STATE OF NEW YORK
DEPARTMENT OF PUBLIC SERVICE

CASE 16-M-0430 - In the Matter of Rate Design Reforms Supporting the Commission's Reforming the Energy Vision.

CASE 14-M-0101 – Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision.

CASE 15-E-0751 – In the Matter of the Value of Distributed Energy Resources.

MATTER 17-01277– In the Matter of the Value of Distributed Energy Resources Working Group Regarding Rate Design.

Staff Scope of Study to Examine Bill Impacts of a Range of Mass Market Rate Reform Scenarios

(October 3, 2017)

TABLE OF CONTENTS

INTRODUCTION AND BACKGROUND

On May 19, 2016, the Public Service Commission (Commission) issued an Order Adopting a Ratemaking and Utility Revenue Model Policy Framework in Case 14-M-0101 (Track Two Order). The Track Two Order identified several rate design issues to be considered for future action. By the Track Two Order, Department of Public Service Staff (Staff) was required to work with stakeholders and report to the Commission by October 1, 2017 regarding the scope, feasibility and deliverables of an analytic approach to examining bill impacts of a range of opt-out variable rate scenarios (e.g., time-of-use rates, demand charges, and peak-coincident demand charges) for various non-demand commercial and residential classes of customers.

Specifically, the Commission directed Staff to consult with stakeholders to define the scope of a study that would analyze the potential impacts of a variety of mass-market rate reform scenarios for delivery and/or default commodity service. The Commission noted that the analysis of these rate design changes must include a substantial focus on impacts on customers that do not participate in distributed energy resource (DER) programs or markets. In addition, the Commission noted that the study should be designed to model impacts using New York-specific data, but should consider experience from other jurisdictions.

The Track Two Order explains that the policy framework guiding this effort should consider:

- Integration of REV objectives with rate design principles, such that a time-variable rate can support customer response as well as representing efficient cost recovery;

- Potential consequences for customers participating in DER (both "active" and "prosumer" as defined in the Track Two Order), non-participants ("traditional" customers), low-income customers, and utility financial risk as it relates to cost recovery; and
- Prerequisites to implementation, e.g. advanced metering, valuation of DER, outreach and education, and enabling technologies.

The Commission also noted in the Track Two Order that within the general category of time-variable rates structures, design choices can have a large impact on both the achievement of REV objectives and on the bill impacts for customers at all levels of participation. For that reason, the scoping effort should consider a range of determinant factors that may contribute to the overall value of a study. These may include:

- Type of costs recovered within rate elements or time periods;
- Ratio of peak to off-peak prices;
- Duration of peak or demand intervals;
- Number of peak periods included;
- Seasonal differentials; and
- Implementation factors, including types of pricing signals, enrollment mechanism, and enabling technologies

Since many of the rate design issues addressed in the Track Two Order also relate to the efforts of Staff and stakeholders in the Value of DER (VDER) Proceeding,[1] the Commission issued a Notice of Rate Design Issues to be Addressed in VDER Proceeding. One of those issues identified, which would

[1] Case 15-E-0751, In the Matter of the Value of Distributed Energy Resources.

be addressed in the VDER Proceeding through the Rate Design Working Group, was the bill impact report to be filed by Staff. Staff's VDER Rate Design Working Group has included a series of in-person meetings and written comments to develop ideas and solicit feedback, which Staff has reflected in this report.

While the scope of the study was initially intended to include only opt-out mass market rate design modifications, Staff proposes that the initial phase of the study begin by examining bill impacts associated with the VDER Phase Two rates that would be developed to replace Phase One NEM, as discussed in the Commission's March 9, 2017 Order on Net Energy Metering Transition, Phase One of the Value of Distributed Energy Resources and Related Matters (VDER Phase One Order).

In the VDER Phase One Order, the Commission stated that Phase One NEM will be available to all mass market on-site projects. Phase One NEM is available to projects that are: (1) interconnected behind the meter of a customer within a utility's residential or small commercial service class; (2) not billed based on peak demand; (3) not used to offset consumption at any other site; and (4) interconnected before the earlier of January 1, 2020 or a Commission order directing modification. Therefore, to allow enough time for implementation of new rate designs prior to the expiration of the Phase One NEM option, the Commission concluded that a Phase Two rate design can and should be presented to the Commission for consideration by or before December 31, 2018. Such rate design will be developed through the VDER working group process, with the bill impact analysis of that proposal forming a critical component of the Staff filing to the Commission.

PURPOSE OF BILL IMPACT STUDY

The bill impact study will provide valuable information for the Commission to evaluate mass market rate design changes, on both a generic and utility specific basis. The bill impact(s) can help inform the Commission regarding the pace of implementation and the specific rate design modifications. Since the Track Two Order does not require the application of a specific rate design, the Staff proposal includes a two-step approach. The first step is the development of the rate design(s) for VDER Phase Two rates. Upon completing the first step of determining the VDER Phase Two rates, a subsequent step will be established to examine opt-out rate designs that would be applicable to all mass market customers.

Staff notes that there are several initiatives underway to study rate design impacts including rate pilots in areas with AMI, existing TOU rates, Smart Home Rate demonstration projects, and the NGRID Clifton Park demonstration project. It is likely that full results of these pilots will not be available until the later assessment of rate designs for all mass market customers.

RATE DESIGN DEVELOPMENT

Before conducting a bill impact study, the rate designs to study and the definition of the typical customers need to be determined. Utilities can begin developing analytical tools to perform the bill impact study concurrent with development of the threshold constraints of rate designs to be tested and the definition of typical customers to study.

There are many important issues that need to go into determining which rate designs are included in the bill impact study for each utility, including, in part:

- What metering technology exists or is likely to exist at each utility;
- Whether one set of tariffs is sufficient to promote efficient use of the grid by both prosumers and consumers;
- Whether aspects of the information reflected in value stack elements could be applied to rates; and
- Experience from New York and out-of-state utilities.

The specific steps necessary to develop rate designs are as follows:

Develop Rate Structure

For both distribution and energy supply, determine the appropriate rate structure (e.g., fixed charge, demand), time periods if applicable, and method of demand measurement if applicable.

Calculate Billing Determinants

Once the rate structure is established, the billing determinants (e.g., number of billed kWh or kW by time period) for customers in the sample are quantified using interval data available from the utility's load research sample. This result is then extrapolated to the class population to create the billing determinants necessary for rate design.

Calculate Revenue-Neutral Rates

Using the billing determinants and other rate design parameters (e.g., peak to off-peak differentials, summer to winter differentials, costs to be recovered through each rate component) the rates can be calculated for each rate design to be considered.

RATE DESIGN STRUCTURES TO BE CONSIDERED

Many possible rate design options are available for consideration. Principles should be applied to identify a

limited number of the most promising rate design options for distribution and energy supply. The principles should be those adopted by the Commission in the Track Two Order as stated below:

Cost causation: Rates should reflect cost causation, including embedded costs as well as long-run marginal and future costs. Fixed charges should only be used to recover costs that do not vary with demand or energy usage.

Encourage outcomes: Rates should encourage desired market and policy outcomes including energy efficiency and peak load reduction, improved grid resilience and flexibility, and reduced environmental impacts in a technology neutral manner.

Policy transparency: Incentives should be explicit and transparent, and should support state policy goals.

Decision-making: Rates should encourage economically efficient and market-enabled decision-making, for both operations and new investments, in a technology neutral manner.

Fair value: Customers should pay the utility fair value for services provided by grid connection, and the utility should pay customers fair value for services provided by the customer.

Customer-orientation: The customer experience should be practical, understandable, and promote customer choice.

Stability: Customer bills should be relatively stable even if underlying rates include dynamic and sophisticated price signals.

Access: Customers with low and moderate incomes or who may be vulnerable to losing service for other reasons should have access to energy efficiency and other mechanisms that ensure they have electricity at an affordable cost

Gradualism: Changes to rate design formulas and rate design calibrations should not cause large abrupt increases in customer bills or delivery rate impacts

Economic sustainability: Rate design should reflect a long-term approach to price signals and the ability to build markets independent of any particular technology or investment cycle.

Examples of possible rate design approaches to be considered are:

- Time-of-Use (TOU)

- Demand Charges (non-coincident and coincident peak)
- Grid Access Charges
- Fixed Subscription Fees
- Minimum Bills
- Critical Peak Pricing
- Seasonal / Tiered Pricing
- Reduced or Increased Customer Charges
- Commodity vs. Delivery / overlapping price signals
- VDER Stack – Prosumer Rate Option
- Market Based – Energy and Capacity Supply

The categories of costs (i.e. customer, distribution, transmission, and generation) to include in each rate component, the percentage of each type of cost to recover, and TOU periods must be justified and supported by data. As the list demonstrates, there are many potential rate design options to consider. Thus, to move forward expeditiously, a reasonable approach is to select several of the most promising options from the list above for initial study.

DATA NEEDED FOR RATE DESIGN DEVELOPMENT

Ideally, the rate design development and bill impact study would be done with several years of individual customer data from AMI meters, if installed, that would enable robust customer segment analyses, calculation of the frequency distribution of impacts, and many sensitivity analyses. This data will not be available for several years for those utilities pursuing AMI. New York utilities have representative or surrogate sample interval data for mass market customers within the appropriate classes. This data is obtained and updated periodically through in-house load research programs at

Consolidated Edison Company of New York, Inc., Orange and Rockland Utilities, Inc. and Central Hudson Gas & Electric and from a third party such as Itron, Inc. at New York State Electric & Gas Corporation and Rochester Gas and Electric Corporation. Analyses of this data can be extrapolated to a class population in a manner that produces statistically significant results. In addition to load research data, rate design development can require system load data. Each New York State utility has system load data available as described in the Distributed System Implementation plans filed on June 30, 2016 in Case 14-M-0101.

BILL IMPACT STUDY

For the bill impact study to produce meaningful results that provide the Commission with reliable information, the bill impact study should be clearly defined and replicable by Staff and stakeholders. There also needs to be consistency in the approaches used by each utility, while acknowledging that basic differences exist among the utilities' data availability, metering, etc. Therefore, the Commission should require that all underlying data sources are provided in an easily used electronic format and that all assumptions are carefully documented along with supporting documents.

Utilities in New York have a wide variety of geographies, system designs, customer types, and weather, all of which affect revenue requirements, cost allocation, and rate design. Therefore, it is necessary to define utility-specific typical customers for purposes of the bill impact studies, in a manner consistent amongst utilities. The customer bill impact analysis and the process used to conduct the analysis must be transparent, efficient, and supportive of Commission decision-making. Joint Utilities will provide their bill impact models

to stakeholders. The process should initially focus stakeholders' efforts on providing input into and review of the Joint Utilities' modeling approaches and data. This process is efficient because it avoids the potential for multiple stakeholders developing parallel bill impact models and analyses that would be difficult to reconcile. Regularly scheduled Rate Design Working Group meetings will provide the forum that will foster consistency among the utilities and provide stakeholders and the Commission with transparent and reliable information.

While each utility knows the usage level of customers participating in low-income programs and their distribution within applicable service classes, utility load research samples are not designed to produce statistically significant findings for low-income customers or any other customer demographic group.

The specific steps necessary to perform the bill impact study, after revenue neutral rates have been developed, are as follows:

Calculate Customer Structural Bill Impacts

The customer structural bill impacts can be described as the effect on electric bills without any change in customer behavior, assuming T&D revenue neutrality from the utilities' perspective. This analysis is a straightforward exercise, similar to what is done in a rate case where the utility estimates, by class of customer, the effect of a particular set of rates, usually without any assumptions about change in customer behavior (e.g., price elasticity). The rate change needs to produce the allowed T&D revenue requirement based upon bill frequency data. Using the interval data available for the utility's load research sample, customer structural bill impacts (assuming no behavioral changes or technology adoption) should

be determined for each customer in the sample. Results should be extrapolated to the class population.

Bill Impact Sensitivity Analysis

The sensitivity analysis should be focused on instances where a change in an assumption could lead to a material change in the bill impact study. Sensitivity analyses should be performed by varying the rate structure and customer usage to reflect behavioral effects or technology adoption. Key assumptions must be made about price elasticity and expected penetration and adoption rates as well as assumptions for opt-in and opt-out, and energy usage information obtained from AMI data. Behavioral and related information should support the assumptions and should be drawn from outside sources, consultants, and results from New York demonstration projects and pilots as they become available. The Joint Utilities' models should be structured to perform a top-down analysis in a manner that enables stakeholders to make varying assumptions about customer responses to specific rate designs.

The sensitivity analysis should be performed for two levels of application, including: (1) short term effects that change with little to no capital investment; and (2) longer term effects that require significant capital investment by either the utility, a consumer, or a prosumer. Both levels should be considered in a bill impact study since looking at any one without the others might provide a skewed view of how the new rate designs might affect behavior and the utility system.

Short-term impacts look at what shifts in behavior might occur with little or no capital investment by the consumer, typically impacted by customer education, utility supported programs (e.g., efficient appliance subsidies, removal of old refrigerators, thermostat swaps, optional rate designs that require direct utility control of appliance's such as water

heaters or air conditioners), third party solar installations and short-term price elasticity. This stage of the analysis requires assumptions of customer behavior based upon studies (wherever they may have been performed) that indicate customer adoption rates, appliance penetration rates and short-term price elasticity. The use of publicly-available reports and information drawn at least in part from other sources, such as consultants and stakeholders, should be used to assess the behavioral impacts of rate design changes on customer bills.

The inclusion of behavioral impacts is important to ensure that mass-market customers can understand and will respond in a rational manner to changes in rate design. This may include an evidence-based evaluation of what customers understand, what they are willing to accept, and what actions they are willing to take. Typical usage data and load curves for end-use appliances have been develop and can often be found through the National Laboratories and Electric Power Research Institute.

Longer-term impacts include changes in customer behavior that require capital investments. It is substantially similar to the short-term analysis, other than the cost of the capital improvement must also be considered. The bill impact study should consider investments such as onsite generation, storage or building energy management systems. The longer-term should see additional customer behavioral changes as enabled by capital investments. This sensitivity could also consider the avoided utility capital costs that changes in consumer and prosumer behavior would enable.

DATA NEEDED FOR BILL IMPACT STUDY

The bill impact study will consider a variety of possible rate design approaches, each varying with likely

customer responses. Data and related information that is required to effectively assess each of the options noted include:

- Detailed assessments of the price elasticity of demand by customer segment – As noted previously, information regarding customer response to varying rate designs will be provided from outside sources including consultants. Price elasticities will be used to approximate customer responsiveness to rate designs that include a dynamic price (e.g., time varying rates such as time-of-use, critical peak pricing, and market-based energy and capacity supply rate programs) and demand charges, which are intended to shift consumption from system peak periods.
- Customer load profiles – Detailed load profiles indicate the volume of customer energy or demand that is potentially available to respond to the studied rate designs.
- Variations in consumer behavior due to DER participation - Rate designs must be sustainable as participation in DER programs broadens and the penetration of DER resources increases.
- Customer demographics – The Joint Utilities have varying amounts of customer demographic data at their disposal. The Utilities' load research data has not historically been used to provide demographic information. As a result, it is not possible to draw meaningful demographic conclusions for rate design options that are dependent on load interval data. In such situations, other yet to be determined methods would be required to fill the disconnect between demographics and load interval data. This type of information would need to be extracted from census data, utility specific studies, and studies at other utilities.

- DER Profiles – a customer bill impact study can look at prototypical customers with select types of DER, if reliable hourly generation and/or load data are available for technologies such as distributed solar, electric vehicle charging, and electric heat pumps.