BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of Staff's Review of Commission Rules 4 CSR 240-20.060 (Cogeneration), 4 CSR 240-3.155 (Filing Requirements for Electric Utility Cogeneration Tariff Filing), and 4 CSR 240-20.065 (Net Metering)	)))))	File No. EW-2018-0078

AMENDED
RESPONSIVE COMMENTS OF KANSAS CITY POWER & LIGHT COMPANY AND KCP&L GREATER MISSOURI OPERATIONS COMPANY
TO FILED COMMENTS

Kansas City Power & Light Company ("KCP&L-MO") and KCP&L Greater Missouri Operations Company ("GMO") (collectively, "KCP&L" or "the Company") hereby submit these amended responsive comments to the filed comments received in this working case as ordered by the Missouri Public Service Commission's ("Commission") *Order Inviting Responses to Filed Comments* issued on October 31, 2017.

On November 15, 2017, the Company filed its *Responsive Comments of KCP&L and GMO to Filed Comments* ("Responsive Comments"), however, Attachment A (as referenced on page 7 of those Responsive Comments) was unintentionally omitted. Attached hereto to these Amended Responsive Comments is the referenced Attachment A. Other than the inclusion of the omitted attachment, no edits have been made to the previously filed Responsive Comments.

KCP&L has reviewed the filed comments offered by the Union Electric Company d/b/a Ameren Missouri ("Ameren Missouri"), the Missouri Division of Energy ("DE"), the Office of the Public Counsel ("OPC"), Renew Missouri Advocates and Cypress Creek Renewables ("Renew Missouri-CCR"), and Summit Natural Gas of Missouri, Inc. ("SNGMO"). In that review, KCP&L has identified a series of common topics applicable to the rules under consideration. Those topics are related to PURPA requirements (Avoided Cost, Standard Offer Contract, Standard Contract

Terms, and Allowable System Size), Net Metering (Alternate Metering and Value of Distributed Energy Resources ("DER")/Solar), and DER Policy (State Energy Plan, Combined Heat and Power ("CHP"), Standby, and general DER promotion). The Company will speak to each.

PURPA Requirements

KCP&L observes that many of the comments speak to reforms that have, or are in the process of occurring in other jurisdictions. RenewMO-CCR highlights efforts from Michigan in their comments. The Company is aware of similar efforts in Idaho[1], Washington[2], Oregon[3], Wyoming[4], Utah[5], South Carolina[6], Montana[7] and North Carolina[8]. These proceedings take various forms, but generally seek to modernize or update the states rules and applications of the PURPA requirements. The common results are either cutting avoided cost rates or shortening standard contract lengths under the law. Utilities contend that PURPA, established at a different time and under different market conditions, places requirements for energy purchases that are not in sync with need. The requirements to enter into long-term agreements at costs that are often higher than those established by the market are believed to place additional risk on customers at a point when the customer demand is being met with resources on hand. Coupled with slow growth in customer demand, some states rules pertaining to the PURPA requirements were increasingly

[1] Idaho Power: Case AVU-E-15-01 and IPC-E-17-01, and Rocky Mountain Power: Case PAC-E-15-03

[2] Commission General Investigation: Case U-161024

[3] Pacific Power: Case UM 1734 and Portal General Electric: Case UM 1854

[4] Rocky Mountain Power: Case 14220 and 14736

[5] Rocky Mountain Power: Case 15-035-53

[6] South Carolina Electric and Gas Company: Case 2017-2-E

[7] Northwestern Energy: Case D2016.6.39 and Greycliff Wind Prime: Case D2015.8.64

[8] Duke Energy: Case E-100 Sub 148

found to be in conflict with utility planning in some jurisdictions. Within the various proceedings concerning PURPA reforms, the Company notes the following trends:

- Commissions are supporting shorter standard contract terms,
- Commissions are authorizing reduced avoided cost amounts, and
- Commissions are allowing smaller limits on the size of Qualifying Facilities (QF) under standard contracts.

Developers of renewable projects have generally argued that these reforms will dramatically reduce renewable development, but Commissions have increasingly supported revisions that are believed to better reflect actual avoided costs.

KCP&L does not believe any changes in Missouri are necessary at this time because the current rules are well balanced between participant and non-participant and can be maintained. As noted in the Company's Initial Comments in this Case, PURPA and the state rules and regulations pertaining to PURPA were established when customer generation was virtually non-existent and there was no obligation for the electric utility to interconnect and purchase customer generated energy. PURPA requirements defined rates and processes that, at the time, were just and reasonable to the electricity consumers and in the public interest, non-discriminatory with respect to QFs, and not in excess of the incremental cost to the electric utility of alternative electric energy. Subsequent Missouri rules were established to encourage customer generation and ensure balance, perpetuating limits on the amount and system sizes of customer generation a utility would be obligated to purchase and the price for the purchase was set at the utility's avoided cost.

At this time, KCP&L does not have specific recommendations concerning the PURPA reforms that should be considered in Missouri, as the PURPA implementation has thus far not generated issues with utilities or customers. Recommendations to add specific requirements in

Missouri, such as those offered by RenewMo-CCR to introduce a 20-year standard contract term or changing the system size limit, are not appropriate and should be rejected by the Commission. There is no evidence that the existing Commission rule would benefit from these changes. Additionally, RenewMo-CCR recommendations concerning revisions to the state's avoided cost methodology should similarly be rejected. Citing recent efforts in Michigan, RenewMO-CCR believes the "Technical Advisory Committee process" for developing an avoided cost methodology should be applied in Missouri. The Company disagrees and believes it is important to note this process required a significant investment of time and effort by many parties. The Committee process alone took six months to complete and spawned subsequent contested cases for three groupings of utilities, requiring an additional year to resolve thus far. As of the date of this response, the cases remain active and unresolved. KCP&L is not convinced that the methods used currently to determine avoided costs in Missouri are in need of revision, particularly if the Michigan process and its reliance on contested cases is offered as the best example.

If the Commission wishes to pursue these reforms as part of this Working Case or requires more information on the matter, the Company is willing to provide more detailed comment and recommendation.

Net Metering

As noted in the KCP&L Initial Comments, Net Metering was introduced in 2005 as part of the Energy Policy Act of 2005. Net Metering ("NM") moved beyond avoided cost, providing for the offset of utility energy by customer generated energy, essentially providing for this to occur at the full retail rate. State law included limits with respect to allowed generator unit sizes and utility obligations to purchase in order to provide for deployment of meaningfully-sized customer owned systems while helping to protect the utility grid and non-generating customers.

DE, through its comments, advocates for several changes that could impact NM. Specifically, DE proposed the Commission consider a third-party examination of the value of DER, increase the flexibility afforded to customer-generators in how net metering occurs, and establish a working group to develop an approach for consistent implementation of NM. The Company urges the Commission to reject these proposals as they move NM well beyond its original intent and will serve to increase the cost paid by non-NM customers.

To begin, the current NM rules provide a means to ensure that the interconnection of customer systems are safe, consistent, and timely. Further, NM rules provide for pricing that provides support for the deployment of NM, but retains some level of protection for non-NM customers. The Commission should remain aware that this "support" translates into subsidy to NM customers at the expense of non-NM customers. Also, instead of expanding this subsidy, many jurisdictions are moving away from NM. As noted in the Company's Initial comments, jurisdictions are turning to Time of Use rates, modified net metering, increased fixed or demand charges, value pricing, or grid supply pricing as alternatives to net metering.[9] Also, the Kansas Corporation Commission issued an order in a recent general investigation, establishing that current net metering rates are providing subsidy to net metering customers and allowing electric utilities to propose alternate rate designs, such as demand rates, to alleviate the issue.[10]

The Company would like to make particular comment concerning its view of efforts to establish Value of DER or Value of Solar studies. These "Value" studies are performed in an effort to assign a dollar per kWh value for these resources based on the costs and benefits produced by those resources. Within the study, the costs and benefits are identified and to the extent

[9] Jim Lazar, Regulatory Assistance Project, in a July 2016 presentation at an EUCI Net Metering workshop.

[10] Docket 16-GIME-403-GIE

possible, quantified, to produce a net value for the resource. Advocates of the methodology say the study is "essentially a comprehensive avoided cost analysis that goes beyond the traditional energy-only PURPA analysis to reveal the benefits created by distributed solar in terms of energy, capacity, transmission, distribution, market price impacts, fuel price risk, environmental costs, and other known and measurable categories."[11] On its face, this would seem to be a reasonable alternative to explore the question concerning the value of DER/solar resources. In practice, it is not. It is KCP&L's observation that the study process, particularly for solar, is an imprecise process, providing results that vary significantly dependent upon the basis of the valuation and drivers external to the valuation effort. Additionally, efforts to include broad, social factors such as health and security introduce high levels of subjectivity to the effort. Lastly, it would appear that the party supporting the Value study sets the variables and, in a sense, drives the result. Developer and Advocate supported studies tend to return a high value and utility supported studies tend to return a low value. Even studies deemed as "independent" are prone to issues resulting from the inclusion of external social factors.

An additional concern with valuation studies is the cost of performing the study. A valuation study could be costly and DE did not speak to how that cost would be addressed. It would not be reasonable to burden Staff, and subsequently the customers of the Missouri regulated utilities with this expense. This detail cannot be ignored when considering if a study is to be performed.

[11] Karl Rabago, Value of Solar, Study Design Elements prepared for Pace Energy and Climate Center and Northeast Solar Energy Market Coalition, March 11, 2016

In the end, it is the opinion of KCP&L that a comprehensive valuation study would be costly, controversial, and likely contribute little additional information to the existing renewable discussion.

As a final point concerning the value of DER/solar, it should be noted that DER customers are already receiving an appropriate value for their contributions of energy to the grid. The Commission has already determined the value of excess energy from NM systems. The Missouri Code of State Regulation, 4 CSR 240-20.065(8) establishes:

> Each electric utility shall file on or before January 15 of each odd-numbered year for the commission's approval in the electric utility's tariff, a rate schedule with a net metering rate that is the same rate as the utility's cogeneration rate.

The same rate applies for Cogeneration systems. This rate, established through the Commission's rulemaking process and subject to affirmation from the State Legislature, has been deemed to be an appropriate value.

Many of the issues related to NM are currently being considered by the U.S. Department of Energy at the direction of the U.S. Congress.[12] As part of the request for stakeholder input, the Edison Electric Institute has offered comments on behalf of its member utilities. KCP&L believes those comments are relevant to this Working Case and provides them as Attachment A to these Responsive Comments.[13]

[12] Docket Number EERE-2017-OT-0056

[13] COMMENTS OF THE EDISON ELECTRIC INSTITUTE, Costs and Benefits of Net Metering (Docket Number EERE-2017-OT-0056), October 30, 2017

DER Policy

Within the broad context of DER Policy, KCP&L wishes to address two topics raised within the Initial Comment offered in this Working Case, the role of the Missouri Comprehensive State Energy Policy ("CSEP") and Combined Heat & Power ("CHP").

Beginning with the CSEP, DE relies heavily on the CSEP to support its comments, identifying a number of CSEP sections that are recommended for consideration in the cogeneration and net metering rules. Specific Company concerns about portions of those recommendations have already been addressed in these Responsive Comments. Here, the Company would like to speak to the CSEP itself. KCP&L participated in the process that led to the CSEP and provided representation through the Steering Committee overseeing the effort. Following the Executive Order of then Governor Jeremiah W. (Jay) Nixon, the DE established working groups and held public meetings across the state to assemble information for the plan. In October 2015, the CSEP was released, "providing guidance for ensuring access to clean, reliable, affordable, and abundant energy, while promoting job creation and investment."[14]

At the time the CSEP was released, it was expected that the recommendations would then be further considered to understand feasibility, costs, benefits, and timelines for implementation. The CSEP would then be available for policymakers, to use to develop priorities and action objectives. It is KCP&L's understanding that these feasibility steps did not occur. As such, the plan recommendations have not been prioritized or otherwise evaluated to determine appropriateness and how or if implementation might occur. Further, the CSEP has not been reviewed to address internal overlap of issues, potential conflicts between recommendations, or incongruities with existing law or programs. In its current state, the CSEP offers a "wish list" for

[14] https://ded.mo.gov/content/division-energy-presents-key-recommendations-comprehensive-energy-plan

consideration of energy goals. The Commission should exercise great care in shaping policy with respect to the CSEP. Although the effort to construct the CSEP is admirable and provides insight into the wide range of energy issues within the state, it falls short of establishing actionable policy guidance.

Concerning CHP, DE and SNGMO each provide recommendations related to this technology. The U.S. Department of Energy[15] defines CHP as:

- The concurrent production of electricity or mechanical power and useful thermal energy (heating and/or cooling) from a single source of energy.
- A type of distributed generation, which, unlike central station generation, is located at or near the point of consumption.
- A suite of technologies that can use a variety of fuels to generate electricity or power at the point of use, allowing the heat that would normally be lost in the power generation process to be recovered to provide needed heating and/or cooling.

The recommendations offered are focused on promoting CHP deployment. KCP&L does not have issue with the potential benefits of CHP, but instead has concern that the recommendations imply that CHP needs special promotion. CHP, along with other DER technologies such as NM, microgrids, batteries, or demand response should be implemented as a result of an economic evaluation. In considering these options, the customer must determine if the benefit of DER surpasses the value provided by the incumbent utility for its energy service. Absent a mandate to do so, special promotion for DERs are not within the scope of this effort. Beyond simple promotion, KCP&L is not aware of any utility process or tariff that is impeding the deployment of DER technologies such as CHP and microgrids. For KCP&L, existing constructs are able to incorporate CHP and microgrid deployment and any limitations experienced by customers have been the result of the cost-benefit analysis for the planned project. Further, the Company offers a

[15] https://www.energy.gov/eere/amo/combined-heat-and-power-basics

rebate program for CHP under its Missouri Energy Efficiency Investment Act (MEEIA) programs to help support this technology. With that, KCP&L does not feel that the recommendations related to CHP are warranted.

The Company appreciates the opportunity to provide comments and participate in this Working Case.

Respectfully submitted,

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CERTIFICATE OF SERVICE

I do hereby certify that a true and correct copy of the foregoing document has been hand delivered, emailed or mailed, postage prepaid, this 16th day of November, 2017, to all counsel of record.

/s/ Roger W. Steiner

Roger W. Steiner

Attorney for Kansas City Power & Light Company and KCP&L Greater Missouri Operations Company

Edison Electric INSTITUTE

Power by Association℠

COMMENTS OF THE EDISON ELECTRIC INSTITUTE
Costs and Benefits of Net Metering (Docket Number EERE-2017-OT-0056)

October 30, 2017

The Edison Electric Institute (EEI), on behalf of its member companies, respectfully submits these comments to the U.S. Department of Energy (DOE) in response to its Request for Information on the costs and benefits of net metering, issued September 15, 2017.

EEI is the association that represents all U.S. investor-owned electric companies, international affiliates, and industry associates worldwide. Our members provide electricity for 220 million Americans, operate in all 50 states and the District of Columbia, and directly employ more than 500,000 workers. With more than $100 billion in annual capital expenditures, the electric power industry is responsible for more than 7 million additional jobs. Our members in all parts of the country provide Americans with reliable, affordable, and sustainable electricity, and are committed to giving all customers the electricity services they desire at rates that are reasonable and equitable.

EEI applauds DOE's effort to conduct a review of the costs and benefits of net energy metering (NEM), and believes the Department has correctly identified the parameters around which NEM should be evaluated. To establish a common baseline for discussion, it is worth briefly reviewing how NEM works in relation to traditional residential rate structures. Typically, an electric company's costs (e.g., generation capacity, poles, wires, metering, billing, call centers, borrowing costs, certain taxes and fees) are recovered primarily from customers through retail rates that vary by the customer's electricity use, as well as a relatively small customer charge.

For most residential electric customers, the retail rate of electricity is assessed on the basis of cents per kWh. This volumetric-based charge goes up and down depending on how much electricity the customer uses. Problematically, many of the costs to serve residential customers, especially those associated with the transmission and distribution system, are not driven by volumetric usage, and instead are largely fixed. The traditional volumetric-driven residential rate structure is an artifact of a time in the past, when smart meters did not exist and distributed energy resources such as private solar generation were not as likely to be adopted on a widespread basis.

In today's world, in which there are ample opportunities for residential or private solar generation development, NEM allows residential solar customers (hereafter referred to as private solar customers) to be compensated for all their self-generated electricity at the full retail rate, thereby overcompensating them and also under collecting the fixed costs of maintaining and operating the energy grid that they rely upon 24-hours a day, every day of the year.[1] As a result, a policy that was implemented as a temporary solution in the 1980s—a time when private solar generation was just emerging and before the advent of advanced metering—exists today as a subsidy for private solar customers. The costs of the subsidy are shifted from private solar customers to those customers who do not have, do not want, or in some cases cannot afford or install private solar generation.[2]

In recent years, NEM has been the subject of review by many states to assess its negative financial impact on the general body of electric company customers—that is, those customers without private solar. There are several methods for assessing the impact of NEM. One such method, as identified by DOE, is cost-benefit analysis that incorporates unbiased and objective inputs.[3] When conducted in a methodologically sound manner, cost-benefit analyses result in consistent findings: NEM, as traditionally structured in most states, produces more costs in the aggregate than it does benefits, constitutes a subsidy for private solar customers, and creates a cost shift to the majority of customers who do not have private solar.[4]

While EEI supports DOE's effort to provide a national perspective on NEM through the lens of cost-benefit analysis, decisions about NEM, including its impacts on state jurisdictional customers, ultimately rest at the state level. EEI respects the role of the state utility commissions in evaluating NEM and making policy decisions based on sound data and defensible methods. DOE's efforts to evaluate costs and benefits will provide the states with important information as they continue efforts on how to address NEM now and into the future.

To contribute to the discussion, below we provide information on the five (5) supplementary topics on which DOE requested information, and conclude with a list of reasonable cost-benefit studies.

[1] EEI's comments focus on residential NEM customers who are rolled into the same rate class as standard (non-solar) residential customers. It is important to note, however, that the financial impact of NEM on non-participating customers can increase or decrease depending on rate design.
[2] Institute for Electric Innovation, *Net Energy Metering: Subsidy Issues and Regulatory Solutions,"* September 2014.
[3] DOE did not ask about methods beyond cost-benefit analysis, but it is worth noting that marginal cost analysis is another means of assessing the impact of NEM.
[4] See EEI's list of reasonable net metering cost-benefit analyses on page 12 of these comments.

1. Motivations and Policy Context for NEM, and the Role of Cost-Benefit Analysis

A cornerstone of good policymaking is sound and impartial economic analysis that can be used to ensure both cost-effectiveness and fairness. When properly conducted, cost-benefit analysis of NEM can be used to help policymakers answer three key questions: 1) Who benefits from NEM; 2) Who bears the costs of NEM; and 3) Is NEM the most efficient mechanism for achieving policy objectives?

In the last few years, policymakers across the country have started evaluating NEM with the goal of answering the above three questions. The outcomes in multiple states and jurisdictions show that NEM is worthy of revision: Seventeen states have eliminated NEM entirely or moved to reduce the compensation given to private solar customers on the grounds that the policy was neither efficient nor equitable.[5] At least another six states are currently reviewing NEM with the intention of amending or replacing the policy.[6]

Below, we evaluate the above three questions and identify the ways in which properly conducted cost-benefit analyses can help inform policy decisions around NEM.

Who benefits from NEM—and who bears the costs of NEM?

As established above, NEM compensates private solar customers at the full retail rate of electricity[7] for any energy they use or sell back to the grid. Compensation at this level allows private solar customers to avoid paying their fair share for the energy grid that they rely upon throughout the entire day, all year. By not sharing equitably in the costs of the energy grid, private solar customers shift costs to those without private solar generation.

Three cost-benefit analyses—based on measurable data and consistent with cost-of-service ratemaking—conducted by the firm Energy+Environmental Economics, Inc. (E3) for the utility commissions of California, Hawaii, and Nevada each found that, while NEM resulted in benefits for private solar customers, the total (aggregate) costs exceeded total (aggregate) benefits when considering all customers. Additionally, the policy resulted in the transfer of costs from private solar customers to customers without private solar generation. In California, E3 found that, given the rate structure in the state and the NEM program design at the time, NEM, if left unchanged, would produce an annual net cost of $1.1 billion by 2020—costs that would be borne by customers without private solar systems.[8]

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[5] NC Clean Energy Technology Center, *The 50 States of Solar: 2016 Policy Review and Q4 Quarterly Report, The 50 States of Solar: Q1 2017, The 50 States of Solar: Q2 2017, The 50 States of Solar: Q3 2017.*
[6] See ongoing activity in Arkansas, Idaho, Kentucky, Louisiana, Michigan, and Montana.
[7] Throughout these comments EEI assumes NEM compensation at the full retail rate. We recognize that in some states, NEM compensation is below the full retail rate.
[8] E3 for the California Public Utility Commission, *California Net Energy Metering Ratepayer Impacts Evaluation*, October 2013.

Similarly, Arizona Public Service (APS) conducted and made public two separate cost-of-service studies (COSS) on private solar customers as a separate rate class (based on 2014 and 2015 information). With COSS, the hard dollar cost to serve the private solar customers is examined based on documented expenses and the actual hard dollar realized benefits (for example, reduced fuel consumption) are similarly calculated. While results would differ by electric company, for APS, these studies demonstrated that private solar customers are typically only paying between 36 and 38 percent of the actual hard dollar cost to provide them service.[9]

There also is a deeper regressiveness embedded in the private solar generation market that compounds the cost-shift associated with NEM. Multiple studies have found that current private solar customers tend to be more affluent than those without private solar. All three of E3's state studies found an income disparity between private solar customers and the rest of the residential class. In California, for example, E3 found that the median income of private solar customers was approximately $90,000 per year—nearly double the state's median income of $54,000 per year. Similarly, a report from Acadian Consulting Group for the Louisiana Public Service Commission (LPSC) found that private solar customers within the LPSC's jurisdiction had median household incomes of $60,460 relative to the statewide median household income level of only $44,673.[10] These studies indicate that the more affluent private solar customers are being enriched at the expense of lower income customers.

Informed by E3's cost-benefit analysis, the Hawaii and Nevada[11] Commissions chose to eliminate NEM entirely, while the California commission decided to change its rate structure and opened a new proceeding to devise a NEM successor tariff. Conducting its own evaluation of NEM, the Kansas Corporation Commission (KCC) issued a final order in September 2017 that approved a new rate class to prevent the cost shift associated with private solar customers' underpayment for the energy grid. The Commission noted that private solar (distributed generation) customers "use the grid as a backup system resulting in their consuming less energy than non-DG customers, which results in DG customers not paying the same proportion of fixed costs as non-DG customers."[12] Similarly, MIT's seminal study on solar generation identified underpayment of fixed costs by private solar customers, and the associated cost shift to other customers, as problems created by NEM.[13]

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[9] Direct Testimony of L. Snook at Attachments LRS2DR-8DR, Arizona Corporation Commission Docket No. E-00000J-14-0023, February 25, 2016; Direct Testimony of L.Snook at Attachment LRS-04DR, Arizona Corporation Commission Docket No. E-01345A-16-0036, June 1, 2016.

[10] Acadian Consulting Group for the Louisiana PSC, "In re: Examination of the Comprehensive Costs and Benefits of Net Metering in Louisiana" September 2015.

[11] In June 2017, the Nevada legislature overturned the Commission's decision to revise net metering.

[12] Kansas Corporation Commission, "In the Matter of the General Investigation to Examine Issues Surrounding Rate Design for Distributed Generation Customers," Docket No. 16-GIME-403-GIE, September 2017.

[13] MIT, *The Future of Solar Energy* (sections 5.3, 7.4, 9.5), 2015.

Backed by substantial data showing the cost shift associated with NEM, consumer advocates around the country are increasingly speaking out about the policy. For example, in 2014, the National Black Caucus of State Legislators released a white paper on the need to establish equitable energy policies, specifically critiquing NEM: "[If NEM is] left unaddressed, policymakers risk the creation of an 'energy divide' alongside the already established income gap where low and fixed income consumers and large swaths of minority consumers subsidize new distributed generation services for higher-income customers."[14]

This critique of NEM was echoed in a joint article written by consumer advocate Barbara Alexander and leading rate experts Ahmad Faruqui and Ashley Brown: "[N]et metering [causes] an unfair shift of costs to non-solar customers. This policy is unfair because it is too expensive, because it shifts essential electricity service costs to those who cannot afford to install solar on their roofs, and because its justification to jumpstart a nascent industry is no longer applicable."[15]

Is NEM the most efficient mechanism for achieving policy objectives?

A common argument in support of preserving NEM is that the policy is necessary to help stimulate growth of the residential private solar market and that the level of compensation (in the form of reduced electric bills) is reflective of the "true value" that private solar provides—including speculative "non-energy benefits."

However, there are additional considerations with some benefit categories. For example, if the compensation of private solar generation were to include a zero-carbon emission attribute, then similar compensation should be awarded to any non-fossil-based generation, including large-scale universal solar, wind, hydroelectric, and nuclear generation. Attributing "value" to only one generating technology (private small-scale solar) discounts the larger "value" provided by numerous other generating technologies. Also, some private solar-focused "value of solar" studies typically focus on gross (rather than net) benefits, so that, for example, total jobs from one action will be considered while not evaluating job loss in another area or jobs that would have resulted had an alternative been chosen.

The use of NEM to promote the deployment of private (distributed) solar speaks to a bigger issue about policy efficiency and cost-effectiveness. Richard Schmalensee, Emeritus Professor of Management and Economics at MIT, highlighted the inefficiency of the NEM subsidy in comments to the Maine Public Utilities Commission: "Large-scale solar generators, like other large-scale generators, receive the wholesale price for their output, while distributed solar generators receive the higher retail price…. Both forms of solar

[14] National Black Caucus of State Legislators, *The Need to Develop & Implement Equitable Energy Policies*, 2014.
[15] B. Alexander, A. Brown, and A. Faruqui; "Rethinking Rationale for Net Metering," *Public Utilities Fortnightly*, October 2016.

generation bring the same environmental and other benefits per kilowatt-hour of generation, but large-scale solar provides more generation per dollar of subsidy and thus more benefits. It makes no economic sense to give higher subsidies to the less efficient solar technology."[16] Recent reports by the Brattle Group[17] and Lazard[18] have reached similar conclusions. Similarly, staff of the California Public Utilities Commission recently completed modeling in its Integrated Resource Plan Proceeding, comparing the use of high levels of private rooftop solar versus high levels of large-scale renewables (and low levels of rooftop solar) to meet the state's greenhouse gas reduction goals. This modeling showed that high levels of private solar would cost electric company customers over $1 billion more per year than relying on utility-scale options.[19]

The inefficiency and cross-subsidy issues around private solar generation should be considered in the broader context of overall subsidies. In addition to NEM, private solar customers also qualify for taxpayer-funded subsidies through state and federal incentives. The extent of the total subsidies available for private solar was highlighted in a 2016 study from the Consumer Energy Alliance (CEA). In a review of 15 states, CEA found that private solar customers could receive a total subsidy greater than 100 percent of the value of their entire solar system in eight states and a total subsidy covering 75 percent of solar system costs in another seven states. By comparison, the study found that large-scale, universal solar, which provides more benefits (in total and per unit of electricity) than private solar, receives a total subsidy covering 58 percent of the cost of the system.[20]

As highlighted above, private solar receives far greater subsidies on a percentage basis than large-scale solar, despite being the less efficient resource. As a policy tool, NEM is neither efficient nor equitable, yet proponents of the policy argue that it is a proxy payment for the value that private solar generation provides. As discussed in the section below, this is a fundamentally flawed argument in support of a system that rewards a subset of customers while shifting costs to the vast majority of customers who ultimately bear the expense of rate increases to cover fixed energy grid infrastructure costs.

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[16] R. Schmalensee, "Re: Docket No. 2016-00222 – Maine Public Utilities Commission Proposed Rule on Customer Net Energy Billing," October 2016.
[17] Brattle Group, *Comparative Generation Costs of Utility-Scale PV and Residential-Scale PV in Xcel Energy's Colorado Service Territory*, July 2015.
[18] Lazard, *Levelized Cost of Energy Analysis 10.0*, December 2016.
[19] CPUC, see *Administrative Law Judge's Ruling Seeking Comment on Proposed Reference System Plan and Related Commission Policy Actions, Attachment A: Proposed Reference System Plan*, slide 186, available here: http://cpuc.ca.gov/irp/proposedrsp/.
[20] Consumer Energy Alliance, *Incentivizing Solar Energy: An In-Depth Analysis of U.S. Solar Incentives*, 2016.

2. Categories of Costs and Benefits in NEM Analysis

Fundamentally, rates charged to customers by electric companies are based on known and measurable costs that are reflected in the company's accounting records (i.e., "on their books"). The charge of state regulators and the electric companies they regulate has always been to design electric rates that reflect these "booked" costs, promote the efficient use of electricity, and seek equity for all customers, as well as other stakeholders. Both parties have historically accomplished this task through cost-of-service ratemaking. Despite the rise of customer-based and owned technologies, including private solar, the long-standing rationale for cost-of-service regulation has not changed. It remains the primary mechanism for protecting customers by basing prospective electric rates on readily observable and verifiable costs.

Likewise, NEM should be evaluated in an unbiased, objective manner and with costs and benefits that adhere to long-standing cost-of-service principles. And since the goal of such an analysis is to quantify the policy's financial impact on all customers (not just the subset of private solar customers), costs and benefits should be considered in the aggregate, with the goal of answering one question: Do the total costs of NEM outweigh the total benefits? To answer this question, a methodologically sound cost-benefit analysis of NEM could include the following elements:

Costs for Inclusion

- **Reduced energy charges**—Measured as a portion of private solar customers' reduction in energy consumed from the electric company. This reduction captures the underpayment for fixed infrastructure and other energy grid costs by private solar customers. All self-generated energy should be considered a cost, not just the amount exported to the distribution system, since all energy generated by a private solar system is compensated under NEM and because the private solar customer relies on the energy grid on a constant basis, regardless of their level of self-generation.
- **Electric system integration and upgrade costs**—Includes the electric company's costs associated with connecting private solar customers, as well as additional energy grid investments, that electric companies incur to serve all customers, including private solar customers. Additional distribution system costs may need to be incurred to maintain system reliability once the private solar generation is installed. Such potential costs include those associated with changes to existing capacitors and load tap changers, additional breakers, or reconductoring existing lines. Further, regardless of where the distributed solar is located on the system, it will not eliminate the need to replace the fundamental infrastructure needed to deliver power to customers as that infrastructure ages and requires replacement. Additionally, private solar generation might necessitate additional integration costs on the bulk grid, such as increased reserve requirements or additional flexible capacity needs.

- **Electric system administration costs**—Includes the additional administrative costs, such as billing and monitoring, associated with NEM and private solar customers that electric companies incur.

Benefits for Inclusion

- **Avoided energy and capacity costs—**Avoided energy costs constitute the largest savings attributable to the installation of private solar. These avoided costs can be directly measured by the amount of fuel and other (non-private solar) generation electric companies do not need to purchase given the reduced load of private solar customers. Avoided capacity is more complicated. Any reductions in the amount of traditional (non-private solar) capacity an electric company needs (as a result of capacity provided by private solar) will be specific to each electric company's peak demand and the level and production shape of private solar in that jurisdiction.

  It is important to note that private solar typically does not provide energy at times of the system peak. Although solar production and electricity demand patterns change throughout the year, solar production peaks around noon while demand tends to peak in the late afternoon to early evening. If private solar systems cannot be relied upon to help meet an electric company's peak demand, the company is required to continue to ensure adequate capacity is available to serve the needs of customers. As a result, the company avoids no costs in its responsibility of providing customers with reliable power. If avoided capacity is considered in a cost-benefit analysis of NEM, the benefit may often be "zero." In cases where a capacity benefit is ascribed, avoided costs should be demonstrable in the electric company's reduced costs of securing that capacity.

- **Deferred or avoided transmission and distribution capacity—**Deferred or avoided transmission and distribution costs, as well as line losses, should only be included if they are based on specific and verifiable savings in transmission and distribution system planning, operations, and/or maintenance. In most cases, there are no benefits of deferred distribution investment, as the presence of private solar generation does not reduce the amount of customer load a distribution line or system must be able to support. In most states, transmission and distribution-level savings from private solar generation cannot be reasonably or reliably measured. For example, in California, a methodology for considering transmission and distribution system savings resulting from private solar generation is being developed because the Commission recognizes there is no market-based system for measuring the value of distributed resources to the transmission and distribution system.

  Further, any verifiable deferred costs should be treated as such. The need for transmission or distribution facility upgrades is not likely to be permanently deferred, but rather tabled until a later date. Therefore, any demonstrable benefits in the near-term should be offset by any medium- to long-term expenses of the electric company.

- **Applicable environmental benefits—**States may choose to include projected costs of compliance with environmental regulations —for example, a proxy carbon price— when assessing the potential benefits of private solar generation. Any compensation for or financial credit given to avoided carbon emissions should be extended to all clean energy generating resources (e.g., wind, hydropower, geothermal, biomass, and nuclear). If significant value is attributed to one clean energy resource but not others, the net effect is to disadvantage the other clean energy resources in the market, thereby jeopardizing the economic sustainability of the other clean energy resources and the achievement of environmental goals. Any approach that ascribes benefits to a single resource, while not rewarding other resources that provide the same benefits, will result in a fundamentally flawed analysis and ultimately discriminatory rates and charges.

Costs and Benefits That May Warrant Exclusion

- **Other speculative "non-energy benefits"—**Parties sometimes argue for other speculative "non-energy benefits" to be estimated and included in cost-benefit analyses of NEM. Such speculative benefits can include increases in property values, job creation, and enhancements to economic growth, among others. Such claimed benefits should not be included because they may constitute double-counting of other benefits, and because they are entirely speculative. The Arizona Corporation Commission (ACC) spent nearly two years reviewing the cost and value of private solar, ultimately ordering that NEM be replaced with a compensation system based on the short-term assessed costs and benefits of private solar. In its final order, the ACC made a clear determination about the inclusion of non-market based elements: "We agree with the parties who argued that quantifying the societal and economic development benefits of DG in an avoided cost forecast…is a speculative endeavor that has no place in ratemaking."[21]
- **"Risk" avoidance—**Some flawed cost-benefit studies attempt to capture benefits of avoided future risks, such as avoided risk from fuel price volatility. Unless avoided risks can be verified, they should not be included. First, the theory behind this type of risk avoidance ignores the potentially greater cost risk due to private solar generation's uncertain effects on the transmission and distribution system, its intermittent nature, and other factors. Second, efforts to quantify any value associated with such reduced risks are inherently speculative.

[21] See Arizona Corporation Commission, "In the Matter of the Commission's Investigation of the Value and Cost of Distributed Generation," docket number E-00000J-14-0023, p. 150, January 2017.

3. Methodological Issues & 4. Drivers and Underlying Market Conditions

A cost-benefit analysis of NEM for one state will look entirely different from a cost-benefit analysis in another state, with the same potentially being true for different companies within a given state. Each study will consider different requirements imposed by state commissions or legislatures, and be based on different costs and rate structures. Further, each state is unique, meaning that each cost-benefit analysis will vary depending on the state's energy profile, existing policies, electric structure, and natural solar resource. As a result, the inputs (categories as well as values) to a cost-benefit study will vary from state to state and electric company to electric company. More specifically, the following factors will shape the outcome of a cost-benefit analysis:

- **Retail price of electricity**—Since NEM typically compensates private solar customers at the full retail rate, the level of the retail rate (and the amount it exists above the regional or local wholesale or avoided cost price) will be the primary determinant of the extent of the NEM subsidy.
- **Existing rate structure**—The presence of time-of-use or time-varying rates, demand charges, or a DG rate class will affect the extent of customer cost shift resulting from NEM.
- **Level of private solar penetration**—While a cost shift exists regardless of the level of solar penetration, the extent of the shift will vary depending on how much private solar exists in each state. For example, high penetration in a locality could necessitate distribution system upgrades to manage voltage issues.
- **System characteristics**—Each state and electric company will have a different mix of electric generation, peaks, load profiles, and reserve capacity needs and requirements, all of which will impact cost-benefit analyses.
- **Location/orientation**—NEM compensates private solar equally, regardless of location or orientation. A few states (New York, California) are devising structures that would include location and orientation as a factor in determining more granular compensation.
- **Timeframe**—Cost-benefit analyses are conducted within specific timeframes. A study covering 5 years will differ significantly from one covering 30 years, since any number of factors can differ in that span. All of the factors above will vary depending on the timeframe of the study. Additionally, the assumed or projected cost of technology will also change.

5. Specific Emerging Issues Related to NEM Cost-Benefit Analysis

Several reasonable NEM-related cost-benefit analyses exist. While it should not be presumed that EEI or its members endorse all aspects of any given study, EEI is generally supportive of various studies performed by E3.

In contrast, there also is a sizeable amount of NEM-related literature that is methodologically or otherwise flawed or simply not comparable to cost-benefit analyses. The proliferation of such literature undermines reasonable, fact-based conversation about the impact of NEM. Further, the conflation of NEM cost-benefit analyses and completely different "value of solar" reports focused on private solar or distributed resources only complicates policy discussions. Examining the costs and benefits of NEM (a policy) is an entirely separate exercise than examining the costs and benefits of private solar (a technology), and both of these are distinct from efforts to calculate the potential future value that distributed resources bring to the grid and electric company customers.

Different still are studies that attempt to compare NEM to completely separate electric company costs. For example, a recent Lawrence Berkeley National Laboratory (LBNL) report[22] attempted to show that NEM has a relatively small rate impact compared to electric companies' major infrastructure investments. Tom Tanton, Director of Science and Technology at the Energy and Environment Institute and former principal policy advisor at the California Energy Commission, criticized the LBNL effort by noting: "The main problem is that the LBNL study contains numerous analytic issues….The study enlists average retail electricity price data, ignoring the fact that ratemaking is done for a specific area's issues and customers and existing fleet of power plants. Each element of rates is treated differently. Some costs, like building power plants and transmission lines, are recovered over a long period of time while others, like fuel costs, are expensed over short time frames."[23] Ultimately, studies such as LBNL's that attempt to make apples-to-oranges comparisons of electric company costs and investments, while they may be academically interesting, should play no role in actual rate analysis and decision making.

Conclusion

EEI would like to thank DOE for the opportunity to comment on this effort. As policymakers undertake reviews of NEM, it is important that they be able to distinguish among different analytical efforts, put like to like, and separate the wheat from the chaff. A thorough review of NEM-related literature by the Department could go a long way toward elevating high-quality, rigorous cost-benefit analyses, while placing lesser or incomparable efforts in the proper context. We look forward to seeing the results of DOE's review, which we believe could be a valuable resource for state-level policymakers responsible for evaluating NEM and ensuring that rates remain just and reasonable for all customers.

[22] Lawrence Berkeley National Laboratory, *Putting the Potential Rate Impacts of Distributed Solar Into Context*, January 2017.
[23] Tom Tanton, IHS Energy Daily, "Op-Ed: Determining DER Cost-Shift: Another Misplaced National Labs Estimate," April 3, 2017.

Cost-Benefit Studies of Net Energy Metering

Sound Cost-Benefit Analysis of NEM—The following studies are reasonable assessments of the impacts of NEM. These studies are grounded by solid methodology, supported by existing data, and do not include speculative value elements.

- E3 for the Public Utility Commission of Nevada, Nevada Net Energy Metering Impacts Evaluation 2016 Update, August 2016.

- Acadian Consulting Group for the Louisiana Public Service Commission, Estimating the Impact of Net Metering on LPSC Jurisdictional Ratepayers, September 2015.

- E3 for the Hawaii Public Utility Commission, Evaluation of Hawaii's Renewable Energy Policy and Procurement, January 2014.

- E3 for the California Public Utility Commission, California Net Energy Metering Ratepayer Impacts Evaluation, October 2013.

Flawed Studies—The following studies from these companies are a representative sample of unreasonable analysis. These efforts rely on hypothetical scenarios and/or speculative elements and, therefore, cannot be considered rigorous cost-benefit studies.

- Clean Power Research, Maine Distributed Solar Valuation Study, April 2015: This study is not a cost-benefit evaluation of NEM, but rather of private solar as a technology. Further, it assigns speculative non-energy benefits to private solar.

- Crossborder Energy, The Benefits and Costs of Solar Distributed Generation for Arizona Public Service, May 2013: This study is not a cost-benefit evaluation of NEM, but rather of private solar as a technology. Further, it includes large benefits for avoided transmission and distribution costs, based on possible (not real and measurable) estimated cost savings from a 2009 study. Additionally, it awards private solar generation "avoided renewables" benefits, based on the faulty logic that it is more cost-effective to achieve renewables penetration through low-efficiency private solar than through higher-efficiency large-scale renewables.

- Crossborder Energy, The Benefits and Costs of Net Metering Solar Distributed Generation on the System of Entergy Arkansas, Inc., September 2017: This study—commissioned by the Sierra Club—purports to use inputs and assumptions from Entergy Arkansas, Inc.'s recent energy efficiency and integrated resource planning proceedings. The study, however, was based on outdated assumption in some instances, inflated avoided transmission and distribution costs and various avoided risks.

- Environment America and Frontier Group, Shining Rewards: The Value of Rooftop Solar Power for Consumers and Society, Summer 2015: Not an analysis but a meta-report of selective and supportive studies that did not review NEM, but rather compiled speculative benefits of solar.

- Synapse Energy Economics for the PSC of Mississippi, Net Metering in Mississippi: Costs, Benefits, and Policy Considerations, September 2014: This study is based on a hypothetical net metering program, since Mississippi does not use NEM, and includes large benefits for non-demonstrable avoided transmission and distribution costs, as well as speculative benefits such as "increased customer satisfaction and fewer service complaints." The PSC ultimately rejected the higher compensation rate put forth in the Synapse report.

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