Institute *for*
Policy Integrity
NEW YORK UNIVERSITY SCHOOL OF LAW

May 29, 2018
Hon. Kathleen H. Burgess, Secretary
New York State Public Service Commission
Three Empire State Plaza
Albany, New York 12223-1350

<u>VIA ELECTRONIC SUBMISSION</u>

Attn.: Matter 17-01276 (In the Matter of the Value of Distributed Energy Resources Working Group Regarding Value Stack), Matter 17-01277 (In the Matter of the Value of Distributed Energy Resources Working Group Regarding Rate Design)

Subject: Comments on Rate Design Successor to Net Energy Metering for Mass Market Customers

Dear Secretary Burgess:

The Institute for Policy Integrity at New York University School of Law[1] ("Policy Integrity") respectfully submits the following comments to the New York State Department of Public Service Staff ("Staff") on rate design proposals for a net energy metering successor tariff. Policy Integrity is a non-partisan think tank dedicated to improving the quality of government decisionmaking through advocacy and scholarship in the fields of administrative law, economics, and public policy. Policy Integrity has extensive experience advising stakeholders and government decisionmakers on the rational, balanced use of economic analysis, both in federal practice and at the state level.

We are grateful for your consideration of these comments.

Sincerely,

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[1] This document does not purport to present New York University School of Law's views, if any.

Introduction

In the *Order on Net Energy Metering Transition, Phase One of the Value of Distributed Energy Resources, and Related Matters*,[2] the New York Public Service Commission ("Commission") correctly recognized that net energy metering, coupled with current rate designs, does not send correct signals for the deployment and use of distributed energy resources ("DERs") and lacks the ability to take into account "locational, environmental, and temporal values of projects." [3] And, by "failing to accurately reflect the value provided by and to the DER they compensate," these mechanisms lack the structure to "maximize overall value to all utility customers."[4] In an effort to improve the incentives for DER customers, Phase Two of the Value of Distributed Energy Resources Proceeding ("VDER Proceeding") aims to overhaul existing rate structures for mass market DER customers.

Policy Integrity applauds and supports Commission and Staff in undertaking such an important effort. Improving rate designs will not only correct the incentives for deployment of DERs but also improve the efficiency of consumption price signals that customers receive.[5] Moving away from current two-part tariffs with a fixed charge and a flat, time-invariant volumetric charge that does not accurately reflect the underlying costs to an approach that is more cost-reflective and granular would lead to an increase in economic efficiency.

As a part of the Phase Two of the VDER process, Staff issued its *VDER Value Stack and Rate Design Working Group Process and 2018 Schedule*, inviting parties to submit proposals for rate designs that could serve as the basis for a mass-market Net Energy Metering ("NEM") successor tariff using the Rate Design Proposal Handbook and Rate Design Input Workbook prepared by Joint Utilities. [6] Once the proposals are submitted, Staff will select a number of proposals for further analyses.

While we appreciate the efforts by the Joint Utilities to provide a Rate Design Input Workbook ("Workbook") and make certain data available to standardize proposal submissions, we do not think this approach provides enough flexibility and information to be able to propose a fully cost-reflective tariff. Therefore, at this time, Policy Integrity respectfully comments only on general principles for rate design selection.[7]

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[2] PSC Case 15-E-7051: Value of Distributed Energy Resources (VDER), *Order On Net Energy Metering Transition, Phase One Of Value Of Distributed Energy Resources* (issued Mar. 9, 2017) ("VDER Phase One Order").

[3] VDER Phase One Order, *supra* note 2, at 3.

[4] VDER Phase One Order, *supra* note 2, at 3.

[5] *See* Richard L. Revesz & Burcin Unel, *Managing The Future Of The Electricity Grid: Distributed Generation And Net Metering*, 41 HARV. ENTL. L. REV. 43-108 (Feb. 19, 2017) (for a more detailed explanation of the inefficiencies of net metering coupled with current rate designs, and how better rate design can improve incentives for DERs).

[6] PSC Case 15-E-0751: Value of Distributed Energy Resources (VDER), *VDER Value Stack and Rate Design Working Group Process and 2018 Schedule* (filed Dec. 12, 2017).

[7] These comments are in addition to the joint comments submitted by the Coalition For Sustainable Distributed Clean Energy Comments On Rate Design Successor To Net Energy Metering For Mass Market Customers" on higher level rate design principles.

In particular, the Commission and Staff can enhance economic efficiency by:

- Moving to a design that aligns the price signals customers receive with the underlying costs of generating, transmitting, and distributing electricity, including environmental externalities;
- Acknowledging the necessity of a similar treatment between the compensation that DER consumers receive for their electricity injections into the grid and the rates they pay for the electricity they withdraw from the grid;
- Clarifying that the NEM-successor rate design will eventually be rolled out to all customers, including non-DER consumers to eliminate any distortions in incentives for DERs;
- Setting the details of rate designs based on findings from economics research when a fully cost reflective tariff is impractical; and
- Selecting a rate design that is flexible enough to vary between utilities, depending on the individual load and transmission conditions, and over time as peak periods may shift with increasing penetration of DERs as well as large scale renewable resources.

I. The rate design should align the price signals consumers receive with the underlying costs of generating, transmitting, and distributing electricity, including environmental externalities.

A key tenet of efficient rate design is cost causation. Customers should receive correct signals that reflect potential scarcities associated with electricity generation and the opportunity cost of the electricity usage. As Alfred Kahn explains in his classical textbook on regulation, only when faced with prices that reflect true economic costs, the customers will make socially correct decisions:

> "[...] demand for all goods and services is in some degree, at some point, responsive to price. Then, if consumers are to decide intelligently whether to take somewhat more or somewhat less of any particular item, the price they have to pay for it (and the prices of all other goods and services with which they compare it) must reflect the cost of supplying somewhat more or somewhat less - in short, marginal opportunity cost."[8]

There are different types of costs associated with providing electricity to the end users. Some of them, like billing costs, are dependent only on the number of customers and do not depend on an individual's consumption behavior. Others are associated with the volumetric (kWh) usage of energy. They reflect the costs such as operational and fuel costs of generating electricity, and transmitting it using lines that are congested at times. Another category of costs relate to the energy demand (kW), for instance through capacity obligations that utilities are required to ensure through the capacity markets or the costs related to building and maintaining a big enough distribution network to serve all the consumer demand. Finally, there are external costs associated directly with amount of

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[8] 1 ALFRED A. KAHN, THE ECONOMICS OF REGULATION: PRINCIPLES AND INSTITUTIONS 66 (1988).

electricity generation. For example, air pollution caused by fossil-fuel-fired generation imposes costs on society that are not fully reflected in markets.

Only when customers see price signals that are proportional to the costs they cause by their volumetric electricity usage and capacity needs, the system can induce efficient electricity consumption and DER injections. Thus, the ideal rate design should convey information about these different types of costs to the customers. Given the current structure of electricity markets, a three-part tariff that includes the following elements is often prescribed:[9]

- A fixed customer charge;
- A volumetric charge; and
- A kW-based charge.

A fixed customer charge should reflect the per-customer costs that are independent of the customer's behavior. For examples, costs related to billing or customer care should be included in this charge.

A volumetric charge should reflect the avoidable incremental cost of electricity generation, transmission, and distribution. While the costs of providing electricity vary from time-to-time, and location-to-location, residential rates have been historically time-invariant and lacked the proper incentives optimize the electricity usage, leading to inefficiently high electricity system costs.[10] Real-time pricing, on the other hand, would induce optimal incentives. [11] To the extent it is possible, the Commission should adopt a real-time pricing design for the supply component. If it is not deemed feasible at the moment, the Commission should adopt a design that approximates real-time pricing as closely as possible. This volumetric charge should also reflect the external costs associated with air pollution resulting from fossil-fuel-fired plants to ensure that both electricity consumption and the resulting DER deployment and use can be socially efficient.

A kW-based charge (or a "demand charge") should reflect the incremental (avoidable) costs that are related to the level of a consumer's maximum demand at given period of time such as generation, distribution, and transmission capacity costs. Given that those costs usually occur in peak load time periods of each system they should be recovered using three different kW-based charges that depend on consumer's demand coincident with the peak load period of each respective system.

The theoretical foundation for such charges relies on the notion that for "commodities whose demands are periodic and essentially non-storable," it is well accepted that peak

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[9] *See e.g.* Ahmad Faruqui et al., *Curating the Future of Rate Design for Residential Customers*,. ELECTRICITY POLICY (2016); *see* Ryan Hledik, *Rediscovering Residential Demand Charges*, 27 ELECTR. J. 82 (2014) (for a discussion of how demand charges improve economic outcomes).

[10] *See* Severin Borenstein & Stephen Holland, *On the Efficiency of Competitive Electricity Markets with Time-Invariant Retail Prices*, 36 RAND J. ECON. 469 (2005) (for the problems associated with time-invariant pricing).

[11] Jacob Mays & Diego Klabjan, *Optimization of Time-Varying Electricity Rates*, 38 ENERGY J. 67, 70 (2017).

users should pay "marginal operating plus marginal capacity costs and off-peak users should pay only marginal operating costs."[12] Kahn further explains this concept as follows:

> "The economic principle here is absolutely clear: if the same type of capacity serves all users, capacity costs as such should be levied only on utilization at the peak. Every purchase at that time makes its proportionate contribution in the long-term to the incurrence of those capacity costs and should therefore have that responsibility reflected in its price. No part of those costs as such should be levied on off-peak users."[13]

Consequently, utilities should rely on coincident peak demand charges for the incremental costs caused by a customer's additional demand during peak periods. But, these charges must be well-designed. For example, a demand charge that is designed to recover costs of new, additional peak capacity cannot be based on a customer's monthly maximum demand, which may occur at an off-peak time period. It should be based on a customer's coincident peak demand. Non-coincident peak charges can be additionally implemented, but only to recover any other *avoidable* distribution network capacity costs that depend on the level of demand but do not depend on the time of the occurrence of that demand, if any.

Well-designed demand charges would incentivize customers to reduce their costly peak demand, as well as incentivizing types of DERs that can help customers reduce their demand during peak time periods. There is indeed a growing understanding of cost saving effects of demand charges.[14] There is also evidence that demand charges can lead to gains for utilities and for both DER and non-DER customers.[15] Consequently, the charges are gaining popularity throughout United States with tariffs incorporating demand charges states present in 44 utilities in 22 states.[16]

II. Staff should initiate efforts to harmonize the treatment of energy imports and exports for DER customers.

The current VDER process treats injections to the grid differently from withdrawals from the grid, as well as the reduction in consumption behind-the-meter. The value of the DER injections are currently based on the value stack framework, while withdrawals from the grid or reductions in consumption are valued based on the rate design framework. However, there is no reason why the frameworks for these should be different, even if the numerical values for the compensation might be different.

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[12] Paul L. Joskow, *Contributions to the Theory of Marginal Cost Pricing*, 7 BELL J. OF ECON.198, 197-206 (1976).

[13] KAHN, *supra* note 1, at 89.

[14] ROCKY MOUNTAIN INST., A REVIEW OF ALTERNATIVE RATE DESIGNS INDUSTRY EXPERIENCE WITH TIME-BASED AND DEMAND CHARGE RATES FOR MASS-MARKET CUSTOMERS (May 2016). See also a recent presentation by Xcel Energy showing a $9.73/kW demand charge in the summer reducing the peak demand by 7%. Scott Brockett, EUCI 2018 Residential Demand Charges Conference, Update On Public Service Company Residential Demand Charges (May 2018) (on file with the authors).

[15] David P. Brown & David E.M. Sappington, *On the Role of Maximum Demand Charges in the Presence of Distributed Generation Resources*, 69 ENERGY ECONOMICS 237-249 (2018).

[16] Ahmad Faruqui, EUCI 2018 Residential Demand Charges Conference, Rate Design 3.0 and The Efficient Pricing Frontier (May 2018), *available at* http://files.brattle.com/files/13846_rate_design_3_0_and_the_pricing_frontier_05-11-2018.pdf.

While energy consumption causes costs, reduction in behind-the-meter consumption or DER injections avoid those costs. Therefore, the value stack payments for injecting electricity to the grid should have a structure that to a large extent mirrors the rate design for electricity consumption. For example, the rates for capacity costs should equal payments for avoided capacity costs.

Essentially, any action that leads to a reduction in the need for capacity, whether it is because of energy efficiency, because of distributed generation, or because of consumers responding to price signals by reducing their demand, should be rewarded using a similar framework. Generation from a distributed generation system should be treated using a similar framework regardless of whether it reduces the need for bulk system generation because it is used by the consumer on-site, or whether, instead, it reduces the need for bulk system generation because it is injected to the grid. For example, the amount a customer can reduce her bill by reducing her demand during a peak period by avoiding the capacity component of the rate design should ideally correspond to the capacity value stack a DER injection to the grid can earn during the same period.

Similarly, a DER that can reduce the need for energy generation from fossil-fuel-fired plants should get rewarded for avoiding costly air pollution regardless of whether the DER reduces the amount of withdrawals from the grid, or whether it directly injects to the grid. Compensating DERs that can inject to the grid for avoiding emissions, but not doing the same for DERs that can avoid emissions without injecting to the grid might lead to an economically inefficient portfolio of DERs.

Therefore, in the long term a structure to harmonize these frameworks is needed. The only difference in tariff frameworks should stem from costs and benefits that are relevant only for exports, if any, for example an increase in balancing and ancillary services costs due to the two-way flow of electricity.

III. Both DER and non-DER consumers should face the same rate design.

All mass market consumers, including non-DER customers, should eventually face the same rate design framework to ensure economic efficiency. If the framework, such as the implementation of time- and demand-variant rates differ between the DER and non-DER consumers, the decision about whether to install DER would be distorted resulting in too little or too much of different kinds of DER compared to the socially optimal outcome.

Therefore, rate schedules for both customer groups should consist of the same core elements. In particular, all types of customers should face the same price signals for costs that are imposed in the same manner for both types of customers, like increased distribution or generation capacity requirements or additional energy purchases. The tariff for DER customers may include additional elements only to the extent that there are additional costs and benefit elements that are idiosyncratic to DERs.

IV. Staff should set the details of the designs using findings from economics if cost-causation principles cannot be practically implemented.

We recognize that perfectly cost-reflective and granular rate designs that hold to key to the distributed energy future envisioned by the Reforming the Energy Vision initiative may not be practical to implement currently, and the Commission may desire to opt for much simpler rate designs. Even then, the chosen designs should try to approximate such ideal designs. And, the details of the designs should follow the findings of economic research.

For example, real-time pricing for mass market customers may not be feasible to implement in the near term. However, various forms of time-of-use rates that can approximate real time pricing by differentiating kWh prices across time of day and, possibly, across seasons might instead be used. There is evidence that such time-of-use rates lower customer's usage in peak periods, leading to lower average wholesale prices. [17] This effect is amplified by the presence of enabling technologies.[18] Such time-variant designs would also improve efficiency of the electric system by providing more accurate incentivize to DERs.[19]

If a time-of-use design is chosen, the ratio of prices in different time periods is a crucial design element of a time-varying rate. A higher peak to off-peak price ratio would lead to a lower demand in the peak period, but there are diminishing returns to increasing the peak to off-peak price ratio.[20] Figure 1 shows the results from the use multiple Time-of-Use rates across the world, illustrating how the magnitude of the reduction in peak electricity usage changes with respect to the peak to off-peak price ratio, and the use of technology.

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[17] Ahmad Faruqui et al., *Arcturus 2.0: A Meta-Analysis of Time-Varying Rates for Electricity*, 30 ELECTRICITY J. 64-72 (2017)

[18] *Id.*

[19] *See* Revesz & Unel, *supra* note 5 (for example such designs would incentivize the solar panel installations to face the direction that would maximize generation during when electricity is most beneficial to the grid.); *see also* Richard L. Revesz & Burcin Unel, *Managing the Future of the Electricity Grid: Energy Storage and Greenhouse Gas Emissions* 42 HARV. ENVTL. L. REV. 140-196 (2018) (for how improving rate design would also increase incentives for energy storage); *see also* MADISON CONDON, RICHARD L. REVESZ, & BURCIN UNEL MANAGING THE FUTURE OF ENERGY STORAGE: IMPLICATIONS FOR GREENHOUSE GAS EMISSIONS (2018).

[20] Ahmad Faruqui et al., *supra* note 17.

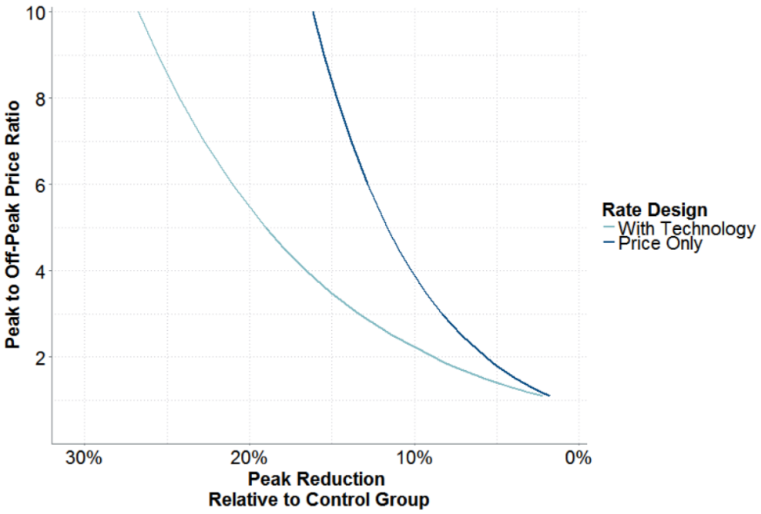

Figure 1: The Arc of Price Responsiveness. Source: Ahmad Faruqui et al., *Arcturus 2.0: A Meta-Analysis of Time-Varying Rates for Electricity*, 30 ELECTRICITY J. 64-72 (2017)

Similarly, the number of time periods and the length of these time periods in a time-of-use design can affect the efficiency of the design. Defining a relatively short peak time period would enable sending a stronger price signal to avoid consumption in the peak period (or incentivizing injecting electricity during the peak period.) On the other hand, if there is enough temporal variation in the cost structures, time-of-use rates may include more than two periods (e.g. off-peak, shoulder, and peak) and/or may differentiate among seasons. Likewise, if a Critical Peak Pricing design is chosen, the number of days should be limited to send a stronger signal when the signal is needed.

By the same token, if coincident-peak demand charges are chosen, the same period can be used for generation, transmission, and distribution peaks for simplicity if these peaks are relatively close to each other even though it is ideal to have separate kW-based charges that reflect the avoidable capacity costs of each of these systems. However, if the timing of these peaks is significantly different, separate coincident-peak demand charges should still be considered.

Therefore, if moving away from cost-causation, Staff should optimize the number of the various pricing periods and the ratio of peak to off-peak prices based on the underlying cost structures, taking into account the possibility of automated price responses facilitated by new technologies, and balancing the accuracy of price signals to incent economically efficient behavior with simplicity.

Importantly, even if perfectly cost-reflective prices are not feasible, price signals should still be grounded on the real cost structures in order to incentivize economically efficient behavior. Ad-hoc designs without using existing cost information will lead to inferior tariffs and to missed cost-saving opportunities. Therefore, when choosing rate designs for further analysis, Staff should be guided by utility costs to determine the numerical values of the rate structures submitted in the Workbooks no matter what design is chosen. Given that the Workbook format allows for ad-hoc suggestions without any cost basis, for example choosing the level of demand charges as a percentage of current customer charges, adopting such designs as-suggested would lead to economically inefficient rates.

V. Rate designs should be flexible enough to vary among utilities and vary over time.

The specifics of the optimal design rates such as the number of peak periods and the timing of the peak may differ substantially among the utilities depending on their cost structures. For example, a given percentage of top demand hours might correspond to a different number of hours in different networks. Consequently, the ideal number of hours in a peak period might differ among utilities. Similarly, the timing of the peak periods might shift with increased penetration of DERs and renewable resources. In the case of peak shifts, the economically efficient marginal cost pricing might be different.[21] Thus, the designs chosen should be flexible in terms of its parametrization to allow for utility-specific differences and allow for updating as the load shapes and cost structures change. And, Staff should issue a guidance on how to set rate designs parameters instead of inflexibly setting the parameters.

Conclusion

New York continues to be a leader in modernizing the electricity markets as it is working to improve its retail rate designs. To ensure socially socially-optimal DER deployment and use, Staff should select rate designs that reflect underlying costs of generating, transmitting, and distributing electricity, including environmental externalities.

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[21] Paul Joskow, *supra* note 12, at 198.