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State Corporation Commission
of Kansas

**THE STATE CORPORATION COMMISSION
OF THE STATE OF KANSAS**

In the Matter of the General Investigation to Examine Issues Surrounding Rate Design for Distributed Generation Customers.	)))	Docket No. 16-GIME-403-GIE

NOTICE OF FILING STAFF'S VERIFIED INITIAL COMMENTS

The Staff of the State Corporation Commission of the State of Kansas (Staff and Commission, respectively) files its Initial Comments as required by the Commission's February 16, 2017 Order Setting Procedural Schedule.

I. Background

1. On March 11, 2016, Staff filed a Motion to Open Docket. In support of its Motion, Staff attached a Report and Recommendation (R&R) which outlined various issues and procedural considerations.

2. On July 12, 2016, the Commission issued an Order opening this general investigation docket in order to examine various issues surrounding rate structure for Kansas distributed generation (DG) customers.[1]

3. The parties to the docket were "ordered to file comments on how the general investigation should proceed to minimize the need for extensive comment periods."[2] Such comments were to be filed by August 26, 2016.[3]

[1] Order Opening General Investigation, Ordering Clause A (July 12, 2016).
[2] Order Opening General Investigation, Ordering Clause D (July 12, 2016).
[3] *I.e.*, within 45 days of the date of the Order Opening General Investigation.

4. Following receipt of comments, the Commission issued an Order Setting Procedural Schedule on February 16, 2017.[4] The Order Setting Procedural Schedule required parties to file initial comments with supporting affidavits by March 17, 2017.[5]

II. Summary of Staff's Initial Comments

5. Robert H. Glass, Ph.D., Chief of Economics and Rates for Commission Staff, submits verified Initial Comments in response to the Commission's February 16, 2017 Order Setting Procedural Schedule. Dr. Glass identifies the two fundamental questions posed by designing rates for distributed generation customers; specifically (1) What are the costs (fixed and variable) and the benefits of providing utility service to distributed generation customers; and (2) What is the best way to structure the residential rate design to recover the costs created by distributed generation customers?

6. Dr. Glass discusses the costs and benefits of distributed generation, respectively, then notes the rate design for distributed generation customers should be individualized to reflect the customers' burden on the utility system. Dr. Glass explains Staff's analysis; specifically that Staff analyzed (1) the market-based benefits and costs of distributed generation; (2) real-time pricing, the marketplace, and avoided costs; and (3) time-varying electric rates as approximations for real-time pricing.

7. Dr. Glass concludes by recommending the Commission consider a three part rate design consisting of customer charge (dollars per person), demand charge (dollars per kW peak), and energy charge (dollars per kWh) to achieve a fair and reasonable, cost-based rate design for distributed generation customers.

WHEREFORE, Staff submits its Initial Comments.

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[4] Order Setting Procedural Schedule (Feb. 16, 2017).
[5] *Id.* at ¶12.

Respectfully submitted,

Amber Smith, #23911
Jake Fisher, #19908
Kansas Corporation Commission
1500 SW Arrowhead Road
Topeka, Kansas 66604
(785) 271-3301 (Telephone)
(785) 271-3167 (Facsimile)
a.smith@kcc.ks.gov (E-mail)

For Commission Staff

THE STATE CORPORATION COMMISSION
OF THE STATE OF KANSAS

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VERIFIED INITIAL COMMENTS OF COMMISSION STAFF

I. Introduction

Distributed Generation, Benefits and Costs, and Rate Design

1. The current electric residential rate structure for nearly all utilities is not designed to fairly price distributed generation. The standard residential rate structure in Kansas includes a customer charge, an energy charge, and usually some riders such as a fuel rider. Utilities have traditionally had relatively low customer charges and used a higher energy charge to collect the additional fixed costs of utility service.[1] Distributed generation customers do not fit into the standard residential rate structure and disrupt the utility's collection of its approved revenue requirement. Distributed generation customers essentially use the grid as a backup system, but because of their lower energy use, they do not pay the same proportion of the fixed costs as traditional residential customers.

2. In Staff's initial Report and Recommendation attached to the March 11, 2016, Staff Motion to Open Docket (initial R&R) requesting the opening of this general investigation, Staff stated that designing rates for distributed generation customers posed two fundamental questions:

[1] The historical reasons why utilities have lower customer charges than the fixed costs of service are: (1) electric utilities have bet on growth and with a higher energy charge, growth allows utilities to recover more than its revenue requirement; (2) high customer charges are unpopular with residential customers because they cannot reduce customer charges by changing behavior; and (3) high energy charges encourage energy efficiency and conservation.

1. What are the costs (fixed and variable) and the benefits of providing utility service to distributed generation customers?
2. What is the best way to structure the residential rate design to recover the costs created by distributed generation customers?[2]

Costs Created by Distributed Generation

3. Utilities argue that distributed generation creates costs in two fundamental ways. First, the distributed generation customer uses the utility system as a backup to their own system. Regardless of whether the distributed generation customer uses the utility system daily or only a few days a month, the utility must have capacity to serve distributed generation customers as needed, and for those periods where it is not needed, the capacity and associated costs do not go away.

4. Second, since nearly all residential distributed generation is renewable generation, the energy produced is intermittent which adds to existing load volatility on the system. The volatility requires more dispatchable generation and spinning reserve backup which increases cost. The decentralized location of distributed generation and the fact that its generation is not controllable by the utility or the Southwest Power Pool (SPP) makes the utility's requirement to estimate usage a day ahead for the SPP's Integrated Marketplace (Marketplace) inherently more precarious.

The Benefits of Distributed Generation

5. The advocates for distributed generation describe numerous benefits of distributed generation. Staff's initial R&R listed eleven potential benefits that should be examined.[3] In Table 1 below, these benefits are separated into market-based benefits and non-market-based

[2] Report and Recommendation, Docket No. 16-GIME-403-GIE, p. 5 (Mar. 11, 2016).
[3] *Id.*, pp. 5-6.

benefits. The distinction is important because for some of the market-based benefits either prices or costs exist making analysis of their value more transparent.

Table 1

The Benefits of Distributed Generation

Market Based Avoided Costs	Non-Market Based Avoided Costs
Avoided Energy Costs	Avoided Environmental Costs
Avoided Generation Capacity Costs	Avoided Renewable Costs
Avoided Ancillary & Capacity Reserve Services	Price Mitigation Benefits
Avoided Transmission Costs	Economic Development
Avoided Distribution Costs	Health Benefits
	Grid Security

6. The non-market-based avoided costs are more difficult to analyze. The avoided environmental costs of fossil fuel generation and the health benefits of substituting distributed generation for fossil generation are nearly identical. Nearly all of the quantifiable environmental benefits are tied to the health benefits of less SO_2, NO_X, mercury, and particulate emissions. Therefore, including environmental and health benefits would result in double counting.[4] Since the Renewable Energy Standard has been made voluntary, there are no avoided renewable costs in Kansas. Because of its decentralized nature, distributed generation does provide a little hedge if the whole system goes down. But distributed generation also provides one more portal into the grid for hackers. It is not clear that for non-distributed generation customers there are any price mitigation benefits, and in fact distributed generation could raise the costs for non-distributed generation customers. Finally, economic development benefits are difficult to quantify where it appears there is the substitution of one good (e.g. solar panels) for other consumption goods. Thus, Staff's comments will focus only on the market-based avoided costs because these avoided costs seem to have the best possibility of resolution.

[4] Also, how are the health benefits of Kansas distributed generation estimated and do those benefits include only Kansans, or do they include the whole United States, or, as the Environmental Protection Agency did with the Clean Power Plan, do they include the whole world's benefits?

Rate Design for Distributed Generation

7. The costs created and the costs avoided by distributed generation are dependent upon individual choices (i.e., the size of the system or preventive maintenance used by the customer). This suggests that rate design for these customers should be individualized to reflect their burden on the utility system. Thus, the crux of the distributed generation problem: benefits and costs need to be estimated at a granular level and then the results need to be reflected in rate design.

Staff's Proposal

8. The basic tension created by distributed generation is between the fixed costs of using the utility system as a backup and the avoided costs of not using the utility system due to some of the fixed costs being embedded in the energy charge. Staff's suggestion is to tie the fixed costs that distributed generation customers pay directly to their use of the system. The advantage of Staff's approach is that Staff's recommended rate design can eliminate the need for some expensive benefit-cost analysis that Staff initially foresaw as necessary to set rates for distributed generation customers.

9. The key elements of Staff's case are the Marketplace and time-varying electric rates. Staff will show that the real-time prices generated by the Marketplace embed a number of costs that distributed generation advocates argue are avoided by the use of distributed generation. Further, time-varying rates can be used to approximate real-time pricing and thus take advantage of the embedded cost information in the Marketplace's real-time prices. It is Staff's position, that by using time-varying rates for distributed generation customers, the Commission can forego some of the expensive benefit-cost studies needed to establish distributed generation rates

because the data for estimating time-varying rates will be in the class cost of service studies filed in future rate cases.[5]

Outline of Staff's Analysis

10. Staff's analysis is primarily based on four documents.

1. *A Regulator's Guidebook: Calculating the Benefits and Costs of Distributed Solar Generation (Regulator's Guidebook)*, Interstate Renewable Energy Council, Inc., October 2013;
2. *Recovery of Utility Fixed Costs: Utility, Consumer, Environmental and Economist Perspectives (Recovery of Fixed Costs)*, Future Electric Utility Regulation, Report 5, Lawrence Berkeley National Laboratory, June 2016;
3. *Planning for a Distributed Disruption: Innovative Practices for Incorporating Distributed Solar into Utility Planning (Planning for Disruption)*, Lawrence Berkeley National laboratory, August 2016; and
4. *Distributed Energy Resources Rate Design and Compensation (NARUC Manual)*, Prepared by the Staff Committee on Rate Design, The National Association of Regulatory Utility Commissioners (NARUC), November 2016.

II. Staff's Analysis

11. Staff's analysis is arranged into four parts. First, some of the market-based avoided costs are discussed along with the potential problems involved with using benefit-cost studies to quantify potential benefits. Second, Staff explains how the Marketplace's real-time electric pricing would incorporate many of the avoided costs that distributed generation advocates want included in the rate design for distributed generation customers. Third, Staff describes three time-varying electric rates that are approximations for real-time pricing of electricity and demonstrates how Staff's preferred rate design captures some of the avoided costs. Fourth, Staff summarizes its case and provides its recommendation.

[5] Nearly all class cost of service studies includes estimates of customer class peak usage such as 12-CP, 4-CP, and 1-CP. In addition, costs are usually broken out by season and by customer fixed cost, demand cost, and energy cost. These data allow the creation of time-varying rates.

1. The Market-Based Benefits and Cost of Distributed Generation

12. Meta-studies of distributed generation, and more specifically distributed solar generation (DSG), benefit-cost studies have found wide differences in results. For example, in Arizona,

> [T]wo DSG benefit and cost studies were released in consecutive order by that State's largest utility and then by the solar industry. The utility-funded study showed a net solar value of less than four cents per kilowatt-hour ("kWh"), while the industry funded study found a value in excess of 21 cents per kWh.[6]

The significant difference between the two Arizona studies makes one wonder if the two studies were measuring the same phenomenon. Because stakeholders have competing interests, benefit-cost studies tend to reflect the interests of the party paying for the study. Therefore, Staff would like to avoid competing benefit-cost studies performed by consultants hired by advocates which rarely result in a clear solution to the distributed generation rate design issue.

13. The rest of this section will describe three key market-based avoided costs and some of the issues with trying to quantify them: avoided energy cost, avoid generation capacity costs, and avoided transmission and distribution costs.

Avoided Energy Costs

14. The avoided cost of energy was settled by the 2014 net metering legislation. Avoided energy costs are the average energy cost per kWh.

Avoided Generation Capacity Costs

15. There are two basic methods for estimating avoided generation capacity costs: using the market value of capacity, and estimating the costs of operating the marginal generator.[7] Staff has argued in recent energy efficiency dockets that the appropriate avoided cost for

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[6] Regulator's Guidebook, p. 3.
[7] *Regulator's Guidebook*, pp. 25-26.

capacity in the SPP is the market value of capacity. Staff takes this position because excess capacity in the SPP footprint is currently 49%.[8] The value of excess capacity has been a contentious issue in energy efficiency dockets so it is not hard to imagine avoided capacity cost as a litigious issue.

16. Another contentious issue is estimating the amount of capacity that distributed generation should be credited with. There are two problems with trying to estimate this. First, distributed generation is intermittent. As more distributed generation capacity is added to the grid, this problem becomes smaller but never goes away. Second, distributed generation capacity must be aggregated and large enough to be measured in order to create capacity value. Otherwise, distributed generation is primarily noise on the grid.[9]

Avoided transmission and distribution costs

17. The following explanation of estimating avoided transmission and distribution costs is from the *Regulator's Guidebook.*

> The ability of DSG systems to yield T&D benefits is location-specific and also depends on the extent to which system output correlates to cost-causing local load conditions, especially before and during peak load periods. Utilities undertake system resource planning (i.e., planning for upgrades or additions to T&D capacity) to meet peak load conditions, so the correlation of DSG output to peak load conditions is important to understand. On the distribution system, unlike the bulk transmission system, this is a more difficult undertaking because local cost-causing load conditions (i.e., the timing, duration, and ramping rates associated with peak load on a given circuit) will vary according to a number of factors. These factors include customer mix, weather conditions, system age and condition, and others. As a simple example, a circuit that carries predominantly single-family residential load is likely to rise relatively smoothly to a peak in

[8] KEEIA and Westar Docket No. 15-WSEE-181-TAR

[9] *Methods for Analyzing the Benefits and Costs of Distributed Photovoltaic Generation to the U.S. Electric Utility System,* National Renewable Energy laboratory, September 2014, p. 13, footnote 18. Xcel Energy used the ProSym production cost model to analyze the effects of photovoltaic on its system. "The analysis used 100 MW increments of solar because, after testing, it was determined that the actual 10 MW level of solar on the NSP System was too small to produce reliable model results....In the context of the 10,000 MW NSP System, such a small increment of firm capacity was essentially 'lost in the noise' of the rest of the model simulations."

early evening, when solar PV output is waning. A circuit primarily serving commercial customers in a downtown setting will typically peak in the early afternoon. All other things being equal, DSG systems on circuits primarily serving commercial customers are more likely to avoid distribution capacity costs.[10]

18. Notice the complexity of the estimation process, especially for the distribution system. This type of study would be necessary for all Kansas utilities that have distributed generation in order to estimate the avoided cost of transmission and distribution capacity created by distributed generation. Further, a study for all Kansas utilities with distributed generation could also be necessary because estimation of avoided transmission and distribution costs are location specific. Meaning, it would be difficult to defend using the results of one utility study in Kansas to extrapolate to the rest of Kansas utilities.

19. To further illustrate Staff's concerns with estimating the avoided distribution capacity costs, Table 2 below reproduces Table 2 from R. Thomas Beach and Patrick G. McGuire's "Initial Update of the Maine PUC's Value of Solar Study." The table summarizes eight avoided distribution capacity cost studies done since 2009. Notice two of the studies done for the California Public Utility Commission (CPUC) by Energy and Environmental Economics, Inc. (E3) have substantially different estimates for the avoided distribution capacity costs.

20. Benefit-cost and engineering studies might be necessary to quantify the benefits of distributed generation for transmission and distribution, but benefit-cost studies can give widely varying results and they are not cheap. In addition, some of the avoided costs that distributed generation advocates demand be quantified and considered can be addressed in a simpler way using a class cost of service study developed for a future rate case.

[10] *Regulator's Guidebook*, pp. 26-27.

Table 2

Studies of Avoided Distribution Capacity Costs[8]		
State / Study / Date	**Avoided Distribution Capacity Costs (¢/kWh)**	**Source**
AZ / R.W. Beck / 2009	0 to 0.31	*Fig. 6-2 at 6-14.*
PA-NJ / Clean Power / 2012	0.1 to 0.8	*Table 4*
AZ / Crossborder / 2013	0.2	*Table 1, at 2.*
AZ / SAIC / 2013	0	*pp. 2-10 to 2-12. No savings unless solar is targeted to circuits that are close to capacity.*
CA / CPUC-E3 / 2013[9]	0.6	*Includes marginal subtransmission and distribution capacity costs. Based on correlation of distribution substation peaks to solar peaks. See Appendix C.*
CO / Xcel Energy / 2013	0.05	*Table 1, at v and 27-36.*
CO / Crossborder Energy critique of Xcel Energy / 2013[10]	0.6	*Based on Xcel's marginal distribution capacity costs and the correlation of distribution substation peaks to solar peaks. See pages 9-11 and Table 5.*
CA / CPUC-E3 / Public Tool Model / 2015[11]	2.9	*Based on the marginal distribution and sub-transmission capacity costs for the California electric utilities and the correlation of distribution substation peaks to solar peaks.*

NOTES: The table is from "Initial Update of the Maine PUC's Value of Solar Study," by R. Thomas Beach and Patrick G. McGuire of Crossborder Energy, July 22, 2016, p. 6.

[8] All of these studies except for the Crossborder Colorado critique and the 2013 and 2015 CPUC-E3 studies are referenced and discussed in the Rocky Mountain Institute's meta-analysis of distributed generation benefit-cost studies. See Rocky Mountain Institute, *A Review of Solar PV Benefit and Cost Studies* (July 2013), at page 31, available at http://www.rmi.org/Knowledge-Center/Library/2013-13_eLabDERCostValue.

[9] The 2013 CPUC-E3 net metering cost-benefit study is available at http://www.cpuc.ca.gov/general.aspx?id=3800.

[10] See R. Thomas Beach and Patrick G. McGuire, *Benefits and Costs of Solar Distributed Generation for the Public Service Company of Colorado: A Critique of PSCo's Distributed Solar Generation Study.* Available at http://www.oursolarrights.org/files/5513/8662/3174/Crossborder_Study_of_the_Benefits_of_Distributed_Solar_Generation_for_PSCo.pdf

[11] Based on the marginal subtransmission and distribution costs of the California electric utilities and the CPUC-E3's Public Tool model of the benefits and cost of net metering in California. The Public Tool is described and is available at http://www.cpuc.ca.gov/General.aspx?id=11285.
Assumes the use of 100% of the utilities' marginal subtransmission and distribution costs.

2. Real-Time Pricing, the Marketplace, and Avoided Costs

21. In the economic essay in *Recovery of Fixed Costs,* Severin Borenstein explores a simple economic method for linking cost recovery and rate design.[11] First, in microeconomic theory there is one agreed upon efficiency condition—price should be equal to the social marginal cost of a product.[12] Second, after setting price equal to the social marginal cost of electricity, the utility's problem becomes how to recover the remaining costs that marginal cost pricing does not recover because of the natural monopoly aspects of the electric utility industry.

22. To be clear, Borenstein is arguing that the energy charge for customers should be set equal to the marginal social cost of electricity, and then all the remaining costs to an electric utility, including an approved rate of return, should be recovered with a fixed charge. The fixed charge is not based on demand costs or customer costs; instead the fixed charge is established to recover all the remaining costs not recovered by setting the energy rate equal to the marginal social cost of electricity.

Social Marginal Cost

23. Borenstein describes the social marginal cost as "not just the marginal fuel, labor, capital and other production costs of the utility, but also the externalities caused by generating and selling that incremental kWh of power."[13] The time frame that Borenstein is using to set the price is the short run social marginal cost. "The focus is on short-run social marginal cost, because at any point in time price should reflect the incremental cost of producing one more unit,

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[11] Severin Borenstein, "The Economics of Fixed Cost Recovery by Utilities," *Recovery of Fixed Costs*, pp. 47-63.
[12] "The simple guidance on volumetric pricing of electricity is that the retail price of a kilowatt-hour (kWh) should reflect society's full short-run marginal cost of supplying it." *Ibid.*, p. 47. As Staff noted in the initial R&R for this docket, the Commission has historically opposed using the societal benefit and adders for externalities. Thus, historically in Kansas, the social marginal cost of electricity ends up being simply the marginal cost of electricity.
[13] "Those externalities include greenhouse gas emissions, local air pollution, and other dis-amenities from the presence of generating stations, as well as transmission and distribution lines." *Ibid.*

which will likely be higher when production capacity is strained than when there is plenty of excess capacity."[14]

24. Borenstein is assuming real-time pricing where prices change every five minutes. There are some people who would not mind having their price of electricity change every five minutes, but most customers probably prefer something more stable and predictable. In fact, the most popular non-standard rate design is not real-time price, but average pricing where customers pay the same amount every month, excluding riders, and have it trued up at the end of the year.

Real-Time Pricing and Avoided Costs

25. Borenstein offers insight into how his suggested rate design best recovers costs and accounts for avoided costs. First, using real-- time pricing eliminates the concerns of covering the capacity costs that distributed generation imposes on generation and the grid. When a distributed generation customer uses electricity from the grid, that customer is paying the market price of electricity. During peak hours when the price rises because of more expensive generation coming online, the customer is paying the more expensive price for electricity and the variable portion of the electric bill is based solely on the amount of electricity used at that time. Thus, demand charges, which are discussed in greater detail below, are not needed to cover the cost of the customer's demand for capacity.[15]

26. Second, the price paid for the excess generation from distributed generation customers is the market price of electricity. If the peak generation from solar in Kansas occurs at 2:00 p.m. but the utility's peak price occurs at 6:00 p.m., the solar customer is paid based on

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[14] *Ibid.*

[15] "The value of such approximations [demand charges] has been mostly eliminated with smart meters ... [that] permit time-varying price schedules that can easily be designed to more effectively capture the time-varying costs that a customer imposes on the system." *Id.*, p. 60. Borenstein is using demand charge to refer to non-coincidental demand charges. He is more sympathetic to coincidental demand charges. *Id.*, footnote 128.

what the value of their generation is worth and no proxy (such as average retail price, average wholesale price, or average cost of energy) is needed to estimate that value.[16]

27. Third, the use of real-time pricing illustrates the extent of the approximations used in standard rate design such as summer and winter retail rates. Real-time pricing individualizes rate design by having customers pay the market price of electricity at the time it is consumed, compared to a retail price that is averaged over all customers in a particular class. And as mentioned above, real-time pricing eliminates the need for a demand charge.

28. Although economists have historically advocated real-time pricing, only a small percentage of customers seem to prefer it. Even though Staff's analysis starts with real-time pricing, Staff does not advocate real-time pricing for all customers.

29. The real-time pricing analysis of distributed generation illustrates that good rate design approximations of real-time pricing can capture some of the avoided costs that distributed generation creates and also capture the extent that distributed generation customers are using the grid as backup.[17] The problem becomes not choosing the perfect rate design, but choosing a good rate design that covers utility costs, is easily understood, and is acceptable to most distributed generation and non-distributed generation customers.

3. Time-Varying Electric Rates as Approximations for Real-Time Pricing

Time-Varying Rates: Time-of-Use, Critical Peak, and Demand Charge

30. Besides real-time pricing, the three most popular time-varying rates are time-of-use pricing, critical peak pricing, and demand charges. Time-of-use pricing sets rates that are

[16] The average cost of energy is the net metering price received for excess energy, if they came online after July 1, 2014. 66-1266, (c)(2).

[17] Real-time prices do not capture the price of ancillary services. However, the Marketplace does set a price for some ancillary services. "[Ancillary Services] refers to the services necessary to support the transmission of capacity and energy from resources to loads while maintaining reliable operation of the Transmission System in accordance with Good Utility Practice. Integrated Marketplace will set prices for certain Ancillary Services, specifically Operating Reserves, as part of both the DA [day ahead] Market and Real Time Balancing Market (RTBM)." *Integrated Marketplace Dictionary and Quick Reference Guide*, p. 10.

dependent upon the time of day that electricity is used. In the summer (or peak usage season)[18] usually two or three time periods are established with different electric rates. For example, with three time periods, the rates charged would be off-peak, mid-peak, and on-peak, with rates increasing as the time period is closer to peak. During winter, there would only be two rates, off-peak and mid-peak.

31. Critical peak pricing usually requires the utility to notify customers that high wholesale market electric prices are anticipated during a particular day and customers will then have to pay substantially more for electricity on those critical peak days. Critical peak days can be caused by an extended period of high temperatures or because of grid reliability concerns.

32. Demand charges are a kW rate rather than a kWh rate. There are two types of demand charges—coincidental peak demand charges and non-coincidental peak demand charges. Coincidental demand is a customer's usage when the whole system is a peak. Non-coincidental demand is the peak usage of a customer whether the system is at peak demand or not. The idea is that, in part, the grid and generation are built to respond to peak demand days,[19] and by adding an additional charge for the energy usage during the system peak demand, the demand charge is approximately capturing the fixed cost of the grid and generation. Thus, Staff recommends using coincidental peak demand for estimating distributed generation customers demand charge.

33. Again, the general concern with distributed generation customers is that by reducing their energy usage, they are able to escape paying the demand costs currently embedded within the energy charge. Because of this concern, in Staff's Initial R&R, Staff recommended

[18] Some electric utilities are winter peaking because of numerous space heating customers such as Empire Electric some years.

[19] Staff has argued in several rate cases that generation is built with two purposes in mind: fulfilling peak demand and proving energy as cheap as possible. Thus, utilities have portfolios of generation with some generation designed for peak load and some generation designed to provide base load energy as cheap as possible. If meeting peak demand was the only criteria, then utilities would be cheaper for utilities to only have peaking units.

exploring the inclusion of a demand charge in the rate design for distributed generation customers.

The Three Part Rate Design

34. A three part rate design has a customer charge (dollars per person), demand charge (dollars per kW peak), and energy charge (dollars per kWh). Staff continues to think the three part rate design for residential distributed generation customers has potential to mitigate at least some of the cost recovery and rate design challenges created by distributed generation. The use of a customer charge, demand charge, and energy charge eliminates a couple of the avoided cost issues that distributed generation customers are concerned about. By taking the recovery of capacity demand out of the energy charge, the energy charge will more closely reflect electricity's marginal cost. And the demand charge covers the avoided cost of capacity. If distributed generation customers use less capacity and energy, then their electric bill will be smaller.

35. However, Staff is aware that demand charges are not universally loved. Energy efficiency advocates are opposed to lowering the energy charge for customers because it reduces the incentive for customers to reduce energy usage and pay for more efficient electric appliances and lightbulbs. Staff agrees that reducing the energy charge will diminish the incentive to use less electricity. On the other hand, a demand charge provides an incentive for customers to reduce usage, especially at the time of system peak. Customer advocates are not convinced the addition of a demand charge will incent customers to use less electricity without a significant educational effort.[20]

[20] "In theory, demand charges send consumers a price signal to reduce peak consumption. However, there is little evidence indicating that large numbers of residential consumers have the wherewithal to respond to demand charge price signals." John Howat, "A Consumer Advocate's Perspective on Electric Utility Rate Design Options for Recovering Fixed Costs in an Environment of Flat or Declining Demand," *Recovery of Utility Fixed Costs: Utility,*

36. Some environmental advocates see time-of-use pricing, critical peak pricing, and demand charges (time-varying rates) as providing incentives for residential customers to put less peak demand on the electric system.[21] For example, after noting evidence of the successful use of time-varying rates to control demand growth, Cavanagh adds "these same findings counsel against demand charges not linked to system-wide peak periods, which would also lack a comparable grounding in cost and reliability considerations, and could impede beneficial shifts in demand such as off-peak charging of electric vehicles."[22] Cavanagh agrees with Borenstein (and Staff) that if demand charges are used, they should be based on system peak demand not non-coincidental demand.

4. Summary and Conclusion

37. The benefits of distributed generation can generally be separated into market-based avoided costs and non-market-based avoided costs. The market-based avoided costs are easier to estimate because there are either market prices available or readily available cost estimates for these avoided costs. The non-market-based avoided costs are more difficult to estimate and may not be significant since the Commission has traditionally ignored societal costs.

38. A real-time pricing analysis of distributed generation points out that several of the avoided costs of distributed generation can be captured using real-time pricing. The most

Consumer, Environmental and Economist Perspectives, Future Electric Utility Regulation, Report 5, Lawrence Berkeley National laboratory, June 2016, p. 30. Howat also notes that if residential demand charges are instituted, then an educational program for residential customers is necessary. "It is also reasonable to expect that considerable time and effort will be required to build a broad understanding of demand charges among residential customers who have not dealt with the concept in the past."

[21] "From the perspective of energy efficiency and distributed resources, there are significant upsides potentially associated with time-varying rates, and certainly no cause for reflexive opposition. Evidence has been accumulating that diversified energy efficiency portfolios tend on balance to yield disproportionately positive impacts during periods of peak system use[.]" Ralph Cavanagh, "Environmentally Preferred Approaches for Recovering Electric Utilities' Authorized Costs of Services: Options for Setting and Adjusting Electricity Rates," *Recovery of Utility Fixed Costs: Utility, Consumer, Environmental and Economist Perspectives*, Future Electric Utility Regulation, Report 5, Lawrence Berkeley National laboratory, June 2016, p. 39.

[22] *Ibid.*

important avoided cost from both the utility and the distributed generation customer point of view is the demand for utility system capacity when the distributed generation customer needs to rely on the utility system as a backup. However, real-time pricing does not capture all market-based avoided costs. For example, some ancillary services in the Marketplace have a price but that price is not part of the real-time price.

39. Real-time pricing can be approximated using time-varying rates. Staff argues that the most appropriate time-varying rate for distributed generation customers is a three part tariff: a customer charge, a demand charge, and an energy charge. The three part tariff would be the best approximation for incorporating capacity demand into the rate design. By using a three part tariff, distributed generation customers would be charged for the demand they used and not charged for the demand they did not use. When distributed generation allows customers to use less capacity, then they would only pay for the capacity they used.

40. Another advantage of a three part tariff is that it would account for most of the market-based avoided costs meaning a separate benefit-cost study would not necessarily be required. Class cost of service studies filed in future rate cases will have the information necessary to establish the customer, demand, and energy rates.

41. In conclusion, based on the above-discussed rationale, Staff recommends that the Commission consider a three part tariff rate structure for residential distributed generation customers to achieve a fair and reasonable, cost-based rate design for these customers.

STATE OF KANSAS)
) ss.
COUNTY OF SHAWNEE /)

VERIFICATION

Robert H. Glass Ph.D. being duly sworn upon his oath deposes and says that he is Chief - Economics and Rates for the State Corporation Commission of the State of Kansas, that he has read and is familiar with the foregoing *Initial Comments* and that the statements contained therein are true and correct to the best of his knowledge, information and belief.

Robert H. Glass

Robert H. Glass Ph.D., Chief--Economics and Rates
State Corporation Commission of the
State of Kansas

Subscribed and sworn to before me this 17th day of March, 2017.

VICKI D. JACOBSEN
Notary Public - State of Kansas
My Appt. Expires 6-30-18

Vicki D. Jacobsen
Notary Public

My Appointment Expires: June 30, 2018

CERTIFICATE OF SERVICE

16-GIME-403-GIE

I, the undersigned, certify that a true and correct copy of the above and foregoing Notice of Filing Staff's Verified Initial Comments was served via electronic service on the 17th day of March, 2017, to the following:

JAMES G. FLAHERTY, ATTORNEY
ANDERSON & BYRD, L.L.P.
216 S HICKORY
PO BOX 17
OTTAWA, KS 66067
Fax: 785-242-1279
jflaherty@andersonbyrd.com

MARTIN J. BREGMAN
BREGMAN LAW OFFICE, L.L.C.
311 PARKER CIRCLE
LAWRENCE, KS 66049
mjb@mjbregmanlaw.com

ANDREW J ZELLERS, GEN COUNSEL/VP REGULATORY AFFAIRS
BRIGHTERGY, LLC
1712 MAIN ST 6TH FLR
KANSAS CITY, MO 64108
Fax: 816-511-0822
andy.zellers@brightergy.com

C. EDWARD PETERSON
C. EDWARD PETERSON, ATTORNEY AT LAW
5522 ABERDEEN
FAIRWAY, KS 66205
Fax: 913-722-0181
ed.peterson2010@gmail.com

GLENDA CAFER, ATTORNEY
CAFER PEMBERTON LLC
3321 SW 6TH ST
TOPEKA, KS 66606
Fax: 785-233-3040
glenda@caferlaw.com

TERRI PEMBERTON, ATTORNEY
CAFER PEMBERTON LLC
3321 SW 6TH ST
TOPEKA, KS 66606
Fax: 785-233-3040
terri@caferlaw.com

THOMAS J. CONNORS, ATTORNEY AT LAW
CITIZENS' UTILITY RATEPAYER BOARD
1500 SW ARROWHEAD RD
TOPEKA, KS 66604
Fax: 785-271-3116
tj.connors@curb.kansas.gov

TODD E. LOVE, ATTORNEY
CITIZENS' UTILITY RATEPAYER BOARD
1500 SW ARROWHEAD RD
TOPEKA, KS 66604
Fax: 785-271-3116
t.love@curb.kansas.gov

DAVID W. NICKEL, CONSUMER COUNSEL
CITIZENS' UTILITY RATEPAYER BOARD
1500 SW ARROWHEAD RD
TOPEKA, KS 66604
Fax: 785-271-3116
d.nickel@curb.kansas.gov

DELLA SMITH
CITIZENS' UTILITY RATEPAYER BOARD
1500 SW ARROWHEAD RD
TOPEKA, KS 66604
Fax: 785-271-3116
d.smith@curb.kansas.gov

CERTIFICATE OF SERVICE

16-GIME-403-GIE

SHONDA SMITH
CITIZENS' UTILITY RATEPAYER BOARD
1500 SW ARROWHEAD RD
TOPEKA, KS 66604
Fax: 785-271-3116
sd.smith@curb.kansas.gov

ARON CROMWELL
CROMWELL ENVIRONMENTAL, INC.
615 VERMONT ST
LAWRENCE, KS 66044
acromwell@cromwellenv.com

SUSAN B. CUNNINGHAM, ATTORNEY
DENTONS US LLP
7028 SW 69TH ST
AUBURN, KS 66402-9421
Fax: 816-531-7545
susan.cunningham@dentons.com

BRYAN OWENS, ASSISTANT DIRECTOR OF PLANNING & REGULATORY
EMPIRE DISTRICT INDUSTRIES, INC.
602 JOPLIN
PO BOX 127
JOPLIN, MO 64802-0127
Fax: 417-625-5169
bowens@empiredistrict.com

ERIN BESSON
ERIN BESSON ATTORNEY AT LAW
1535 NEW HAMPSHIRE
LAWRENCE, KS 66044
besson.law@gmail.com

JOHN GARRETSON, BUSINESS MANAGER
IBEW LOCAL UNION NO. 304
3906 NW 16TH STREET
TOPEKA, KS 66615
Fax: 785-235-3345
johng@ibew304.org

ROBERT J. HACK, LEAD REGULATORY COUNSEL
KANSAS CITY POWER & LIGHT COMPANY
ONE KANSAS CITY PL, 1200 MAIN ST 19th FLOOR (64105)
PO BOX 418679
KANSAS CITY, MO 64141-9679
Fax: 816-556-2787
rob.hack@kcpl.com

ROGER W. STEINER, CORPORATE COUNSEL
KANSAS CITY POWER & LIGHT COMPANY
ONE KANSAS CITY PL, 1200 MAIN ST 19th FLOOR (64105)
PO BOX 418679
KANSAS CITY, MO 64141-9679
Fax: 816-556-2787
roger.steiner@kcpl.com

MARY TURNER, DIRECTOR, REGULATORY AFFAIR
KANSAS CITY POWER & LIGHT COMPANY
ONE KANSAS CITY PL, 1200 MAIN ST 19th FLOOR (64105)
PO BOX 418679
KANSAS CITY, MO 64141-9679
Fax: 816-556-2110
mary.turner@kcpl.com

ANTHONY WESTENKIRCHNER, SENIOR PARALEGAL
KANSAS CITY POWER & LIGHT COMPANY
ONE KANSAS CITY PL, 1200 MAIN ST 19th FLOOR (64105)
PO BOX 418679
KANSAS CITY, MO 64141-9679
Fax: 816-556-2787
anthony.westenkirchner@kcpl.com

SAMUEL FEATHER, DEPUTY GENERAL COUNSEL
KANSAS CORPORATION COMMISSION
1500 SW ARROWHEAD RD
TOPEKA, KS 66604-4027
Fax: 785-271-3167
s.feather@kcc.ks.gov

AMBER SMITH, CHIEF LITIGATION COUNSEL
KANSAS CORPORATION COMMISSION
1500 SW ARROWHEAD RD
TOPEKA, KS 66604-4027
Fax: 785-271-3167
a.smith@kcc.ks.gov

CERTIFICATE OF SERVICE

16-GIME-403-GIE

KIM E. CHRISTIANSEN, ATTORNEY
KANSAS ELECTRIC COOPERATIVES, INC.
7332 SW 21ST STREET
PO BOX 4267
TOPEKA, KS 66604-0267
Fax: 785-478-4852
kchristiansen@kec.org

BRUCE GRAHAM, CHIEF EXECUTIVE OFFICER
KANSAS ELECTRIC COOPERATIVES, INC.
7332 SW 21ST STREET
PO BOX 4267
TOPEKA, KS 66604-0267
Fax: 785-478-4852
bgraham@kec.org

DOUGLAS SHEPHERD, VP, MANAGEMENT CONSULTING SERVICES
KANSAS ELECTRIC COOPERATIVES, INC.
7332 SW 21ST STREET
PO BOX 4267
TOPEKA, KS 66604-0267
Fax: 785-478-4852
dshepherd@kec.org

SCOTT DUNBAR
KEYES FOX & WIEDMAN LLP
1580 LINCOLN STREET
SUITE 880
DENVER, CO 80203
sdunbar@kfwlaw.com

JACOB J SCHLESINGER, ATTORNEY
KEYES FOX & WIEDMAN LLP
1580 LINCOLN STREET
SUITE 880
DENVER, CO 80203
jschlesinger@kfwlaw.com

PATRICK PARKE, VICE PRESIDENT CUSTOMER SERVICE
MIDWEST ENERGY, INC.
1330 Canterbury Rd
PO Box 898
Hays, KS 67601-0898
Fax: 785-625-1494
patparke@mwenergy.com

ANNE E. CALLENBACH, ATTORNEY
POLSINELLI PC
900 W 48TH PLACE STE 900
KANSAS CITY, MO 64112
Fax: 913-451-6205
acallenbach@polsinelli.com

RANDY MAGNISON, EXEC VP & ASST CEO
SOUTHERN PIONEER ELECTRIC COMPANY
1850 W OKLAHOMA
PO BOX 430
ULYSSES, KS 67880-0430
Fax: 620-356-4306
rmagnison@pioneerelectric.coop

LINDSAY SHEPARD, EXECUTIVE VP - GENERAL COUNSEL
SOUTHERN PIONEER ELECTRIC COMPANY
1850 W OKLAHOMA
PO BOX 430
ULYSSES, KS 67880-0430
Fax: 620-356-4306
lshepard@pioneerelectric.coop

RENEE BRAUN, CORPORATE PARALEGAL, SUPERVISOR
SUNFLOWER ELECTRIC POWER CORPORATION
301 W. 13TH
PO BOX 1020 (67601-1020)
HAYS, KS 67601
Fax: 785-623-3395
rbraun@sunflower.net

JAMES BRUNGARDT, REGULATORY AFFAIRS ADMINISTRATOR
SUNFLOWER ELECTRIC POWER CORPORATION
301 W. 13TH
PO BOX 1020 (67601-1020)
HAYS, KS 67601
Fax: 785-623-3395
jbrungardt@sunflower.net

COREY LINVILLE, VICE PRESIDENT, POWER SUPPLY & DELIVER
SUNFLOWER ELECTRIC POWER CORPORATION
301 W. 13TH
PO BOX 1020 (67601-1020)
HAYS, KS 67601
Fax: 785-623-3395
clinville@sunflower.net

CERTIFICATE OF SERVICE

16-GIME-403-GIE

AL TAMIMI, VICE PRESIDENT, TRANSMISSION PLANNING AND POLICY
SUNFLOWER ELECTRIC POWER CORPORATION
301 W. 13TH
PO BOX 1020 (67601-1020)
HAYS, KS 67601
Fax: 785-623-3395
atamimi@sunflower.net

JASON KAPLAN ESQ
UNITED WIND, INC.
20 Jay Street
Suite 928
Brooklyn, NY 11201
jkaplan@unitedwind.com

MARK D. CALCARA, ATTORNEY
WATKINS CALCARA CHTD.
1321 MAIN ST STE 300
PO DRAWER 1110
GREAT BEND, KS 67530
Fax: 620-792-2775
mcalcara@wcrf.com

TAYLOR P. CALCARA, ATTORNEY
WATKINS CALCARA CHTD.
1321 MAIN ST STE 300
PO DRAWER 1110
GREAT BEND, KS 67530
Fax: 620-792-2775
tcalcara@wcrf.com

CATHRYN J. DINGES, SENIOR CORPORATE COUNSEL
WESTAR ENERGY, INC.
818 S KANSAS AVE
PO BOX 889
TOPEKA, KS 66601-0889
Fax: 785-575-8136
cathy.dinges@westarenergy.com

JEFFREY L. MARTIN, VICE PRESIDENT, REGULATORY AFFAIRS
WESTAR ENERGY, INC.
818 S KANSAS AVE
PO BOX 889
TOPEKA, KS 66601-0889
jeff.martin@westarenergy.com

LARRY WILKUS, DIRECTOR, RETAIL RATES
WESTAR ENERGY, INC.
FLOOR #10
818 S KANSAS AVE
TOPEKA, KS 66601-0889
larry.wilkus@westarenergy.com

CASEY YINGLING
YINGLING LAW LLC
330 N MAIN
WICHITA, KS 67202
Fax: 316-267-4160
casey@yinglinglaw.com

Vicki Jacobsen

Vicki Jacobsen