Electric Company ("LG&E") (jointly, the "Companies") in an effort to secure Commission approval of their proposed NMS-2 tariffs applicable to customer-generators taking net metering service. My testimony also provides a framework for evaluation of cost and benefits in order to design and evaluate a tariff for net metered customer generators that is fair, just, and reasonable, as required by Kentucky law and policy.

Q. What recommendations do you make to the Commission regarding the disposition of the Companies' proposed NMS-2 tariff?

A. I recommend that the Commission reject the Companies' proposed NMS-2 tariff proposals. I recommend that the Commission direct the Companies to use the framework that I propose, which is drawn from the NSPM-DER, and which is substantially the same as the evaluation method used in Value of Solar studies, in conducting an evaluation of benefits and costs relating to the operation of net metered facilities. The results of such evaluation should then be used by the Companies in a transparent fashion to provide a foundation for any subsequent net metering tariff by the Companies. Pending compliance with these directives and the filing and approval of a tariff that meets the Commission's requirements in the Company's next general rate case, the Company should continue to offer NMS-1 to qualified customer generators.

Q. What are the key elements of law and regulation governing the Commission's decisions regarding the Companies' NMS-2 proposals?

A. Kentucky law requires electric utilities to provide net metering service[6] up to the point that the cumulative capacity of net metering generation reaches one percent of the utility's peak load during a calendar year. The compensation rate for excess or injected energy from the net metering facility must be just and reasonable[7] and determined using general rate making processes established in Kentucky law.[8] The Commission has clarified that a net metering proposal should be reviewed in the context of a rate proceeding, and not in a separate net metering proceeding.[9] The utility, as the initiating proponent for any net metering rate,[10] bears the burden of proving that the proposed rate is just and reasonable.[11] A utility may, using the same generally applicable rate making processes, seek to recover all costs shown to be necessary to recover the cost to serve net metering customers.[12] However, such a cost recovery rate must be crafted without regard for the rate structure applicable to non-generating customers,[13] and must be above and beyond costs related to interconnection upgrades, which are addressed separately in the law.[14]

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6 KRS § 278.466 (1).
7 KRS § 278.030 (1).
8 KRS § 278.466 (3).
9 KPSC Final Order in Case No. 2020-00174, at 85.
10 *Id.*
11 KRS § 278.190 (3).
12 KRS § 278.466 (5).
13 *Id.*
14 KRS § 278.466 (9).

REVIEW OF THE COMPANIES NMS-2 TARIFF PROPOSALS

Q. Briefly summarize the Companies' proposed NMS-2 tariffs.

A. The Companies' NMS-2 tariffs would replace traditional net metering as reflected in the extant NMS-1 tariffs with a rate design that eliminates net metering in favor of a two-channel net billing approach. The Companies also propose to reduce the compensation rate for generation treated as excess from the full retail consumption rate otherwise charged to the customer. The Companies propose to set the compensation rate at the wholesale energy-only rate calculated pursuant to a wholesale-only, non-time-differentiated avoided cost methodology. The rate proposed by the Companies is explicitly and expressly not a cost-based rate,[15] although the Companies' consultant witness uses the cost of service study for non-generating residential customers as a basis for asserting, without substantiation, that the per-unit costs to serve customer generators and non-generators is the same.[16] Notwithstanding this approach, the Companies view the dramatic and extreme reduction in compensation for excess energy (over 78% for Kentucky Utilities[17] and over 79% for Louisville Gas and Electric[18]) as a "gradual"[19] step toward reducing a cost that the current net metering tariff creates and shifts to non-generating customers.[20] The Companies' basis for asserting that this extreme change in

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[15] Companies witness Seelye direct testimony at 47, lines 1-5.

[16] Companies' responses to JI 2-23 (KU), JI 2-24 (LG&E).

[17] *See id.* at 45, lines 10-18. Calculated as the difference proposed KU retail volumetric rate of $0.09950/kWh and the avoided cost of energy proposed under the wholesale rate for small qualifying facilities of $0.02173/kWh: (0.09950-0.02173)/0.09950 = 78.2%.

[18] Company response to PSC 2-122 (LG&E). Calculated as the difference proposed LGE retail volumetric rate of $0.10482/kWh and the avoided cost of energy proposed under the wholesale rate for small qualifying facilities of $0.02173/kWh: (0.10482-0.02173)/0.10482 = 79.2%.

[19] Companies witness Seelye direct testimony at 47, lines 10-13.

[20] *Id.* at 47, lines 6-20.

net metering compensation is “gradual” is that the Companies used this proceeding to signal intentions to propose an extreme, confusing, and discriminatory rate structure for customer generators at some future date.[21] If they have their way, things will get even worse for customer-generators, so the Companies assert that this is a gradual step. Because the Companies’ current NMS-2 proposal is without merit or evidentiary basis, I will not further address the Companies’ stated future rate proposal plans except to state that the same deficiencies identified in this testimony apply to any such proposals.

Q. How would you summarize the deficiencies in the Companies proposed NMS-2 tariffs?

A. The foundational problems with the Companies’ NMS-2 proposals, as I will explain in greater detail in testimony that follows, can be summarized as:

- The Companies make a category error in treating customer generators as if they were wholesale generators that are in the business of generating power for ultimate resale. Customer-generators generate for use, not for sale, and exports are incidental to an investment objective of managing energy costs. This error manifests in the Companies willful blindness to and refusal to evaluate the costs and benefits of distributed generation. This error further manifests in a failure to objectively evaluate the full range of impacts associated with the operation of distributed generation.
- The Companies make the fundamental error of ignoring the fact that even in the most extreme and unreasonable circumstances—in which every potential cost shift was in fact a cross subsidy that favored customer generators and all benefits resulting from DG operations are ignored—the impacts on the utility and other ratepayers of net

[21] Companies witness Seelye direct testimony at 46, et seq.

metering are negligible and do not merit the use of administrative process and rate making to address. The Companies are not required to file for new net metering tariffs. Even if the impacts could be material at scale, the Companies have refused to follow Kentucky law and use standard ratemaking practices, including a cost of service study for self-generating customers, to inform their assumptions. The absence of any realistically material negative impact strongly suggests an anti-competitive objective of making customer self-generation uneconomic through punitive and confiscatory tariffs.

- The Companies assumptions about costs and cost shifts resulting from the operation of distributed generation that results in occasional exports and reductions in customer-generator bills are based on the categorically false assumption that the Companies are entitled and must ultimately recover all sunk and historical costs incurred in order to provide service at the level and to the customers forecasted in their last rate case. This assumption is not the legal standard,[22] and creates an unreasonable risk of overbuilding and excessive revenue requirements. A customer that reduces their reliance on the grid through self-generation should pay less as a matter of the central cost-causation principle that underlies cost of service regulation, and rates designed to punish customers for reducing their use of the grid through investment in self-generation are unjust, unfair, unreasonable, discriminatory and uneconomic. This is especially so in these cases, where the only argument for cost creation by customer-generators put forward by the Companies is that the Companies

[22] Bluefield Waterworks & Improvement Co. v. Publ. Serv. Comm'n of W. Va., 262 U.S. 679 (1923); Fed. Power Comm'n. v. Hope Natural Gas Co., 320 U.S. 591 (1944).

lose revenue from customers that invest their hard-earned income in a measure of energy independence through self-generation.

- The Companies commit an additional category error in assuming that all fixed costs are sunk.[23] Perhaps blinded by an embedded costs perspective as well as a desire to maintain and grow the extraction of monopoly rents from their customers, the Companies refuse to even consider that the lifetime operations of customer-generation can and will defer and avoid future fixed infrastructure investments. If the Companies would conduct a credible and transparent assessment of the short- and long-run benefits and costs of customer generation, they would be able to quantify the extent to which such facilities can defer and avoid fixed cost investments.

Q. Have the Companies' offered credible evidence that the current NMS-1 tariff could have material impacts in terms of increases in costs that would merit the draconian changes proposed in the NMS-2 tariffs?

A. No, and the Companies' responses to questions about revenue impacts are less than useful, at best. The Companies' position is that the 1% threshold point at which the Companies could refuse to offer net metering service would be reached in six years, if NMS-1 were left in place, but only when assuming a fantastical 39% per year rate of growth for each of those six years for LG&E or 45% per year for KU.[24] This statement not only assumes the ridiculous, but also represents a statistical sleight of hand that focuses on the rate of growth starting from the very small numbers of net metered systems and megawatts in place in the Companies' service territories. The Companies

[23] Companies' responses to KYSEIA 2-2 (LG&E), KYSEIA 2-2 (KU).
[24] Companies' responses to PSC 2-122 (LGE), PSC 2-108 (KU).

have not performed any legitimate projection of growth in net metered capacity under current NMS-1 tariffs. Under a more realistic 5% per year rate of growth, it is worth noting that even out to the year 2050, and even using the Companies' unsupported assertion that all reductions in revenue that result from the operation of customer generation is a subsidy, the annual level of impact never exceeds $1.2 million for either Company.[25]

Q. Can you put this impact in context to help the Commission assess the materiality of this amount of impact under the Companies' assumptions?

A. Yes. One interesting point of reference is that KU provided subsidies to Economic Development Rate customers which grew by about $1.2 million each year in 2019 and 2020.[26] Economic development credits are a load-building mechanism that drives increases in energy use and spending on electricity infrastructure. LG&E's storm-related distribution system costs for the years 2011-2020 averaged $8.8 million per year.[27] The point is not that Economic Development rates are good or bad, or that the Companies should not spend money to repair storm damage to the grid, but that a reasonable assessment of the impacts of net metering fails to support an argument that the cost impacts are material.

Q. Have any other parties attempted to estimate the potential financial impact of net metering on Kentucky ratepayers?

A. Yes. In comments submitted to the Commission in proceedings related to the implementation of the Net Metering Act of 2019 in Commission Case No. 2019-00256, I

[25] Calculated using a 5% per year escalator on a starting value of $275,596 for LG&E and $245,153 for KU, extended out to 2050 from a base year of 2020.
[26] Company response to JI 1-18 (KU).
[27] Company response to JI 1-18 (LG&E).

presented an analysis estimating the potential financial impact of net metering on Kentucky's residential ratepayers. That analysis considered what the financial impact of net metering on residential ratepayers would be, presuming that the value of solar energy delivered to the utility is only worth the utility's wholesale energy-only avoided cost rate as proposed by the Companies in these cases. The Companies assert that the difference between their retail rate and their avoided cost rate, if credited to net metering customers for their excess solar generation, amounts to an "overpayment," which always results in the shifting of costs onto other customers and must therefore be paid by all other ratepayers.[28] This argument disregards all of the benefits provided by solar generation to the utility, ratepayers, and society.

I have updated my analysis from 2019 using data supplied by the Companies for these cases. As shown in the table below, even if one assumes that distributed solar has no value beyond the utility's wholesale energy avoided cost rate, the total financial impact of net metering on non-net metering residential customers does not exceed $0.32/year for KU and $0.40/year for LG&E customers, or about $0.03/month.

[28] Companies' responses to JI 2-22 (KU), JI 2-23 (LG&E).

Potential Financial Impact of Net Metering on KU and LG&E's Residential Ratepayers for 12 months (December 2019 to November 2020), Assuming Distributed Solar Has No Value Beyond the Companies' Wholesale Energy-Only Avoided Cost Rate.

	Excess Solar Energy Exported by Residential NMS-1 Customers (kWh)	Alleged overpayment to NMS-1 customers, per kWh	Total Alleged "Overpayment"	# of Residential Customers	Annual Impact per Customer	Monthly Impact per Customer
KU	1,789,151	$ 0.0778	$139,142	440,124	$ 0.32	$ 0.026
LG&E	1,789,238	$ 0.0831	$148,668	375,985	$ 0.40	$ 0.033

Alleged "Overpayment to NMS-1 customers" is based on the difference between Company's proposed new Residential Rate and proposed NMS-2 solar compensation rate ($0.02173/kWh).

Q. What is the significance of this analysis?

A. This simple analysis represents the upper limit of the cost that net metering might impose on the Companies' residential customers, including net metering customers, if none of the benefits associated with distributed solar are recognized. Viewed in the context of KU seeking to raise their fixed charges by $2.43 per month and increase residential rates by 11.6%; and LG&E seeking to raise their fixed charges by $2.13 per month and increase residential rates by 13.3%, the actual impact of net metering on ratepayers is negligible and not material at merely three cents per month. The benefits of distributed solar if properly and fairly assessed by the Companies, would have the effect of reducing this negligible impact even further—most likely to the point where there are net benefits to all customers from customer generator operations.

Q. What is the consequence of the shift from net metering to net billing in the proposed rate design?

A. The shift from net metering to net billing is a change in the way in which the varying levels of customer generation and consumption occur over the course of a billing period. Kentucky law does not mandate two-channel net billing in favor of traditional net metering. However, this is a reasonable interpretation of the phrases "electricity generated by an eligible customer-generator that is fed back to the electric grid over a billing period"[29] and "all electricity consumed by the eligible customer-generator over the same billing period."[30] This net billing approach has two primary impacts on customer-generators. First, it greatly increases the amount of electricity that is considered excess to the customer's use. It means that any change in consumption during the moment when the generation equipment is producing could result in an export if the instantaneously net level of production becomes greater than the current level of consumption. Sometimes incorrectly described as "instantaneous netting," the net billing approach creates a rate structure that imposes on customers a physically impossible task—tracking exactly the flow of electrons and electrical energy to and from the customer and its generation equipment in order to maximize return on the significant investment they made in their generation equipment. As a result, and to a lesser extent as with true net metering,[31] the second impact is that the customer's return on investment is dramatically affected by the compensation rate paid by the utility.

Q. How do the Companies' proposed NMS-2 tariffs create these impacts?

A. The combined effect of net billing and a nearly 80% reduction in compensation makes, and seems intended to make, private investment in customer-sited generation uneconomic. First, the amount of a customer's generation that is treated as exported is dramatically increased under net billing. No longer can customer generators use self-

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[29] KRS § 278.465 (4) (a).
[30] *Id.*
[31] 16 U.S. Code § 2621 (d) (11) provides that "[t]he term "net metering service" means service to an electric consumer under which electric energy generated by that electric consumer from an eligible on-site generating facility and delivered to the local distribution facilities may be used to offset electric energy provided by the electric utility to the electric consumer during the applicable billing period."

generation to offset consumption during any time in the billing period. Rather, self-generation customers can only offset consumption with their system if they perfectly match generation over which they have no control with consumption about which they have very little real time information.

Q. Do the Companies have any position on this adverse impact on customer-generators flowing from a net billing rate structure?

A. The Companies assert that customers who perfectly align DG production with energy consumption can realize full retail offset benefits from their DG investments,[32] but offer no meaningful option for ordinary customer-generators, who are not professional wholesale generators that generate energy for resale, to achieve this idealized state of generation and consumption.[33] In what can only be described as a "let them eat cake" recommendation, the Companies assert that if customer-generators spend even more of their hard-earned income on energy storage systems, they might increase the value realized from their investments in the face of the Companies' proposed NMS-2 tariffs.[34]

Q. Do the Companies offer any justification for these adverse impacts on customer generators?

A. The Companies' rationales rely on the logical fallacy of begging the question, or circular reasoning. They rely on the unsubstantiated assertion that exported customer-generation has no value beyond the wholesale energy value of those exports to support the assertion that exported generation has no value except as wholesale energy.

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[32] Companies witness Conroy direct testimony at 26, lines 4-8.
[33] Companies' responses to JI 2-26 (LG&E), JI 2-25 (KU).
[34] *Id.*

Q. What is the second major impact on customer generators as a result of the Companies' proposed NMS-2 tariff design?

A. The second major impact on customer generators is that the dramatic proposed reduction in compensation, which is not based on any objective data or principled cost of service analysis, will effectively confiscate from customer-generators all value except the wholesale value of energy that these generators create. Facing this result, the proposed rate will result in economic waste in two ways. The proposed tariffs, as the Companies intend,[35] will drive customers toward smaller system investment in order to minimize the amount of energy that earns the miserly level of compensation proposed by the Companies. Since the economics of customer generation investments are driven by high fixed costs, as are utility investments, this will result in suboptimally-sized systems and deny all customers on the grid the benefits of clean distributed energy. Second, the economics of the proposed tariffs will create an incentive for customers to increase their use of energy or shift energy consumption to the periods when DG production is high in order to avoid unjustly enriching the utility with high-value energy earning an unreasonably low level of compensation. This will deny all customers on the grid the benefits of locally-generated energy that has coincidence benefits—it could be available at times when peak demand is high.[36] It is irrational and unreasonable to propose tariffs that result in both these kinds of economic waste.

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[35] *Id.*

[36] Companies' responses to JI 2-19 (LG&E), JI 2-18 (KU).

Q. Did the Companies perform any analysis of the costs to serve customer-generators and how customer-generator operations impact the costs to serve non-generating customers?

A. No. The Companies did not perform any analysis of the costs to serve customer-generators and how these costs differ from the costs to serve non-generators.[37] The Companies' rate consultant witness asserted that the cost to serve distributed generation customers was provided in testimony,[38] but this assertion is not credible for two reasons. First, the Companies clearly state that they did not perform a cost of service study on net metering customers as a subset of their rate class.[39] Second, the cost data cited by the Companies' appears to be based entirely on the assertion that "costs for a DG customer are no different than for a non-DG customer" because the per-unit cost of customer costs, demand, and energy are the same for both kinds of residential customer.[40] This assertion is unhelpful at best because a proper cost of service study would show how many units of energy and demand DG customers require as compared to non-DG customers and the timing and shape of those requirements.

Q. Are there any other issues associated with the cost justification for the Companies' proposed rates?

A. Yes. The Companies reliance on cost of service data for non-DG customers in order to develop and propose rates for DG customers appears to violate the plain language of the Kentucky net metering law. The Companies' do not follow the rate making processes

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[37] Companies' responses to JI 1-24 (LG&E & KU).
[38] Companies' responses to KYSEIA 1-8 (LG&E), KYSEIA 1-8 (KU).
[39] Companies' responses to JI 1-24 (KU), JI 1-24 (LG&E).
[40] Companies' responses to JI 2-23 (KU), JI 2-24 (LG&E).

under Kentucky law as required by the net metering law.[41] In addition, by limiting compensation for exported energy to wholesale energy value in order to mitigate an asserted cost shift based solely on lost revenues calculated from a residential class-wide cost of service study, it violates the requirement that costs imposed on net metering customers must be set without regard for the rate structure for customers who are not eligible customer-generators.[42]

Q. Did the Companies perform any evaluation of the costs that are avoided or avoidable as a result of the customer-generator exports?

A. No. The Companies take the position that the kinds of benefits created by customer-generator exports and offsets in load do not justify any changes in utility operations or spending such as would generate savings or other benefits.[43] This assumption does not rest on any analysis in the record in this case, flies in face of dozens of Value of Solar studies conducted across the U.S.,[44] and seems instead largely based on a confusion of fixed and sunk costs.

Q. What do you mean by "a confusion of fixed and sunk costs?"

A. This confused assumption is at the heart of the Companies refusal to honestly analyze the full range of benefits and costs of DG, whether through a focused cost of service study, a Value of Solar study, or any other disciplined BCA. Fixed costs are generally associated with long-lived assets. They are contrasted with variable costs, which vary with the level of production. The most important difference between fixed and variable costs is the

[41] KRS § 278.466 (3) & (5).
[42] KRS § 278.466 (5).
[43] Companies' responses to JI 1-25 (KU & LG&E).
[44] *See* JI direct testimony of James Owen in Case No. 2020-00174.

factor of time. Simply stated, all costs are variable over the long term, and levels of usage and rates of wear and tear impact how long the fixed cost investment remains used and useful. A transformer or substation's useful life is impacted by the level of usage on that equipment, and so changes in usage levels and patterns can impact a fixed cost investment and its replacement date and cost. Accounting for such impacts requires long-term forward looking, and not a narrow preoccupation on treating all fixed costs as "sunk." Sunk costs are costs, fixed or variable, that having been spent are sunk and cannot be avoided, reduced, or deferred.

Q. How does this fundamental confusion manifest itself in the Companies approach to proposing a rate for customer-generators?

A. The Companies take the economically and physically irrational view that all fixed costs are sunk and unavoidable, and that therefore DG can't ever reduce fixed cost investments.[45] Moreover, the Companies take the view that because embedded fixed costs were ostensibly rational when made, and that the last rate case set rates based on assumed levels of system usage by customers, any customer that decides to self-generate in order to reduce their dependence on electricity from the utility is unfairly avoiding paying a so-called fair share for equipment installed on their behalf.[46] As a result, the Companies propose to deny customers that self-generate the full benefit of their reduced usage and to undercompensate them for exported generation.

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[45] Companies' witness Seelye direct testimony at 15, line 10 through 16, line 13.

[46] Companies' witness Seelye direct testimony at 20, lines 12-22. The witness bases his assertion on the simple mathematical fact that the total monthly contribution toward fixed costs recovery through volumetric rates by low users is less than that for high users, with "fairness" apparently existing only when the customer uses the exact average amount of energy for all customers in the class. His proposed remedy for customer generators is an extreme and unreasonable four-part rate that includes a customer charge, a base demand charge, a peak demand charge, and an energy charge.

Q. Is the Companies' proposed approach to trying to claw back fixed costs contributions from customers that lower their bills through self-generation fair?

A. No. The Companies approach is unjust, unfair, unreasonable, and discriminatory. It is important to note that the "take or pay" arrangement the Companies propose for self-generators is not applied to customers that reduce their bills through energy efficiency, energy management, or simple behavioral changes. To the grid, these customers are functionally identical to customers that reduce usage at the same time and at the same level as customers that self-generate. But only for self-generation customers do the Companies assert their obsession with reducing the economic benefits of the investment customers make in order to better control their utility bills.

Q. Are there additional problems related to the Companies assumptions about costs and cost-causation?

A. Yes. The Companies extend this assumption about fixed and sunk costs throughout their justifications for the proposed NMS-2 tariffs by basing all estimates of impacts on lost revenues and on the treatment of lost revenues—but only when they result from customer-generator operations—as costs and cost-shifts.

Q. What is wrong with these assumptions?

A. First, there is no sound rate making principle regarding rates for services that monopolies provide that justifies the basing of rates on the amount of revenue the utility thought it would recover from a customer. There are no "take or pay" rates for monopoly services that vary with usage, and only costs that do not vary with usage should be recovered through fixed customer charges. Second, as explained in greater detail later in this testimony, at best, lost revenues create *the potential* for a material and unjust cost shift that should be addressed in a change to rates.

Q. Did the Companies perform or rely on any marginal cost of service studies in order to capture the benefits or costs of customer-generator exports?

A. No. The Companies assert that they have "no business need" for such studies.[47]

Q. Is it reasonable for the Companies to assert that they have "no business need" for marginal cost of service studies?

A. Absolutely not. Marginal cost of service studies can help utilities understand the incremental costs for transmission and distribution investments triggered by marginal changes in consumption level and demand. Since these investments are growing as a fraction of overall utility rate base investments, and because there are increasing alternatives to traditional wires solutions—including grid modernization investments and DERs in general—it is unreasonable and irresponsible for a utility to not study and understand the drivers of marginal costs. It is important to note that such studies can also be applied to inform the locational value of DERs, including customer-owned DG.

Q. Please summarize your assessment of the Companies' NMS-2 tariff proposals.

A. The Companies have not put into the record substantial and competent evidence to support their NMS-2 proposals and have failed to carry their burden of proposing tariffs that will result in fair, just, and reasonable rates. The Companies did not perform any assessment of the impacts of its proposed NMS-2 tariffs on DG investment payback.[48] The Companies' proposals would substantially undermine the value proposition for

[47] Companies' responses to JI 1-27 (KU & LG&E).
[48] Companies' responses to KYSEIA 2-13 (LG&E), KYSEIA 2-13 (KU).

private investment in DG and effectively seek the Commission's support in confiscating investment-backed benefits from their own customers. The Companies' proposals would, by crippling a small DG industry in Kentucky, deny the Commonwealth the benefits that DG development and operations would produce. The Companies would take all this action without any foundation in cost-of-service data or any objective and transparent method to calculate the costs and benefits of DG deployment and operation.

Q. Do you know why the Company is proposing punitive and confiscatory rates for net metering customers?

A. Not fully, due to the lack of evidence in the record. The Companies view customers who self-generate as causing an unavoidable and significant cost shift to non-generating customers,[49] but provide no evidence based on a cost-of-service study indicating whether self-generators cost more, or less, to serve. The many studies cited by JI witness Owen in his testimony in Commission Case No. 2020-00174 establish that under a full, fair, and transparent assessment of costs and benefits, the net benefits of DG typically exceed the locally prevailing retail rate.[50] The Companies took a very narrow view of the costs that are avoided by DG in order to propose a sudden and dramatic reduction in the compensation rate for energy injections.[51] The Companies' approach, however, is that the Commission should support a kind of piece-meal rate making for DG compensation that is economically inefficient and, again, discriminatory. The Companies assert that this

[49] Companies' responses to PSC 2-122 (LGE), PSC 2-108 (KU).

[50] *See, e.g.,* G. Weissman & B. Fanshaw, *"Shining Rewards: The Value of Rooftop Solar Power for Consumers and Society,"* Frontier Group and Environment America Research and Policy Center (Oct. 2016). Available at: https://environmentamerica.org/sites/environment/files/reports/AME%20ShiningRewards%20Rpt%20Oct16%201.1.pdf.

[51] Companies' responses to JI 1-14, 1-25 (KU & LG&E).

confiscatory compensation rate is necessary to mitigate against a claimed subsidy to net metering customers that it did not substantiate.[52] Again, however, the evidence in jurisdictions that have sponsored transparent and comprehensive assessments of the costs and benefits of DG is that customers that install and operate such systems are typically subsidizing both the utility and non-generating customers.[53]

Q. In several places in your testimony you use the words "confiscate" or "confiscatory" to describe the potential effect of the Companies' proposed NMS-2 tariff. Why do you describe the proposed tariffs in those terms?

A. Customer generators form and hold reasonable investment-backed expectations relating to their DG facilities. Realizing a fair return on that investment requires that the value those investments create is compensated fairly when the output from those facilities is delivered to the grid. Kentucky's net metering law embodies this concept of just and reasonable compensation determined as a result of a process which affords due process protections through traditional rate making procedures and following principles of justice, reasonableness, and non-discrimination. The Companies' proposed NMS-2 tariffs would take from customer generators much of the value of their investment without fair compensation determined through a just process. The Companies' proposals have no basis in cost of service or economic analysis. In the end, it is not surprising that a monopoly utility would seek to use a regulatory process to extract value from customers in excess of costs, that is, to engage in rent-seeking behavior. But Kentucky law and the

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[52] Companies' responses to JI 2-29 (LG&E), 2-28 (KU). The Companies' assertion is that credit in excess of wholesale energy rates is a subsidy because it is a payment in excess of wholesale energy rates.
[53] *See supra* note 60.

Commission's duty to ensure that rates are just and reasonable demands a different process and a different result than the one the Companies seek in these cases.

RATE MAKING PRINCIPLES AND CONSIDERATIONS GUIDING THESE CASES

Q. Are there any general rate making benchmarks against which the Commission can evaluate the charges in the Companies' proposed NMS-2 tariffs?

A. For nearly 60 years, James Bonbright's treatise entitled "Principles of Public Utility Rates" has stood as a foundational reference for evaluation of rate making proposals and approaches.[54] A review of the Companies' proposed NMS-2 tariffs against Bonbright's principles serves a useful framework for summarizing my conclusions about the proposals.

Q. What are Bonbright's principles?

A. Commentators and industry experts have offered varying summaries of the core principles articulated by Bonbright. Kentucky law reflects these principles as well.[55] I find the following articulation[56] useful in general and in reviewing the Companies' NMS-2 proposals:

- Rates should be characterized by simplicity, understandability, public acceptability, and feasibility of application and interpretation.
- Rates should be effective in yielding total revenue requirements.
- Rates should support revenue and cash flow stability from year to year.

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[54] James C. Bonbright, *Principles of Public Utility Rates* (Columbia Univ. Press 1961), available at: https://www.raponline.org/knowledge-center/principles-of-public-utility-rates/.

[55] KRS § 278.030.

[56] This summary was derived from Jess Totten, *Tariff Development II: Rate Design for Electric Utilities,* Briefing for NARUC/INE Partnership (Feb. 1, 2008), https://pubs.naruc.org/pub.cfm?id=538EA65C-2354-D714-5107-44736A60B037 (last visited Nov. 12, 2018).

- Rate levels should be stable in themselves, with minimal unexpected changes that are seriously averse to existing customers.
- Rates should be fair in apportioning cost of service among different consumers.
- Rate design and application should avoid undue discrimination.
- Rates should advance economic efficiency, promote the efficient use of energy, and support market growth for competing products and services.

Q. How do these principles apply to the evaluation of the Companies' proposed NMS-2 tariff?

A. As they have for decades for hundreds if not thousands of rate proposals across the country and around the world, the Bonbright Principles provide a useful starting point in the evaluation of the Companies' proposed NMS-2 tariff proposal. In addition to being simple, understandable, acceptable, free from controversy in interpretation, stable, and non-discriminatory, the Company must submit competent and substantial evidence that establishes that the proposed net metering compensation rate and any proposed charges on net metering customers are grounded in actual revenue requirements and an honest and comprehensive assessment of the costs to serve net metering customers and the benefits net metered generation creates.

Q. How do the Companies' proposals stack up against traditional rate making principles?

A. The Company's proposals fail to align with traditional rate making principles in several regards. The proposed NMS-2 tariff design fails the test of simplicity and understandability, especially because the consequences of failing to perfectly match consumption with variable production have been dramatically increased through the rate design.[57] The Company asserts that customers can realize full retail value for generation that perfectly matches consumption but does not provide metering or usage information that could inform such decision making by non-professional customers that have installed rooftop solar.

Q. In what other ways do the proposed NMS-2 tariffs depart from sound rate making?

A. The Companies' proposed compensation rates are set to the wholesale value of energy and do not account for the costs and benefits of customer-generation as a load reducer and producer of local energy to serve other loads on the system—they are not cost-based and would not fairly apportion costs among different customers. The Companies have failed to demonstrate that the proposed NMS-2 tariffs would be effective at yielding revenue requirements for the simple reason that they have failed to assess the cost of service related to customer generation. Customer-generators make long-lived investments in systems like solar generators that will operate for twenty-five years or more. The Companies' proposal to limit compensation to relatively volatile wholesale energy prices would introduce instability and lack of understandability into rates that apply to ordinary residential customers that often lack sophisticated understanding of wholesale energy markets.

Q. Are there other deficiencies?

A. Yes. As already explained, the Companies' proposed tariffs would encourage economic waste and encourage the inefficient use of electric services by customer-generators. The radical reduction in compensation for exported energy would introduce a sudden instability into the DG market in Kentucky. And the manner in which the Companies

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[57] The Companies' plans for a complex four-part rate, *supra note 38*, would mark an even greater departure from sound rate making principles.

propose to single out customer-generators for confiscatory rates is unjustly discriminatory.

Q. Can Bonbright's principles be adapted to the modern utility environment?

A. Yes. While the core principles remain valid, some things have changed since Bonbright published his work. Today, utilities are not the only investors with skin in the electric service game—customer-generators are significant investors, too. And customer classes are becoming more diverse, not less so. As a result, the tools and metrics of economic efficiency require attention to far more factors than the price revealed solely by a century-old approach to cost- of-service accounting. There is important work to do in ensuring that public utility rates impacting distributed generators serve and support the public interest. I therefore recommend several modern adaptations of Bonbright's principles that the Commission should rely upon in reviewing the underlying methods and foundation for the Companies' proposed net metering tariffs, and to ensure that equitable cost-of-service based rates are in place for net metered customers.[58] These additional considerations are:

- Full comprehension and reflection of the resource value of net metered generation in net metered generation rates.
- Rates should account for the relative market positions of the various market actors, and especially for the information asymmetries among customers, utilities, and other parties.

[58] K. Rábago & R. Valova, *Revisiting Bonbright's Principles of Public Utility Rates in a DER World,* The Electricity Journal, Vol. 31, Issue 8, pp. 9-13 (Oct. 2018), available at: https://peccpubs.pace.edu/getFileContents.php?resourceid=43bdf87a9063c34.

- Rates must be grounded in a careful assessment of the practical economic impacts of distributed energy resource ("DER") [59] rates, including net metered generation rates, on all market participants.
- Net metered generation rates, like utility rates in general, must support capital attraction for beneficial investments.
- Regulation must account for the incentive effects of DER and net metered generation rates.
- Rates for net metered generation and other DERs require accurate accounting for utility costs and careful differentiation between cost causation and the potential for cost shifting.

Q. Please explain why full comprehension and reflection of resource value is essential for just and reasonable net metering rates.

A. Regulators should fully comprehend and reflect resource value in rates. Typically, comprehension should be supported by full assessment of costs and benefits resulting from DER and distributed generation ("DG") operation, and where possible, quantification of those impacts for use in cost-of-service analysis and rate design. Regulation is complex, even more so in an era of DERs and increasingly competitive markets. Rates are often based on embedded historical costs but have their most profound impact on future behaviors and costs. The growing menu of cost-effective DER-based services and increasing customer choice compels an analysis and explicit reflection of

[59] This testimony and the general practice in the industry uses the term "distributed energy resources" to describe a wide range of technologies and services deployed in the distribution system to meet demand for energy services. These technologies and services include generation, storage, electric vehicles, energy efficiency and conservation, demand response, and demand management.

costs, avoided costs,[60] and benefits in basic service and optional rates like net metering tariffs because such rates impact DER investment and utilization, and are a key mechanism for optimizing development of these clean energy resources. Full data-driven evaluation of costs and benefits of net metered generation has been a constant theme in the work on successor rates to traditional net metering by Commissions and their Staff across the U.S., and work remains to be done in Kentucky. Regulators in many states increasingly recognize that there are significant and challenging gaps between costs, prices, and value in the electricity sector. Regulators are also seeking refinements in costs and benefits based on locational and temporal characteristics of the operation of net metered generation and other DERs. Economic efficiency requires conscious engagement with objective, data-driven valuation processes.

Q: How would you recommend that the Commission engage in such a process?

A: Like Mr. Owen and the JI parties in the Kentucky Power Company case, I recommend that the Commission order the conducting of a comprehensive value of solar study in the form of a Benefit-Cost Analysis ("BCA"), including analysis of the impacts of power outflows and offset consumption to support net metering rates in Kentucky in order to ensure allegiance to the rate making requirement of non-discriminatory cost of service-based rates.

Q. Why is accounting for the relative market positions of and information asymmetries between market actors important?

[60] Here, the term "avoided costs" means full avoided costs, including all the known and measurable costs avoided by the operation of distributed generation over the life of the generation facility. This usage stands in contrast to the much more limited usage employed by the Companies' which quantifies avoided wholesale energy costs and little if anything more, typically derived from averages of locational marginal prices.

A. The determination of just and reasonable net metering tariff rates should account for the relative market positions of the various market actors, and especially for the information asymmetries among customers, utilities, and other parties. Utilities hold all the relevant data necessary to quantify appropriate cost of service-based rates. As this testimony sets out, the Company has failed to produce, gather, or rely upon the data necessary to ensure that its proposal for a new net metering tariff, including compensation values and future tariff structures, meets the statutory requirements with clear and convincing evidence.

Q. Why is it important that rates be grounded in a careful assessment of practical economic impacts?

A. A just and reasonable DG rate must be grounded in a careful assessment of the practical economic impacts of the rate on all market participants. That includes customer-generators and other utility customers as well. This testimony identifies the miniscule fraction of the Companies' finances represented by the actions of customer generators and the glaring lack of reliable data concerning material impacts upon which to base any assessment of the proposed net metering compensation rate. The Company has conducted no analysis of the impacts of the proposed net metering tariff provisions on net metering customer bills. Importantly, this also means that there is insufficient evidence in the record to fully assess whether the Company's proposed net metering rate will have the effect of leading to unnecessary and unwarranted impairment of the quality and character of Kentucky's energy supply. Less renewable net metered generation, now and over the coming decades, will be worse for Kentucky's environment and economy. Any net metering investment discouraged by the economic impacts of confiscatory net metering outflow compensation rates will deny Kentucky the benefit of decades worth of non-polluting electricity generation.

Q. Why is it important that rates support capital attraction for non-utility market participants?

A. Discouraging net metered generation investment denies all customers of the benefit of private, non-utility coverage of insurance, financing, and operational costs associated with generation, and preserves more expensive monopoly control over system costs—costs that are imposed on all customers. An unreasonably and unjustifiably low outflow compensation rate in a net metering tariff will impair the development of renewable energy markets in Kentucky and harm customers who are interested in developing net metering projects. Net metering investments require capital, and this investment represents a proportionately more significant share of a household or business budgets than for a very large utility. Capital access and affordability for small investors is impacted by payback rates and ratios, market size, supply- and value-chain diversity and maturity, and other factors. The rate-regulated utility must provide enough competent evidence for the Commission to evaluate whether the proposed net metering tariff rate will have an unreasonable negative impact on capital attraction to support renewable energy market growth in Kentucky.

Q. Why is it important for the Commission to bear in mind the incentive effects of net metering rates?

A. It is a truism of economic and rate regulation that "all regulation is incentive regulation."[61] Likewise, all rate design is incentive rate design. As previously explained,

[61] J. Lazar, *Electricity Regulation in the U.S.*, Regulatory Assistance Project (Jun. 2016). Available at: https://www.raponline.org/knowledge- center/electricity-regulation-in-the-us-a-guide-2/.

net metering outflow rates impact net metering investment decisions. There are other potential incentives stemming from net metering tariff rate design as well. An inadequately understood and analyzed net metering tariff approved by the Commission creates significant risk of energy waste, economic inefficiency, and increased environmental harm:

- A significant differential between inflow and outflow rates will encourage customer-generators to use as much generation onsite as possible. While this might have the effect of encouraging additional investment in storage technology by the relatively few customers that can afford it, it will primarily encourage customers to time energy consumption during periods of higher net-metered generation output. As a result, valuable on-peak energy production that otherwise could have offset expensive utility generation will be unavailable to the grid at large.
- Unreasonably low outflow rates that do not reflect the full value of exported generation will encourage uneconomic undersizing of DG systems. DG systems are heavily driven by fixed costs—as are utility investments—and the relative cost of incremental capacity additions is falling. Undersizing systems to avoid production that does not earn full and fair value for generation results in economic waste and, again, denies the benefits of excess generation that the system would otherwise benefit from.
- Unreasonably low outflow rates exacerbate the problem of subsidies flowing from net metered customers to the utility and other customers. Excess energy from net metered customers, when properly planned and accounted for by the utility, backs down utility generation and reduces loading on transmission and distribution systems—often

during peak hours when marginal losses are higher. These benefits are not at all studied by the Companies in these cases. Moreover, excess generation is not stored by the utility, but immediately serves the nearest unserved load as a simple matter of electrical physics. As the energy serves that load, it passes through a utility revenue meter, earning the utility a full billing charge at the applicable retail rate. This means that the utility collects a full retail rate's worth of revenues, which includes allocated charges for fixed costs recovery, for every kWh of export from a net metered facility. Of course, if the utility chooses to ignore the injections of energy, it will waste customer money by continuing to generate as if the local generation was not available.[62] And because billing systems have very small variable costs and the distribution system is already in place, the only amount the utility pays for the injected energy—energy that it otherwise would have had to generate or purchase, transmit, and distribute—is the net metering outflow compensation rate.

- Outflow rates that do not reflect full lifecycle environmental costs and full value of outflow have the effect of extending and exacerbating uneconomic costs for electricity service that fail to internalize known, measurable, and significant environmental costs associated with non-renewable generation and inefficient utility system operations.

Q. How is careful accounting for utility costs and a distinction between cost causation and cost shifting important?

A. Just and reasonable rates for net metered generation require accurate accounting for utility costs and careful differentiation between cost causation and the potential for cost

[62] Companies' responses to JI 1-25 (LG&E), JI 1-25 (KU).

shifting. As already addressed in this testimony, the Companies' assertions about the costs of net metered generation operations are unconnected to any meaningful and reliable analysis. In addition, the Company asserts that customer-generators avoid paying for costs without any credible evidence of the cost-of-service basis for those assertions. The Company correctly recognizes that, all other things being equal, net metering customers don't pay as much for their utility bill as they would have without a net metered system. The Company is also correct that, all other things being equal, net metering customers make lower contributions to fixed cost recovery than they would have prior to installing their generation system. The fundamental principle of cost-based rates is that customers who make greater use of the system pay for that greater use, and that customers who make less use of the system pay at an appropriately lower level. What the Companies fail to provide any evidence for is how the cost to serve a net-metered customer changes as a result of generation operation. Customer generators seek to reduce use of utility energy services, but reduction in use does not and cannot *create* costs in a cost-of-service rate making regime. Customer use reductions compared to forecasts *may* result in a potential for a shifting of costs in a subsequent rate case, and such cost shifting *ma*y merit regulatory attention of several different kinds. The Companies have failed to provide any evidence to support a just and reasonable quantification and treatment of any such cost shifts or to demonstrate in any meaningful way the potential cost shifts are sufficiently significant to justify adjustment through the net metering tariff.

Q. To the extent that reductions in use by net metering customers create the potential for cost shifts, what should a reasonable and prudent utility do?

A. As this testimony reiterates, the first step the Company should take is to objectively quantify the potential cost shift. That step remains to be done by the Company. Lost revenues are not a cost. Cost shifts only occur if all of the costs avoided by the reduced use are less than the reduced revenue. A cost shift is unjust only if the net result, after a full accounting of costs and benefits, imposes unreasonable additional costs on non-participant customers or provides unreasonable payments to generating customers that exceed value. The record in these cases is in no way adequate to address these fundamental questions. The second step is to assess the potential cost shift in context of other potential cost shifts.[63] The Company has not assessed the relative magnitude and significance of any potential cost shift that might be associated with net metering operations.

Q. Please provide examples of other potential cost shifts.

A. Potential cost shifts arise for two major reasons. Most commonly, they arise from the averaging of costs into rates within a class of diverse customers with diverse usage patterns. For example, customer charges based on average costs create a cost shift by which customers in multi-family housing bear a disproportionate share of costs associated with service drops, final step-down transformers, and other infrastructure associated with electricity delivery, as compared with residential customers who live in large suburban homes. Customers with usage patterns that do not contribute to system peak costs as much as other customers in the class bear disproportionate costs under average rates as well. Customers that invest in major energy efficiency improvements reduce their use and contribution to fixed cost recovery if rates were set based on an

[63] Potential cost shifts become real cost shifts through a rate case order or other Commission order approving a rate or tariff.

assumption that they would continue their inefficient use in the rate case forecasts, setting up a potential cost shift in the next rate case. And utility economic development rates often shift costs from new load customers to existing customers based on a hope that increases in usage will lead to cost shifts in the opposite direction at some time in the future. Of course, economic development rates are designed to increase demand for energy, so that any benefits in spreading costs between rate cases are often overwhelmed by the costs of increased infrastructure investments required to serve the increased load. And utilities like the Companies provide discounts in the form of credits to customers on economic development rates—that shift revenue requirements to other customers in the short-term.[64] In my experience, the magnitude of the potential cost shifts and the increased infrastructure costs associated with these examples dwarf the potential for properly calculated cost shifts associated with net metering operations even without full and fair consideration of the costs and benefits of net metered generation to the grid.

Q. If the potential cost shifts associated with net metered generation are likely to be very small, what does this say about the Companies' proposed net metering tariffs?

A. In the absence of credible evidence of a significant cost shift that must be addressed in order to ensure just and reasonable rates for all customers, and in the face of likely greater potential cost shifts associated with other factors, the Companies' proposals are both unjustly discriminatory and unjustified as a rate proposal. A focus on other and more significant cost shifts already embedded in rates would advance administrative economy and efficiency.

[64] Companies' responses to JI 1-18 (KU), JI 1-18 (LG&E).

Q. What then should the Companies do in order to ensure that they are proposing just and reasonable rates for net metering customers?

A. The Companies should deploy metering equipment and conduct research to determine how the installation and operation of net metered facilities impacts the costs to serve net metering customers and other customers on the grid and use that data to support a just and reasonable outflow rate proposal. Until the Companies can produce actual data to support the proposed NMS-2 tariffs, they should continue offering the NMS-1 tariff.

BENEFIT-COST ANALYSIS AS A FOUNDATION FOR NET METERING RATES

Q. How can the Commission ensure that any net metering tariff that it approves will result in fair, just, and reasonable rates?

A. The Commission has already explained that the rate making process must examine the quantifiable benefits and costs of net-metered systems in light of the utility's unique characteristics and the specific cost of serving the utility's customers.[65] I fully concur with this approach. The Commission has the broad authority to consider all relevant factors in the context of rate proceedings such as these regarding evidence of the quantifiable benefits and costs of a net-metered system.[66]

Q. In light of the Commission's responsibilities and authority, how best should it proceed?

A. The best and most common place for the Commission to start is by compelling the Companies to base their net metering rate proposals on a transparent and comprehensive

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[65] Letter from Public Service Commission to Senator Brandon Smith, February 18, 2019, cited in JI Post Hearing Brief in Case No. 2020-00174 at 6.
[66] *Id.*

assessment of the costs and benefits of customer generation. As JI witness James Owen detailed in his testimony in the Kentucky Power Company case, a growing number of jurisdictions have used Value of Solar analysis to inform and support net metering rate decisions.[67] Because the Commission must ultimately decide the net metering tariff issue for each utility that it regulates, best practices from other jurisdictions countenance the Commission requiring that the analysis be undertaken under a common analytical framework that can also incorporate utility-specific facts and circumstances.

Q. Why does a common framework approach constitute best practices in benefit-cost analysis?

A. Among other reasons adopting and directing multiple utilities within a single state to utilize a common framework for BCAs aligns with tenets of sound rate making, including ease of understandability and application, and provides greater confidence that rates will track cost causation and fairly apportion costs. And importantly, a common framework approach to evaluating costs and benefits will support efficient and rational statewide market development for DG and other DERs. I will expand on the issue of a BCA framework and my recommendations further in this testimony.

Q. How do legal requirements and prior Commission decisions guide the process that the Commission should order in these cases?

[67] "Many states have conducted Value of Solar studies of one form or another. States that have existing studies include: Arizona (2016 and 2013); Arkansas (2017); California (2016, 2013, 2012, 2011, 2010, 2005); Colorado (2013); Florida (2005); Hawaii (2014); Iowa (2016); Louisiana (2015); Massachusetts (2015); Maine (2015); Mississippi (2013); North Carolina (2014); Nevada (2017, 2014); New Jersey and Pennsylvania (2012); New York (2012 and 2008); South Carolina (2015); Texas (2014), including for the cities of San Antonio (2013) and Austin (2006); Utah (2014); Vermont (2014); Virginia (2014); and Wisconsin (2016). Other states have conducted dockets and processes for establishing a Value of Solar methodology or framework, such as: Minnesota (2014); Rhode Island (2015); and New York (2016)." Direct testimony of JI witness James Owen in KY PSC Case No. 2020-00174 at 34, citing Solar Energy Industries Association, *Solar Cost-Benefit Studies.* Available at: https://www.seia.org/initiatives/solar-cost-benefit-studies .

A. Kentucky law mandates that the application for approval for a new net metering tariff must originate with the utility. The Companies bear the responsibility of submitting sufficient and competent evidence to support the proposed tariff and to demonstrate that the tariff will result in rates that are just and reasonable. Any proposal that is based on recovering or securing costs created by net metered generation must follow rate making processes in Kentucky law and without regard for rate structures applicable to non-generator customers, that is, they must be based on cost of service data for customer generators.

Q. Why do you say that requiring the use of a common analytical framework for benefit-cost analysis ("BCA") is best practice?

A. The concept of standardized BCA frameworks goes back nearly 40 years in the U.S., when the California Standard Practice Manual was published in 1983.[68] Indeed, the common use of standardized frameworks to evaluate energy efficiency programs has improved the stock and performance of such programs to the extent that it is now common knowledge that efficiency is the least expensive energy resource everywhere.

Q. How else have standardized BCA framework approaches been used?

A. Over the past 40 years, state regulatory commissions have developed, shared, and adopted common methods and evaluation frameworks for calculating wholesale avoided cost rates. While each state adapts these methods to address specific local conditions, a strong non-utility wholesale generation sector has emerged in many states, saving customers significant amounts of money.

Q. What is the relationship between BCAs and Value of Solar studies?

[68] *See, generally,* California PUC, *California Standard Practice Manual,* Regulatory Assistance Project (Oct. 1, 2001), available at: https://www.raponline.org/knowledge-center/california-standard-practice-manual/.

A. As already noted, the Value of Solar concept is at heart a BCA, specialized to distributed solar production. As early as 2013, when I co-authored the "A Regulator's Guidebook: Calculating the Benefits and Costs of Distributed Solar,"[69] the methods and metrics of best practices for Value of Solar studies were already identifiable. That reference lists the key categories of impacts that should be assessed and describes methods to quantify those impacts. Transparent and comprehensive evaluations of the value of solar and of distributed energy resources ("DER") have tracked the guidance in the Regulator's Guidebook to describe and quantify costs and benefits resulting from the production of energy by DG facilities over the useful life of facilities. It is important to note that the most useful reports use a fairly standardized analysis framework and transparently document the methods chosen for calculating costs and benefits.

Q. Can you point to a single best example of Value of Solar analysis?

A. In my opinion, the "gold standard" for such analysis is the work done in Minnesota, by Clean Power Research, published in 2014.[70] That report was the product of a multi-stakeholder process and the report fully documents the methods and results. The study was reviewed multiple times by the Minnesota Public Service Commission, and the methodology was adopted for informing compensation rates for community solar projects. Today, the Minnesota Community Solar program leads the nation.[71] The

[69] J. Keyes & K. Rábago, *A Regulator's Guidebook: Calculating the Benefits and Costs of Distributed Solar,* Interstate Renewable Energy Council-IREC (Oct. 2013), available at: http://www.irecusa.org/wp-content/uploads/2013/10/IREC_Rabago_Regulators-Guidebook-to-Assessing-Benefits-and-Costs-of-DSG.pdf.
[70] Clean Power Research, *Minnesota Value of Solar: Methodology,* Minnesota Department of Commerce (Mar. 2014), available at: https://www.cleanpower.com/research/economic-valuation-research/.
[71] *See* J. Farrell, *Why Minnesota's Community Solar Program is the Best,* Institute for Local Self-Reliance (5 Feb. 2021—updated monthly), available at: https://ilsr.org/minnesotas-community-solar-program/.

valuation is regularly updated using a public process, another benefit of adopting a framework approach to benefit-cost analysis.

Q. Are there any other examples you wish to cite that demonstrate the benefits of standardized BCA frameworks for evaluating the impacts and cost effectiveness of programs, rates, or investments?

A. Yes. During the past fifteen years, utilities have invested billions of dollars through smart grid, grid modernization, and/or power sector transformation initiatives. Standardized BCA frameworks have been central to the leading efforts in this regard. I was personally involved in two such processes that I would commend to the Commission's attention. Perhaps one of the most comprehensive transformation initiatives was that initiated by New York, styled New York REV (for "Reforming the Energy Vision"). This proceeding resulted in the institution of a Value of DER proceeding and comprehensive distribution system planning processes that included a BCA Framework.[72] The Pace Energy and Climate Center, which I led, was a public interest intervenor in the REV process. In the words of the NY Commission's order, the BCA Framework was premised on a number of foundational principles which I also recommend that the Commission adapt and adopt for Kentucky:

> The BCA analysis should: 1) be based on transparent assumptions and methodologies; list all benefits and costs including those that are localized and more granular; 2) avoid combining or conflating different benefits and costs; 3) assess portfolios rather than individual measures or investments (allowing for

[72] *See* NY PSC, *Order Establishing the Benefit Cost Analysis Framework*, Case 14-M-0101 – Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision (Jan. 21, 2016), available at: https://www3.dps.ny.gov/W/PSCWeb.nsf/All/C12C0A18F55877E785257E6F005D533E.

consideration of potential synergies and economies among measures); 4) address the full lifetime of the investment while reflecting sensitivities on key assumptions; and, 5) compare benefits and costs to traditional alternatives instead of valuing them in isolation.[73]

Q. Do you wish to cite any other examples of states adopting a BCA Framework?

A. Yes. I would also direct the Commission's attention to the Docket 4600 proceeding conducted by the Rhode Island Public Utilities Commission ("RI PUC") from 2016 to 2017.[74] I participated in that proceeding on behalf of New Energy, Inc. The RI PUC initiated that proceeding, informed by a multi-party stakeholder working group's work, to seek answers to several questions, notably:

What attributes are possible to measure on the electric system and why should they be measured? This overarching question can be further broken down into three broad questions:

1. What are the costs and benefits that can be applied across any and/or all programs, identifying each and whether each is aligned with state policy?
2. At what level should these costs and benefits be quantified—where physically on the system and where in cost-allocation and rates? and

[73] *Id.* at 2.
[74] RI PUC, *In Re: Investigation into the Changing Distribution System and the Modernization of Rates in Light of the Changing Distribution System,* Docket No. 4600. Documents available at: http://www.ripuc.ri.gov/eventsactions/docket/4600page.html.

3. How can we best measure these costs and benefits at these levels–what level of visibility is required on the system and how is that visibility accomplished?[75]

In 2017, the RI Docket 4600 working group delivered to the RI PUC a final report that addressed two key topics, namely, (1) how to better evaluate the benefits and costs of a wide range of technologies, programs, and investments; and (2) how rate design should evolve in Rhode Island over time.[76] The RI Docket 4600 Stakeholder Working Group, which included utility, developer, consumer, regulatory, and economic development stakeholders, delivered a report that established a Rhode Island Benefit-Cost Framework and several rate design recommendations.[77] The RI PUC accepted the report and issued directives for further work in July 2017.[78] The process and RI PUC orders set the stage for power sector transformation work that was a priority for that state.

Q. Is there value to establishing and employing a BCA Framework even if a state is not pursuing utility sector transformation as in New York and Rhode Island?

A. Absolutely. A BCA Framework can lead to clarity in understanding and communication between utilities, regulators, and stakeholders about benefit and cost impacts. A BCA Framework is essential to establishing fair, just, and reasonable rates for DER services and technologies. A BCA Framework can provide a platform for evaluating and

[75] RI PUC Docket No. 4600, *Notice of Commencement of Docket and Invitation for Stakeholders Participation,* RI PUC (Mar. 18. 2016), available at: http://www.ripuc.ri.gov/eventsactions/docket/4600page.html.
[76] Raab Associates, et al., *Docket 4600: Stakeholder Working Group Process Report to the Rhode Island Public Utilities Commission,* RI PUC Docket No. 4600 (Apr. 5, 2017), available at: http://www.ripuc.ri.gov/eventsactions/docket/4600-WGReport_4-5-17.pdf.
[77] *Id.*
[78] RI PUC, *PUC Report and Order No. 22851 Accepting Stakeholder Report,* RI PUC Docket No. 4600 (Jul. 31, 2017), available at: http://www.ripuc.ri.gov/eventsactions/docket/4600-NGrid-Ord22851_7-31-17.pdf.

prioritizing grid modernization and other investment decisions. A BCA Framework can provide a mechanism for examining interactive, portfolio, and competitive effects between programs and rate structures. And, over the long-term, a BCA Framework can provide essential analytical rigor to agendas as big as utility sector transformation. The instant case and those on the Commission's agenda for other utilities provide, in my opinion, all the justification necessary for the Commission to direct the Company to develop and propose a BCA Framework in the ordering language it issues in this supplemental proceeding.

Q. What do you conclude based on this review of the ways in which BCA frameworks have been developed and used in the examples that you cite?

A. While the examples are illustrative and not exhaustive, they reveal the benefits of using a BCA Framework approach to address many of the most important issues facing electric utility regulators and electric utilities today. A consistent and well-structured BCA Framework can be applied to program evaluation, investment decision making, and rate design. More directly, these efforts reveal just how far the Companies' approach is from best practices.

Q. What do you recommend to the Commission based on this finding?

A. The Commission should direct the Companies to develop and propose a BCA Framework as the foundation for its proposal for a tariff to replace their NMS-1 tariffs. That BCA Framework should be shared with Commission staff and stakeholders and improved based on input from those parties. And then, the Companies should develop and propose a new NMS-2 tariff design that aligns with the BCA analysis performed in accordance with the approved and vetted BCA Framework.

BCA FRAMEWORK RECOMMENDATIONS

Q. Do you have specific recommendations as to how the Companies should be required to develop and structure a BCA Framework and use that Framework to perform an analysis of any net metering tariff proposals?

A. Yes. Fortunately, the decades of work invested in sound BCA processes yielded a consensus among leading practitioners as to the elements of best-practices BCAs. That consensus is documented in the NSPM-DER, published in August of 2020. The Companies were not aware of and did not rely upon or follow the Manual's best practices guidance in formulating their net metering tariff proposals.[79]

Q. What process or methodology recommendations did the Companies rely upon in developing their NMS-2 tariff recommendations?

A. The Companies assert only that they are proposing compensation for exports based on wholesale energy avoided costs and cite the method used to calculate that rate.[80] In my view, this is not an adequate foundation for a finding that its proposal would result in fair, just, and reasonable rates.

Q. In your opinion, should the Companies be directed to follow the specific recommendations of the NSPM-DER only?

A. The NSPM-DER is a comprehensive document that includes guiding principles, recommended process steps, impact category lists, definitions, and specific guidance on a wide range of issues associated with developing a BCA Framework and conducting cost

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[79] Companies' responses to JI 1-19 thru 1-22 (KU & LG&E).
[80] *Id.*

effectiveness analysis. It would be wise for the Companies to take advantage of the comprehensive and integrated nature of its recommendations, but it is not absolutely necessary. A substantially equivalent approach will also work, though I am unaware of any similarly comprehensive and up-to-date alternative, and the Companies certainly did not rely upon one.

Q. What, then, does the NSPM-DER recommend?

A. The entire NSPM-DER guidance document is 300 pages in length, including several appendices. In this testimony I only highlight key elements of the entire NSPM-DER that the Commission should direct the Companies to follow. First, the NSPM-DER sets outs eight guiding principles that the Companies should be directed to follow. These principles are summarized as follows:[81]

Principle 1 - Treat DERs as a Utility System Resource.

DERs are one of many energy resources that can be deployed to meet utility/power system needs. DERs should therefore be compared with other energy resources, including other DERs, using consistent methods and assumptions to avoid bias across resource investment decisions.

Principle 2 - Align with Policy Goals

Jurisdictions invest in or support energy resources to meet a variety of goals and objectives. The primary cost-effectiveness test should therefore reflect this intent by accounting for the jurisdiction's applicable policy goals and objectives.

Principle 3 - Ensure Symmetry

[81] NSPM-DER Ch. 2.

Asymmetrical treatment of benefits and costs associated with a resource can lead to a biased assessment of the resource. To avoid such bias, benefits and costs should be treated symmetrically for any given type of impact.

Principle 4 - Account for Relevant, Material Impact

Cost-effectiveness tests should include all relevant (according to applicable policy goals), material impacts including those that are difficult to quantify or monetize.

Principle 5 - Conduct Forward-Looking, Long-term, Incremental Analyses

Cost-effectiveness analyses should be forward-looking, long-term, and incremental to what would have occurred absent the DER. This helps ensure that the resource in question is properly compared with alternatives.

Principle 6 - Avoid Double-Counting Impacts

Cost-effectiveness analyses present a risk of double-counting benefits and/or costs. All impacts should therefore be clearly defined and valued to avoid double-counting.

Principle 7 - Ensure Transparency

Transparency helps to ensure engagement and trust in the BCA process and decisions. BCA practices should therefore be transparent, where all relevant assumptions, methodologies, and results are clearly documented and available for stakeholder review and input.

Principle 8 - Conduct BCAs Separately from Rate Impact Analyses

Cost-effectiveness analyses answer fundamentally different questions from rate impact analyses, and therefore should be conducted separately from rate impact analyses.

Q. The NSPM-DER also proposes a five-step process for developing and conducting BCAs for DERs. What are those steps?

A. The NSPM-DER lays out the following process steps for developing and conducting a BCA:[82]

STEP 1 - Articulate Applicable Policy Goals

Articulate the jurisdiction's applicable policy goals related to DERs.

STEP 2 - Include All Utility System Impacts

Identify and include the full range of utility system impacts in the primary test, and all BCA tests.

STEP 3 - Decide Which Non-Utility System Impacts to Include

Identify those non-utility system impacts to include in the primary test based on applicable policy goals identified in Step 1:

- Determine whether to include host customer impacts, low-income impacts, other fuel and water impacts, and/or societal impacts.

STEP 4 - Ensure that Benefits and Costs are Properly Addressed

Ensure that the impacts identified in Steps 2 and 3 are properly addressed, where:

- Benefits and costs are treated symmetrically.
- Relevant and material impacts are included, even if hard to quantify.

[82] NSPM-DER Ch. 3.

• Benefits and costs are not double counted.

• Benefits and costs are treated consistently across DER types.

STEP 5 - Establish Comprehensive, Transparent Documentation

Establish comprehensive, transparent documentation and reporting, whereby:

• The process used to determine the primary test is fully documented.

• Reporting requirements and/or use of templates for presenting assumptions and results are developed.

Q. Did the Companies' process for establishing their NMS-2 tariff proposals rely upon the same or a similar process as that recommended in the NSPM-DER?

A. No. The Commission should direct the Companies to clearly and completely describe the process that they use in developing a new proposal for any NMS-2 tariff and to reflect the best practices guidance in the NSPM-DER.

Q. The NSPM-DER lists utility system impacts that may result for DER operations that should be considered in every case in order to perform a BCA in accordance with best practices. What are those impacts?

A. The utility system impacts that the NSPM-DER recommends for evaluation in every case are:[83]

- Generation - Energy generation
- Generation – Capacity
- Generation - Environmental compliance
- Generation - RPS/CES compliance

[83] NSPM-DER Ch. 4.

- Generation - Market price effects
- Generation - Ancillary services
- Transmission - Transmission capacity
- Transmission - Transmission system losses
- Distribution - Distribution capacity
- Distribution - Distribution system losses
- Distribution - Distribution operations and maintenance
- Distribution - Distribution voltage
- General - Financial incentives
- General - Program administration
- General - Utility performance incentives
- General - Credit and collection
- General – Risk
- General - Reliability
- General – Resilience

Q. Did the Companies evaluate and quantify or describe all of these utility system impacts that may result from the operation of net metered generation?

A. No.[84] The Commission should direct the Company to evaluate these impacts in a BCA as part of its development of any new NMS tariff.

Q. The NSPM-DER lists host customer and societal impacts that may result for DER operations that may be considered, according to jurisdictional policy preference, in order to perform a BCA in accordance with best practices. What are those impacts?

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[84] Companies' responses to JI 1-20 (KU & LG&E).

A. The host customer and societal impacts that the NSPM-DER recommends for potential evaluation, according to jurisdictional policy preference are:[85]

- Host Customer - Host portion of DER costs
- Host Customer - Host transaction costs
- Host Customer - Interconnection fees
- Host Customer - Risk
- Host Customer - Reliability
- Host Customer - Resilience
- Host Customer - Tax incentives
- Host Customer - Non-energy impacts
- Host Customer - Low-income customer non-energy impacts
- Societal - Resilience impacts beyond those experienced by utilities or host customers
- Societal - Greenhouse gas emissions created by fossil-fueled energy resources
- Societal - Other air emissions, solid waste, land, water, and other environmental impacts
- Societal - Incremental economic development and job impacts
- Societal - Health impacts, medical costs, and productivity affected by health
- Societal - Poverty alleviation, environmental justice, and reduced home foreclosures
- Societal - Energy imports and energy independence

[85] NSPM-DER Ch. 4.

Q. Did the Companies evaluate and quantify or describe all of these host customer or societal impacts that may result from the operation of net metered generation?

A. No.[86] The Commission should direct the Companies to assess these impacts in a BCA as part of their development of any new NMS tariffs.

FINDINGS AND RECOMMENDATIONS

Q. Please summarize your findings regarding a BCA Framework for evaluating the costs and benefits that result from the installation and operation of net metered generation.

A. A BCA Framework developed in accordance with best practices guidance, such as that contained in the NSPM-DER, is essential in order to provide a substantial and competent evidentiary foundation for the design of fair, just, and reasonable rates for customer generators. Given that the Companies have not met their burden of supporting their proposed tariff with adequate evidence and the fact the Commission must conduct similar evaluations for other utilities in Kentucky, the prescribing of the elements of a BCA Framework is administratively efficient and will promote the statewide uniformity in approach that can support the emergence of a self-sustaining competitive non-utility customer generation market segment. In addition to providing cost-based analytical support for net metering compensation, such a framework can also provide broad and future benefits in supporting the development of other tariffs relating to DERs, evaluation of grid modernization investments including those relating to AMI, and transmission, distribution, and generation planning.

Q. What specific recommendation do you have for the Commission in this proceeding?

[86] Companies' responses to JI 1-21 (KU & LG&E).

A. The Commission should deny the Companies' proposals to implement its NMS-2 tariff. The NMS-2 tariff proposals are unfair, unjust, and unreasonable and not in the public interest. The Commission should direct that the NMS-1 tariffs remain in effect until the Companies propose a successor tariff that will result in fair, just, and reasonable rates, based on the development and application of a BCA Framework. The Commission should further direct the Companies to develop a BCA Framework and conduct a BCA for net metered generation in accordance with the principles, process, impacts, and other guidance in the NSPM-DER. The Commission should direct the Companies to report their assumptions, methods, and results in a transparent and comprehensive manner to the interested public and provide a meaningful opportunity for stakeholder comments and suggestions. The Commission should direct the Companies to make the BCA Framework and tool available to the public and interested stakeholders along with any proposal for new rates relating to DERs in order that such stakeholders can design and propose alternative rate approaches for consideration by the Commission. Finally, the Commission should direct the Companies to adopt a schedule for updating their BCA Frameworks on a regular interval—such as once every two years—in order to take advantage of evolving experience and best practices in the industry in general.

Q. Does that conclude your testimony?

A. Yes.