Reforming the Energy Vision (REV)
Working Group 1: DSPP Markets

Staff Report on the Work of the
DSPP Markets Committee

July 8, 2014

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Committee Overview

The Working Group I - DSPP Markets Committee ("Markets Committee") was formed on May 12, 2014 at the Reforming the Energy Vision (REV) Collaborative Meeting. The Working Group consisted of over 100 organizations and 180 individuals representing a broad cross section of interested parties and DPS Staff. The Working Group Co-Conveners were Tammy Mitchell, DPS Staff; Deidre Altobell, Con Edison; and Anne Reynolds, Alliance for Clean Energy New York.

A Steering Committee consisting of representatives of each of the affinity groups was formed to collect and compile input from Committee members and to draft the final Committee report and presentation to the Commission.[1] The Committee held weekly in-person Steering Committee meetings and full Committee conference calls weekly from May 14 through June 26, 2014. In addition, a separate sub-group was formed to investigate issues related to interactions with wholesale markets.[2]

The Objective of Working Group I – DSPP Markets Committee was to:

- Identify potential products, services, and transactions that will occur between various parties – the DSPP, Distributed Energy Resources (DER) providers, customers without DERs, ESCOs, and third parties;
- Identify values or contributions of products to the electric distribution and toward achieving public policy objectives;
- Identify barriers or potential regulatory reforms needed to facilitate the purchase or sale of existing or new products or services from distributed energy resources;
- Recommend a potential initial market structure or model that would facilitate transactions between parties, provide value to all parties, and improve electric system efficiency while considering State public policy objectives; and
- Identify interactions that will occur between all parties and NYISO wholesale markets and identify potential rule changes that might be necessary.

The following were the key findings of the Markets Committee:

- There are numerous potential products and services; some exist today; it is expected that new and innovative products will develop in the future.
- Precise definitions of DSPP products and services will be of great importance; the varying legal, industry, and customer context leads to ambiguity in such basic terms such as energy, capacity, demand response, demand management, and distributed energy resources.

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[1] A listing of the members of the DSPP Markets Committee as well as designated Steering Committee Members and Co-conveners is included in Attachment 1.

[2] A list of members of the Wholesale Market Interactions sub-group is included in Attachment 2.

- Distributed energy resources exist today.
    - Programs and initiatives have been taken by PSC, NYSERDA, utilities, ESCOs, etc.
    - Resources may be under-utilized.
- More resources are needed to optimize efficiency and achieve the goals of REV.
- There are a number of challenges to further proliferation of DER.
- In the initial stage:
    - The utilities will play a key role in further developing and utilizing DER.
    - Utilities and DER providers need to be engaged and share information.
    - Appropriate pricing should be developed for services based on the values and the costs of those services.
    - There are regulatory actions that can help facilitate DER development.
- DSPP can use DER to flatten the load that is seen by the NYISO
    - Helps create more efficient distribution and bulk power systems
- DSPP programs help serve bulk system reliability needs with, or without direct retail participation in NYISO markets
    - Benefits to both systems needs to be monetized
    - Mechanism to ensure proper cost recovery of bulk versus distribution benefits needs to be considered
- Market rules need to be aligned to ensure efficient use of DER participants

Products and Services

The Markets Committee viewed products and services from two perspectives: 1) products or services the Distribution Service Platform Provider (DSPP) would procure to benefit the distribution system and/or achieve public policy requirements or objectives and 2) products or services that would be procured by and among customers, DER providers, ESCOs and other third parties, noting that not all transactions would necessarily involve the DSPP or be solely for the benefit of the distribution system.

Products bought by the DSPP

The Markets Committee considered products bought by the Distribution Service Platform Provider (DSPP) from distributed energy resource (DER) providers, energy service companies (ESCOs), other third parties, or customers without DER. For purposes of the Committee's work, it is assumed that, at the outset of this new paradigm, the incumbent utility is the DSPP, and DERs include, but are not limited to, distributed generation (fossil, wind, solar, etc.), energy storage, combined heat and power, and energy efficiency and demand management. All of these types of DERs can provide a number of valuable products and services to the DSPP. The matrix

attached as Attachment 3 provides a list of such products and services, their potential benefits, and examples of the technologies capable of providing the product or service.

The products and services available to the DSPP can be characterized into four categories:

1) Base load modifications – these are products that affect the base load or delivery of energy. Within this category, supply side products include excess energy output from DERs that is not used for a customer's self supply, and demand side products include permanent load shifts or reductions.
2) Peak load modifications – these are products that affect peak loads or capacity. Within this category, supply side products relate to local peak power production from the DERs, and demand side products relate to demand response/peak management. Additional products include nodal power and firm and flexible capacity for ramp rate control to provide stability to the distribution grid.
3) Grid services – these are non-bulk ancillary services and other products affecting the operation of the distribution grid. DERs can provide services to stabilize and support the grid through dispatched actions and automated/local control.
4) Contingency and Planning – these are products and services for emergency situations and planning purposes. These products address resiliency, response to power outages, and the inclusion of DER in grid planning.

Key potential benefits accruing from the deployment of DERs and use of these products and services are listed under the headings of planning, operations, and public policy benefits. The focus of the Committee's efforts was on benefits to the distribution system; some system-wide benefits are listed under other considerations. It should be noted that this matrix is the consolidation of input from a broad array of parties. It does not indicate agreement by all of the parties. During the discussions a number of questions and issues were raised that will need to be addressed. The main questions and issues are listed below the matrix in Attachment 3.

Products bought by/sold to customers, DER owners, ESCOs and other third parties

The Markets Committee considered products bought by customers, distributed energy resource (DER) providers, ESCOs, or third parties from the Distribution Service Platform Provider (DSPP) through a DSPP created marketplace from other customers, DER providers, energy service companies (ESCOs), or other third parties; or via bilateral transactions between and among these groups. For purposes of the Committee's work, it is assumed that, at the outset of this new paradigm, the incumbent utility is the DSPP. Questions explored by the Committee included:

- What types of transactions may occur between and among the DSPP, DER providers, ESCOs, customers, and third parties?

- Which services could be provided (1) only by the DSPP, (2) only by DER providers, customers, ESCOs, and third parties, or (3) by both the DSPP and DER providers, ESCOs, customers, and third parties?

The Committee first identified categories of product types, then developed attributes and benefits for each type. They include delivery services, pricing and billing services, metering information services, and DER services. The matrix attached as Attachment 4 summarizes the various potential products and services, identifies the nature of the potential transactions, the potential parties who would be engaged in providing the product or service as well as the parties who may be interested in purchasing the product or service. Finally the matrix compares the potential ways the transactions could be funded, and whether the product or service is provided by the DSPP or other parties. Not all parties agree with the comprehensive list of products and services and the respective transactions, but the matrix serves as a summary of those identified and discussed by the Steering Committee sector representatives. Additionally, this is not an all-encompassing list of future products and services; rather, it represents what parties identified as potential retail-level products and services that would be of interest to customers, DER providers, and others. The Committee anticipates that over time, other products and services, not yet identifiable, will be developed based on customer needs and wants (similar to the evolution of products and services in the telecommunications industry). There are a variety of opinions regarding the specific types of products and services that may be useful and the implementation timeline of each was not established.

The Committee's work revealed that there are already a host of products and services available to customers from DER providers, ESCOs, and others. Many of the products and services focus on the needs and desires of commercial and industrial customers, such as energy efficiency, load management, demand response, behind the meter generation, and micro-grid applications. Some of these products and services are also available to other types of customers, but with lesser penetration. Most of these products and services, and as well as others identified by the Committee members, could be sold to customers, either by the DSPP, DER providers, ESCOs, third party providers, and possibly other customers, under the appropriate circumstances.

In a more distributed world delivery service would still be provided by the DSPP, but some of what is included in delivery service today that is customer specific may evolve and could alternatively be provided by others and may not be an exclusive product provided by the DSPP. Examples include value added services (*e.g.*, very stable and robust power quality), ancillary services, DG/DER interconnection services, and smart technology/load management tools. Regarding pricing and billing services, there are some products that exist today as part of delivery service, such as monthly billing, time differentiated pricing for certain customer classes, and value added services such as DSM/EE programs. Each of these may continue to be provided in the future by other parties besides the DSPP. Additionally, aggregation and transactional services may be provided by the DSPP and/or other parties to customers. However,

measurement and verification services as applicable to DSPP DSM/EE programs are likely to be provided by the DSPP. There is a potential for a wide variety of metering and other information services that could be provided once the appropriate platform infrastructure is in place. Services around customer usage data such as in-home display of real time usage or post billing analyses could be provided to customers by the DSPP, ESCOs, or other third parties. Generally, load research data or saturation studies would be provided to customers by the DSPP.

Other products were identified that may benefit the operation of the distribution system and/or individual customers, such as energy storage and properly-located distributed generation facilities. These products may be placed on customer or DSPP property. Similarly, a number of potential services were identified that could provide benefits to customers and/or facilitate the expanded use of DERs. Examples of these services include third party maintenance and operation of DERs owned by customers, and financing services for procurements of DERs. These services could be provided to the customers by the DSPP, DER providers, ESCOs, or other third parties.

Finally for each product or service provided to customers, the Committee attempted to identify potential funding mechanisms. Generally, products and services provided to customers by the DSPP would occur through a tariff collection mechanism, and funding mechanisms for products and services provided to customers by other customers, ESCOs, or other third parties would occur through contractual arrangements. Other financing options include on-bill financing from the DSPP/utility, and property assessed clean energy funding, which is already authorized by State law (but subject to adoption by individual municipalities). This list of potential financing and funding mechanisms is not intended to be all-inclusive, and alternative, reasonable approaches should be encouraged and allowed.

For more details regarding the nature of the transactions associated with products and services purchased by customers, DER providers, ESCOs, or third parties, and the associated funding mechanism, please refer to Attachment 4.

Challenges and Pathways

The Markets Committee, while acknowledging the end-state vision whereby DER will play an integral role in optimizing electric system planning, operations and markets and also acknowledging that a number of DER exist in New York State today, recognized that DER penetration is not currently at a level to fully achieve the goals of the REV initiative. A greater proliferation of various forms of DER throughout the NYS electric system would be needed for the DSPP to employ such resources as alternatives to traditional transmission and distribution system infrastructure investment in many instances. Moreover, more DER would facilitate greater demand elasticity that, if integrated properly into markets, could result in greater market efficiencies.

To facilitate further proliferation of DER, there is a need to identify and remove challenges to entry, expansion and integration of DER. Further, appropriate market structures and incentives are necessary. The Committee identified a number of potential challenges to development of additional or full utilization of existing DER. The Committee categorized these potential barriers into five categories: pricing, information availability, billing and metering, technical and other.

The Committee identified a major issue related to pricing as limiting the ability of DERs to fully monetize their benefits. Some DER are currently compensated through utility programs or tariffs (e.g., energy efficiency, limited renewable resources qualifying for net metering, DG or load participating in utility demand response programs) or through NYISO programs (e.g., Special Case Resources, Emergency Demand Response Program, Day Ahead Demand Response Program, Demand-Side Ancillary Services Program). However, it was also recognized that there are a number of DER benefits that may not be recognized or monetized through these programs. These benefits include benefits to the local distribution system, as well as a number of environmental, public health and other related public policy benefits. Additionally, markets and/or programs either do not exist or are limited in such a way that they do not take advantage of certain attributes or benefits that DER could provide to the electric system.

The Committee suggested that appropriate pricing should be developed for services based on values and costs of those services. For example, mechanisms and incentives should be designed to provide varying compensation based on distribution level benefits (location, level and timing of system needs, and resource performance). In addition, consideration should be given to monetizing certain public policy and customer benefits.

Another key challenge to further proliferation of DER was information availability. The need for better information was identified in three areas. First, DER providers and others noted that there is a need to have information regarding the distribution system needs and capabilities by location. This information would facilitate the development of projects in areas where the need and presumably the payment for DER services would be the greatest. Additionally, the utilities noted that there is a need for DER performance and commitment data, noting that this information is essential in order for the distribution utility to consider DER as an alternative to traditional T&D investments in system planning and to rely on DER to maintain the same level of reliability on the distribution system. Finally, ESCOs and other third parties in particular noted the need for customer account and usage information.[3]

Another challenge to DER growth that was identified was the lack of standardization of metering, verification and reporting requirements. Some technical impediments that were identified include a need for streamlining interconnection rules as well as improving

[3] The topic of customer information access was covered more thoroughly by the Working Group 1 – Customer Engagement Committee.

coordination of the electric, gas and steam operations during the interconnection process. Also noted in the technical category is the need to establish monitoring and control of DER installations and deployment of an effective communication infrastructure.[4] Other potential impediments raised by the Committee members include: the cost and ability of DER providers to finance projects; proper incentives to utilities to consider DER as alternatives to T&D investments; standby rates; the future of net metering; uncertainty regarding the continuation of RPS, EEPs and SBC during a transition to the REV construct; need to improve LSE/customer data submitted to the NYISO for capacity and energy settlements; and the need to ensure that the use of DER maintains reliability of the T&D system.

The Initial Model

In recognition that it is unlikely that a fully functioning market for distributed energy resources, akin to the NYISO run wholesale market, would exist at the outset of the REV initiative, Committee members generally acknowledged that the utilities, as the DSPP, would play a key role in developing, employing and compensating DER. While the utilities may serve the DSPP role at the outset, it may not be appropriate for the utilities to remain the DSPP over time as the market structure matures. Moreover, it is important that the utilities' involvement, whether as the DSPP or the provider or products and services, should not preclude or interfere with the ability of DER providers, ESCOs or other third parties to offer similar or different products and services directly to customers or others. The creation of a level playing field among the utilities, DER providers, ESCOs, and other providers of retail-level products and services is essential to achievement of the REV goals.

As a first step in developing additional DER, the DSPP should identify areas where DER would have near term value. These areas may include, but are not limited to, areas where transmission or distribution infrastructure investment will be needed, particularly those areas where facility capacity is currently stressed or significant load growth is expected. In addition to providing this information to DER providers, the DSPP should develop sufficient price signals to reflect distribution system needs for planning and real-time operations. The Committee recognized that initially DSPP intervention, such as through RFIs, RFPs, or auctions may be required when DER opportunities become apparent.

The DSPPs should also integrate DER in system planning efforts. For that to occur, visibility into new and existing DER locations, performance and availability must be established. Additionally, standard methods for predicting, measuring, observing, and verifying performance must be established.

[4] These topics were more fully addressed in Working Group 2 – DSPP Platform and Technology.

The Committee noted that certain actions or decisions may be needed to help facilitate DSPP procurement of DER and incorporation into its planning and operation functions. Some potential actions include:

- Providing guidance on "values" to be monetized and develop appropriate metrics (e.g., environmental benefits, resiliency, etc.);
- Leveraging and expand existing programs as a bridge to sufficient DER penetration expected to animate markets;
- Creating a platform for communication, monitoring and dispatch of distribution level DER;
- Addressing tariff, pricing and billing issues and policies (e.g., standby rates, net metering, capacity tags, access to customer information, utility rate design); and,
- Address technical challenges (e.g., interconnection requirements, equipment limitations associated with two way flow; DER measurement/verification).

Interaction with Wholesale Markets

The Interaction with Wholesale Markets (WM) group was initially tasked with exploring how the DSPP would reap the value of DER through its interaction with the NYISO's wholesale markets. As a result of the DC Circuit Court vacating FERC's Order 745 the WM group also considered ways to optimize DER value should retail load no longer be able to participate in the wholesale markets, either on an individual basis or through an aggregator.

Currently the NYISO operates installed capacity, energy and ancillary services markets. Demand response providers are able to participate individually, or through aggregators, in the following programs (described in Attachment 5), for which payments are based on benefits to the bulk power system:

- Day Ahead Demand Response Program – Energy
- Demand Side Ancillary Service Program – Ancillary Services
- Special Case Resources – Installed Capacity
- Emergency Demand Response - Reliability

In addition Consolidated Edison offers the following demand response programs (described in Attachment 6) for which payment is tied to distribution system benefits:

- Distribution Load Relief Program – Mandatory and Voluntary

- Commercial System Relief Program – Mandatory and Voluntary

Many participants in Con Edison's programs also participate in a NYISO program.

A major objective for DSPPs would be to flatten load in order to make production and delivery systems more efficient by reducing the amount of infrastructure needed to meet peak load conditions. This would be accomplished by programs that encourage permanent peak load reduction (i.e., high efficiency chillers and fuel switching for peak-related load) and aggregation of controllable dispatchable load in its service territory. By these actions the DSPP can also address reliability issues on its delivery system as well as on the bulk power system.

DSPPs can act as aggregators to sell their customers' demand response capability into the NYISO's markets. The DSPP is in an advantageous position in terms of providing the value of DER to the bulk power system as well as to its own distribution system, because of the greater visibility of DER to the DSPP than to the NYISO. Controllability of dispatchable DER by the DSPP is key to enhancing market efficiency and delivery system operational control.

Market rules allowing participation by DERs at the DSPP level and at the wholesale level, however, need to be aligned to ensure DER interaction in both arenas is efficient, valued and not double counted. Clearly, the impact of increased penetration of DER must be recognized by distribution-system and bulk-system planners in order for full value to be realized. The design of DSPP programs will be crucial to ensuring that the NYISO will be able to appropriately take account of them in load forecasting and the planning process. A key aspect of this is that measurement and verification requirements will need to be aligned between retail and wholesale markets.

Both the manner in which DER is integrated into the wholesale markets and the impact of DER integration on the wholesale markets must be assessed. Care must be taken to ensure that DSPP interaction in NYISO markets does not have unanticipated adverse effects on the NYISO's day ahead commitment process, its real time operations and its ability to satisfy all reliability rules and requirements.

Further review of impacts is required to identify the full scope of Day One issues. Actions taken regarding Day One interaction issues need to be thoroughly evaluated so that they do not create unintended consequences regarding issues that are subsequently considered.

Consideration should be given to directing an evaluation of the impact of DER penetration on the New York bulk electric system. This could include impacts on reliability, the need for increased regulation and other ancillary services, the installed reserve requirement and production costs.

As a result of the D.C. Circuit ruling regarding compensation for retail-level Demand Response resources in wholesale energy markets there is some uncertainty as to whether DER

will be able to participate directly or through aggregators in NYISO programs in the future. The elimination of current demand response (DR) opportunities without viable alternatives would have detrimental impacts on the DR community and system reliability. Distribution level rates/programs could be implemented to transition from the potential loss of NYISO programs. This would raise issues as to who will provide compensation for retail vs wholesale benefits.

Summary

In summary, the Markets Committee identified numerous products and services that are or could be provided by distributed energy resources. Some of these products exist today but it is expected that new and innovative products will develop in the future as we pursue the Reforming the Energy Vision goals. Many distributed energy resources exist today as a result of the efforts of the Public Service Commission, New York State Energy Research and Development Agency (NYSERDA), the NYISO, utilities, ESCOs and others. The development of these resources have been fostered by programs and tariffs including the Renewable Portfolio Standard (RPS), the Energy Efficiency Portfolio Standard (EEPs), various NYISO and utility demand response program, and other state policies such as net metering. However, in order to fully achieve the goals of the REV initiative, additional resources and better utilization of existing resources is needed.

Challenges to the further proliferation and utilization of DER currently exist and should be addressed. In the initial stage of the REV construct, the utilities will likely play a key role in further developing, utilizing, providing proper price signal and pricing mechanisms for DER. But the Committee noted guidance would be needed on developing “values” to be monetized including environmental benefits, resiliency benefits, and other location-specific benefits of DER to the system. One key factor to successful and thoughtful development of DER, particularly where DER would provide the most value to the electric distribution system, will require more information sharing and engagement from utilities, DER providers, and customers. Additionally, there are regulatory actions that can help facilitate DER development. Finally, NYISO market rules need to be aligned to ensure efficient use of DER products and services. Approaches to increasing the penetration of DER should occur systematically, reliably and safely.

Attachment 1

Reforming the Energy Vision (REV)
DSPP Market Committee List

Green - co-convenor
Red - Steering Committee representative
Purple - Steering Committee alternate

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Attachment 2

Reforming the Energy Vision (REV)

DSPP Market Committee – Wholesale Market Interactions Sub-group List

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Atta chment 3

Products Bought by the DSPP

Product Categories	DER/Customer Product	Potential Distribution System Planning Benefits	Potential Distribution System Operations Benefits	Potential Public Policy Benefits	Technology Examples	Other Considerations
Modification to base load	Energy (TOU Rates, Nodal factors) Supply side increase through local energy production	Improved asset utilization, Wholesale market efficiency, Reliable baseload DG, Optimize T&D investment	Reduced line loading, Reduced losses, Local utilization, Improved load factor, Local optimization, Avoided Fuel Cost, Avoided central station O&M, Increased flexibility, Lower overall energy cost,	localization of renewable resources,reduced emissions, improved system efficiency, Fuel diversity, Lower energy prices,	DG (e.g., PV, fuel cells, CHP) , Energy Storage, CHP	Reduced hedging and gas capacity procurement
	Permanent Load Shift/Reduction Demand side modification through local load reduction	Improved asset utilization, Wholesale market efficiency, Reliable baseload DG, Reduced hedging and gas capacity procurement, Optimize T&D investment	Reduced line loading, Reduced losses, Local utilization, Improved load factor, Local optimization, Avoided Fuel Cost, Avoided central station O&M, Increased flexibility, Lower overall energy cost,	localization of renewable resources,reduced emissions, improved system efficiency, Fuel diversity, Lower energy prices,	DG (e.g., PV, fuel cells, CHP), Energy Efficiency, CHP	
Modification to peak loads	Capacity - (DER output offsetting Generation, Transmission, and Distribution components) Supply side increase through local power production	Improved asset utilization and load factor, "net" load duration curve planning (Consideration of upstream and localized asset costs.), Facilitates high renewable penetration, Reduce T&D investment, feeder overload relief and site specific congestion relief	asset utilization, more efficient capacity utilization, increased system efficiency, improved local quality, system stability, Improved reliability, Lower O&M, Lower Generation and T&D investment	Less over capacity, lower infrastructure costs, improved system efficiency, reliability. Increased renewables, Lower emissions, more effective planning, can increase resiliency, lower customer bills	DG, Energy Storage, CHP, efficiency	Potentially increase fuel diversity
	Demand Response/ Peak Management Demand side modification through local peak load reduction	Improved asset utilization and load factor, "net" load duration curve planning (Consideration of upstream and localized asset costs.), Facilitates high renewable penetration, Reduce T&D investment, feeder overload relief and site specific congestion relief	asset utilization, more efficient capacity utilization, increased system efficiency, improved local quality, system stability, Improved reliability, Lower O&M, Lower Generation and T&D investment	Less over capacity, lower infrastructure costs, improved system efficiency, reliability. Increased renewables, Lower emissions, more effective planning, can increase resiliency, lower customer bills	Demand Management (dispatchable or price sensitive), DG, Energy Storage, CHP	
	Power Firming (Nodal Firming)	stable nodes do not drive additioanal regulation and reserve requirements	Reduced system demand for regulation and spinning reserve	more effective planning, less over capacity, lower infrastructure costs, improved system efficiency	Energy Storage, Smart Inverters, Demand Management	
	Ramp Rate or "Flexible Capacity"	stable nodes do not drive additional regulation and reserve requirements	Reduced system demand for regulation and spinning reserve	more effective planning, less over capacity, lower infrastructure costs, improved system efficiency	Energy Storage, Smart Inverters, Demand Management	

Product Categories	DER/Customer Product	Potential Distribution System Planning Benefits	Potential Distribution System Operations Benefits	Potential Public Policy Benefits	Technology Examples	Other Considerations
Grid Support (Ancillary) Services	Frequency Response	local optimization of services reduce tranmission assets and contingency needs	Increased distribution level system scope and revenue	Additional revenue capability to offset opex - Incentivizes fast resources to manage frequency, improve system efficiency	Energy Storage, Smart Inverters, DG, CHP, Demand Reponse	
	Frequency Regulation	local optimization of services reduce transmission assets and contingency needs	Increased distribution level system scope and revenue	Additional revenue capability to offset opex - Minimizes the quantify of operating reserves needed; Improves system efficiency	Energy Storage, Smart Inverters, DG, CHP, Demand Reponse	
	Spinning Reserves	local optimization of services reduce tranmission assets and contingency needs	Increased distribution level system scope and revenue	Additional revenue capability to offset opex - Minimizes the quantity of operating reserves needed	Energy Storage, Smart Inverters, DG, CHP, Demand Reponse	
	Non-Spinning Reserves	local optimization of services reduce tranmission assets and contingency needs	Increased distribution level system scope and revenue	Additional revenue capability to offset opex - Minimizes the quantify of operating reserves needed	Energy Storage, Smart Inverters, DG, CHP, Demand Reponse	
	Power Factor Correction	Improved reliability and power quality, asset utilization, efficiency	Improved reliability and power quality, asset utilization, efficiency	Improved reliability and power quality, asset utilization, efficiency	Energy Storage, Smart Inverters, DG, CHP, FACTS, Capacitor banks	
	Voltage Support	Increased PV penetration levels, reactive/real power support, better power quality	Improved reliability and power quality	Increased PV penetration levels, reduced emissions, better power quality	Energy Storage, Smart Inverters, DG, CHP, FACTS, Capacitor banks	
	Enhanced System Control and Dispatch	Avoided T&D capital investments	Suppresses wholesale prices, improved reliability and system restoration, system balancing, increased system efficiency	Reduced emissions, reduced fuel consumption, lower consumer costs	Remote sensing, Meters, Energy monitoring and management technology, Energy Storage, EV Charging Stations	
Contingency/Planning	Resource Adequacy	Improved asset utilization, "net" load duration curve planning	asset utilization, less overcapacity, improved local quality	more effective planning, less over capacity, lower infrastructure costs	Energy Storage, Smart Inverters, DG, CHP, Demand Reponse	
	Online Backup Power	Improved reliability and power quality	Improved reliability and power quality	Improved reliability and power quality; reduced emissions	Energy Storage, Smart Inverters, DG, CHP, Demand Reponse	
	Demand Response	Improved asset utilization,	asset utilization, less overcapacity, improved local quality	reliability, power quality, emergency support	Energy Storage, Smart Inverters, DG, CHP, Demand Reponse	
	Black Start	Improved reliability and power quality	Improved reliability and system restoration	improved resiliancy, reliability, reduced emissions, reduced recovery time	Energy Storage, Smart Inverters, DG, CHP, Demand Reponse	
	Emergency Power Islands	Improved recovery	Improved response to emergencies and system restoration	Public health and safety benefits, resiliency, avoided economic costs of outages	Microgrid, DG, CHP, Energy Storage, Fuel Cells	

Questions/Issues to be addressed:

Energy (modification to base load)

1) how this will be different from wholesale energy product, ie. How is locational value considered?
2) Realizing value for avoided T&D infrastructure investments depends on location and requires analysis.
3) Permanence of load reduction. Some suggest considering as DR
4) Ensure that DERs are cleaner than existing central station plants
5) Intermittency of some DER sources - how to incorporate unpredictable, intermittent sources into DSPP model
6) Consider whether DERs are cleaner than new central station plants
7) How will fuel diversity be measured? Do gas-fired DERs create fuel diversity if they displace central station plants fueld by something other than gas? Does storage add fuel diversity?

Power (modification to peak loads)

1) how this will be different from wholesale capacity product, ie. How is locational value considered?
2) qualification of reliability of asset
3) Generation, Transmission, and Distribution components should all be considered for pricing
4) Resource capacity is the ability of specific resources to meet the reliability needs of the bulk power system in planning studies and is typically expressed in terms of a resources' maximum output during peak conditions. While various DER measures can supply and receive a payment for capacity, it does not necessarily align with the DSPP needs and therefore does not appear to be a useful product to the DSPP (See note regarding resource adequacy). Existing capacity payments are meant to cover an assets fixed cost and in return, capacity payments entitle a system operator the "option to call" . on the resource to generate energy up to its maximum limit in order to reliability meet system demand. While the DSPP may seek products that give them an "option to call" similar to "capacity", these DSPP calls will be based on the needs of the distribution system and therefore will differ from the existing Capacity product

Contingency/Planning

1) Resource adequacy is a bulk power planning standard and is tied to resource capacity (i.e. planners determine how much resource capacity is needed to avoid a resource adequacy violation of more than one loss of load event in ten years). While DERs currently participate in resource adequacy planning and capacity markets as a substitute to large central generation capacity, this bulk power planning standards is not applicable to distribution system planning or operations. Therefore, there are more meaningful products that will provide direct benefits to the distribution system and warrant consideration as an alternative to traditional solutions.

Attachment 4

Reforming the Energy Vision (REV)
Products or Services Customers, DER providers, ESCOs or Other Third Parties Would Buy
Matrix Prepared by the DSPP Markets and Pricing Committee

The products below to be sold to/bought by customers, DERs, third parties is intended to focus on objectives for the next 3-5yr.
It is not intended to be an all inclusive list.

Product or Services	Description	Transaction Type (describe nature of transaction)	Customer Engagement		Funding mechanism	
			Who can provide service	Who is the customer	by DSPP	Other Parties
Delivery Services	Value Added or Enhanced Delivery Service	These are customer specific services such as enhanced resiliency grid operation service; agreements between DSPP and/or third-party and or directly with customers to maintain and service customer equipment; emergency operational services; measurement and verification service for DG/DERs. More detailed information regarding Enhanced Service will be filed in this case (14-M-0101) by EDU members in response to the ALJ's June 4 2014 ruling;	Customer specific enhanced delivery services can only be provided by DSPP and/or third parties	end use customers including those that own DG/DERs	tiered tariff structure for premium services	bilateral arrangements between third parties, Escos, and end use customers
	Ancillary Services	As penetration increases, the DSPP can aggregate voltage support, or regulation provided by DERs and offer into the wholesale market passing through the wholesale revenues less the DSPP fee; End-use customers or their Escos may purchase voltage support or regulation from the DSPP who procures it either from DERs or NYISO at market value. There may be value to the DSPP if voltage support / power factor correction provides for better distribution system flows (i.e. less overloading of neutrals).Escos may also purchase directly from NYISO market.	Aggregation service provided by DSPP; third parties or Escos can also aggregate energy/capacity and sell to NYISO; DSPP, DERs, or NYISO market may provide voltage support or regulation	DERs are customer of wholesale aggregation service; the wholesale provider is the customer of the NYISO wholesale market; if voltage support / power factor correction provides for better distribution system flows, potentially the end use customers of the DSPP, including those that own DG/DERs	Fee based aggregation service established in Tariff; Voltage support service through tariff	Third parties/Escos who aggregate will fund through either NYISO wholesale market or for local service through contracts or tariff based mechanism or contracts with customers
	Capacity to NYISO (same as ancillary services)	At present this is a pass through of costs from the NYISO through the utility to the end-use customers; Escos also sell to end use customers; Generators also sell to Escos or to NYISO wholesale market; DSPP may provide an aggregation service for energy and/or capacity to the DERs to access NYISO wholesale market	Generators; DERs; Escos; wholesale providers who may provide the service using its own technology or may aggregate the service using the loads and technology of others and sell it to NYISO market; DSPP may also provide aggregation service	Wholesale providers and Escos are customers of the NYISO wholesale market.	At present tariff based for utility; fee based aggregation service to be established in DSPP tariff	The NYISO's capacity market sets a price to be paid by wholesale capacity purchasers. Separate bilateral arrangements allow parties to set their own prices.
	DG/DER Interconnection & Services	DSPP determines solution set of customer-sided and utility-sided solutions, value of service, and appropriate customer-sided pricing and rate impact. DSPP runs business development and marketing to interface with customers and support the solution set. Third parties can perform equipment installation that meets DSPP system standards/requirements; Third parties or DSPP may install metering and telemetry that meets DSPP standards; DSPP provides engineering and installation certification approvals; DSPP provide measurement and verification services	Equipment vendors/contractors can perform equipment and metering installation to DSPP specs; Metering & engineering interconnection service provided by DSPP; M&V service provided by DSPP	end use customer owning DG or DER	installation funded by DER based upon expected future savings; services provided by DSPP collected from customer through tariff with tiered structure for premium services or other mechanism	installation funded by DER based upon expected future savings;

Product or Services	Description	Transaction Type (describe nature of transaction)	Customer Engagement		Funding mechanism	
			Who can provide service	Who is the customer	by DSPP	Other Parties
	Smart Technology and Load management tools	Purchase of controllable thermostats; purchase of building management system; contract for virtual energy audits; contract for data analysis; provide DSM programs such as peak shaving, contingency based, or economic	Third part vendors can provide equipment; Third parties, Escos, DSPP can provide audit services, data analysis service; DSPP can provide load management programs; third parties can provide load management services	Any end use consumer	DSPP could provide tiered tariff structure that allows for enhanced services such as energy audits, and a variety of load management programs	bilateral arrangements between third parties, Escos, and end use customers
	Smart Meter Installation and Connections	DSPP (or meter service providers) could provide interval metering and metering services to customers desiring smart metering functionality, such functionality could facilitate participation in DSPP programs	DSPP (or meter service providers)	Any end use consumer or their aggregator / DER vendor	installation funded by customer or aggregator / DER through tariff with tiered structure or other mechanism	bilateral arrangements between third parties, Escos, and end use customers
	Location based services	DSPP determines optimal interconnection locations on distribution system and provides information to third party developers with the DSPP and third parties competing on non-discrimatory basis to supply targeted DG/DER services/equipment into grid-side locations (i.e. substations)	DSPP provides information - utility and third parties compete to provide DG for grid-side applications	DSPP	rate base where DG/DER can be shown to be more cost effective than other options	cost recovery in rates
Pricing/Billing Services	Billing for third party service provision including energy conservation measures	DSPP basic delivery service includes a monthly bill for each customer; DSPP can provide billing/collections services for Escos or DER aggregators	For basic delivery service only the DSPP; for other billing services, DSPP or other third party	Escos or aggregators or end use customers	DSPP could provide as a value added service in its tiered tariff design	bilateral arrangements between third party and Esco or aggregator or end use customer
	Managing transactions and payments between customers/aggregators and NYISO	In the long term DSPP could aggregate energy, capacity, voltage support and regulation from DERs, offer into NYISO discounting for availability/performance, passing through NYISO revenues after charging its aggregation fee; scheduling service; provide EE/DR advisory service; retail to wholesale aggregation services	DSPP or aggregators	customers with DG/DER	fee based aggregation service established in tiered retail tariff	bilateral arrangements between aggregator, and DER or end use customers
	Managing transactions and payments between customers/aggregators and DSPP for local reliability /loadNYISO	DSPP can provide metering, communication and verification services to customers and aggregators as required by NYISO and utilities for participation in DR programs	DSPP	customers andDR / DER providers	tariff	
	Time differentiated pricing	time of use pricing for demand metered customers; critical peak demand pricing; TOU demand pricing could be a service that customers opt into; also energy supply can be indexed hourly off NYISO wholesale spot prices	DSPP orESCOs can provide demand metered/hourly supply pricing;	end use customers with DG/ DER	DSPP tariff tiered pricing as enhanced delivery ;	bilateral supply arrangements between Escos and customers
	DSM programs	Purchase of controllable thermostats to controlled by DSPP according to tariff provisions; contract for data analysis and advisory services; DSM programs such as peak shaving, contingency based, territory-wide, or economic targeting of specific system locations to maximize grid value; measurement and verification services; DSPP runs business development and marketing to interface with customers and support the solution set for DSM programs	DSPP only to facilitate increased penetration and current public policy objectives, either directly or through contracts with third party providers; ESCOs, retailers, or other third-parties may also provide or sell these products, programs, and services	Aggregators and end use customers	DSPP tiered pricing in tariff based on location and severity of need; DSPP may elect to provide uniform or targeted pricing for territory-wide EE programs	Aggregators contract using DSPP tariff revenues to pay DERs; bilateral contracts between Escos and customers

Product or Services	Description	Transaction Type (describe nature of transaction)	Customer Engagement		Funding mechanism	
			Who can provide service	Who is the customer	by DSPP	Other Parties
	EE Programs	Promotion of market transactions that provide services using less energy (or "permanent load reduction"); outreach/training to builders, contractors, retailers, architects, engineers, end use customers; audits / assessments to identify opportunities; data analysis, benchmarking, and comparison reporting; project development support	DSPP only to facilitate increased penetration and current public policy objectives, either directly or through contracts with third party providers; Escos, retailers, or other third-parties may also provide or sell these products, programs, and services	Aggregators and end use customers	DSPP tiered pricing in tariff based on location and severity of need; DSPP may elect to provide uniform or targeted pricing for territory-wide EE programs, and can embed in revenue requirements	Aggregators contract using DSPP tariff revenues to pay DERs; bilateral contracts between Escos and customers
Metering/ Information Services	Access to Data					
	Customer Usage Data	service for in-home display of real time usage and bill impact for whole home and major appliances; post billing efficiency analysis using virtual energy assessments and automated energy audits, using billing data as primary source without site visits; customized billing inserts giving energy efficiency advise; annual compliance reporting service; provide equipment outage and availability rates to DER or direct otherwise	DSPP; third parties or Escos,	end use customer; third parties, Escos, DSPP	DSPP tiered pricing in tariff	bilateral agreement between third party and consumer
	Load Research Data	aggregated performance data service (may be coupled with advisory service); power quality information service; package data results trending participation/penetration by resource type; package usage information by location (e.g. network) - LONGER TERM DELIVERABLE	DSPP	customer owning DER; aggregators; third parties	fee based value added service based on scope of work	N/A
	Market Potential or Saturation Studies for Circuits/Networks/Substations	package data results trending participation or penetration by resource type; package usage information by location (e.g. network)	DSPP	aggregators, DER customers	fee based value added service based on scope of work	contracts with customers
	Data analytics linked to the provision of energy efficiency services					
	Sub-metering services for multi-tenant facilities as well as for customers with DER for market settlement (energy, capacity, etc.)	install and provide billing services for end-use customers beyond standard retail metering point	DSPP; third parties or Escos,	end use customer; third parties, Escos, DSPP	fee based value added service based on scope of work	contractual arrangements between Escos or other providers and customers
DER Services	Sale of DER technology to customers	Vendors contract for sale of equipment; could include a maintenance and operations agreement	third party vendors/equipment manufacturers	DER owners/customers	N/A	bilateral agreement between third party and DER consumer
	Placement of DSPP/ third-party owned DER technology on customer property	DSPP/vendor enter into construction, operation, maintenance agreement with specified performance warranties/guarantees; whole building energy advisory services	DSPP, Escos, third parties	DSPP and customer have partnership	DSPP tiered pricing in tariff	bilateral agreement between third party and DER consumer
	Deployment of DSPP owned DER on DSPP property	Vendors supply DG or other DER technology for deployment as part of DSPPoperations.	Third Party vendors	DSPP	included in rate base where shown to be cost effective	recovered in rates
	Maintenance of DER technology	provision of energy management service that includes managing DER, retro commissioning, and continuous commissioning	DSPP; Esco's, third party vendors	DER owners/customers or DSPP	included in tiered tariff design as a value added service; may also be included in revenue requirement (for equipment owned by DSPP)	bilateral agreement between third party and DER consumer

Product or Services	Description	Transaction Type (describe nature of transaction)	Customer Engagement		Funding mechanism	
			Who can provide service	Who is the customer	by DSPP	Other Parties
	Operations of DER technology	provision of energy management service that includes managing DER, retro commissioning, and continuous commissioning, annual compliance filings	DSPP; Esco's, third party vendors	DER owners/customers	included in tiered tariff design as a value added service	bilateral agreement between third party and DER consumer
	Deploy DER technology on the grid	Vendors supply DG or other DER technology for deployment as part of DSPP operations.	Third Party vendors	DSPP	included in rate base where shown to be cost effective	recovered in rates
	Financing or Capital for Services	Provide financing (i.e., loan or lease) for the purchase of DER technology	DSPP, Escos, third parties	DER owners/customers	Shareholder funding mechanism (e.g., bond, investment pool)	Financial institutions, state funding mechanisms, on-bill financing
Storage capacity	Thermal/Ice Storage	DSPPs to use economic targeting of specific system locations to maximize grid value of customer-sided solutions; DSPP to run business development and marketing, measurement and verification services;	DSPP runs programs; ESCO's, Third Party Vendors install equip	DER owners/Customers	included in tiered tariff design as a value added services	Bilateral arrangements of Customers, ESCOs, or third party installers with the DSPP for joint ownership or lend/lease arrangements.
	Batteries	DSPPs to use economic targeting of specific system locations to maximize grid value of customer-sided solutions; DSPP to run business development and marketing, measurement and verification services; increased battery utilization will occur in the longer term with improved market conditions	DSPP runs programs; ESCO's, Third Party Vendors install equip	DER owners/Customers	included in tiered tariff design as a value added services	Bilateral arrangements of Customers, ESCOs, or third party installers with the DSPP for joint ownership or lend/lease arrangements.

Attachment 5

THE NYISO MARKETS

I. THE CAPACITY MARKET

A. Background

The NYISO administers an Installed Capacity[1] (ICAP) market to ensure that the New York Control Area (NYCA) (generally, New York State) has adequate electric generating capacity available to meet peak electricity demand plus a reserve margin. The ICAP market provides for the purchase and sale of Unforced Capacity (UCAP) from electric generating facilities, and Responsible Interface Parties (RIPs, also referred to as demand response aggregators) on behalf of Special Case Resources (SCRs). The determination of how much UCAP an ICAP Resource can offer takes into account the amount of capacity, if a Generator, or demand reduction, if an SCR, it demonstrates it can provide and its availability during a previous period.

The amount of capacity required to meet demand plus a reserve margin (the Installed Reserve Margin (IRM)) for the NYCA are determined annually by the New York State Reliability Council. The NYISO utilizes the IRM to establish the NYCA Minimum Installed Capacity Requirement, which it translates into a UCAP requirement.

The NYISO allocates that requirement among Load Serving Entities (LSEs) which include ESCOs and the electric distribution utilities. LSEs can meet their UCAP obligation through a bilateral contract with a supplier or marketer, a NYISO administered auction, or self-supply.

B. Locational Capacity Requirements

Certain geographic regions within the NYCA (Localities) have locational specific purchase requirements. There are three Localities in the NYCA: New York City, Long Island, and the lower Hudson Valley combined with New York City (the G-J Locality). The NYISO determines the specific amount of capacity that must be purchased from within each Locality (the Locational Minimum Installed Capacity Requirement or LCR.) LSEs with customers in these Localities are allocated a purchase obligation based on the LCR which is also credited toward their UCAP obligation. The Localities and their respective LCRs are designed to send Market Participants and potential developers a price signal to invest in existing resources or develop new capacity in those areas.

C. Capacity Procurement

The NYISO conducts three types of capacity auctions: the six-month Capability Period Auction (for the Winter and Summer;) Monthly Auctions, for the next following month and for any other remaining months in the same Capability Period; and monthly ICAP Spot Market Auctions, only for the next following month.

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[1] Capitalized terms that are not otherwise defined in the materials submitted by the NYISO in this proceeding have the meaning specified in the NYISO's Market Administration and Control Area Services Tariff (Services Tariff).

In the Capability Period and Monthly Auctions, Market Participants offer to buy and sell capacity. They are not required to identify a specific capacity resource supporting that sale until a certain deadline. Offers to buy and sell capacity that clear in these auctions are, in essence, matched. The clearing price is the highest price offer to sell that corresponds to an offer to purchase in that same amount. On or before the deadline each month, Market Participants that sold capacity in a Capability Period or Monthly Auction must identify (or 'certify') the specific Resource, supporting that sale .

The NYISO establishes a purchase obligation in the ICAP Spot Market Auction for UCAP obligations that have not been satisfied by the time the certification period ends. Any capacity supplier with supply that has not been certified (as having been sold in an Auction or through a bilateral transaction) can offer it in to the ICAP Spot Market Auction. In this auction, capacity offers are stacked from lowest to highest with the clearing price for all capacity determined at the point on the ICAP Demand Curve where all purchase requirements are satisfied. LSEs also have an obligation to pay for all capacity that is offered below the clearing price beyond requirements.

Approximately 57.30% of the NYCA capacity requirements are transacted through the NYISO-administered capacity auctions, at an annual dollar volume of $1.6 billion. The balance is secured through bilateral contracts or self-supply.

D. Capacity Supply

The NYISO's rules include specific qualification criteria that Generators, and SCRs, must meet to be an ICAP Resource, as well as on-going reporting obligations. Controllable and scheduleable transmission facilities that transmit electricity to a Locality from outside of it that have Unforced Capacity Deliverability Rights can also be used to provide capacity.

Generators must establish the maximum energy they can produce (their Dependable Maximum Net Capability (DMNC)) and provide operating data which the NYISO uses to establish the Resource's Equivalent Demand Forced Outage Rate (EFORd) or "derating" factor. If an offer from a Generator clears in an auction, or is sold in a certified bilateral transaction, the Generator must offer the ICAP equivalent of its UCAP sales in energy into the NYISO's Day-Ahead Market or through a bilateral transaction, every hour of every day for that month, unless it reports to the NYISO it is on a previously scheduled maintenance outage or a "forced outage."[2] Generators that are not able to continuously operate because of environmental restrictions on operations, cyclical requirements, such as a need to recharge or refill, or other non-economic reasons, but which can operate at least four continuous hours every day, and that meet other criteria, can qualify to sell capacity as an Energy Limited Resource (ELRs). Generators from neighboring external Control Areas can also qualify to sell into the NYISO's capacity market, subject to additional rules.

[2] Market Participants that have acquired UDRs that sell capacity have the same obligation regarding daily energy bids as do internal Generators selling UCAP.

SCRs must demonstrate their ability to reduce load. SCRs and Local Generators are aggregated by wholesale sellers (RIPs) by electric Load Zone and offered into the NYISO's auctions with a floor of one-tenth of one MW. Local Generators are a type of SCR that is rated 100 kW or greater and not visible to the NYISO's Market Information System. A Local Generator can be qualified to offer (i) its available capacity in excess of the base load of the customer, up to the level of the load connected to and served via the transmission and/or distribution system, or (ii) capacity in the amount by which it is able to reduce its customers' base load of the customer, up to the level of the load connected to and served via the transmission and/or distribution system. SCRs can be called upon by the NYISO when system conditions require their use to maintain reliability. RIPs that verify the MW of their load reductions or Local Generator output are also paid the energy LBMP for those MW for at least four hours; a Bid Production Cost Guarantee payment is made to RIPs when the LBMP payments for the event do not meet the Minimum Payment Nomination of the SCR, generally $500/MWh.

E. Capacity Mitigation Measures

The NYISO monitors the capacity market for the exercise of market power. The NYISO's Services Tariff contains specific market power rules that apply to Mitigated Capacity Zones, which are New York City and the G-J Locality. To prevent an ICAP supplier from withholding capacity in order to raise the market price of capacity by creating an artificial scarcity, suppliers that control a specified amount of UCAP are required to offer into the ICAP Spot Market Auction all UCAP under their control that has not been previously sold .

Another mitigation measure is designed to deter actions by wholesale capacity purchasers that would otherwise artificially suppress the cost of the capacity they have to purchase. When a new resource proposes to enter the capacity market in the New York City or the G-J Locality, the NYISO determines whether its capacity offer will be subject to a floor price. A Resource that has an Offer Floor can only offer at or above its Offer Floor and only into the ICAP Spot Market Auction until all of its capacity clears for any twelve months.

II. ENERGY AND ANCILLARY SERVICE MARKETS

A. Energy Markets

The NYISO energy markets provide a mechanism for wholesale Market Participants (purchasers such as Load Serving Entities ("LSEs") and suppliers such as Generators or Demand Response Providers) to buy and sell energy and ancillary services at prices established through a competitive auction process designed to meet the NYCA reliability needs, with the least-cost resources available. The NYISO market also allows purchases and sales through contractual, bilateral transactions where quantities and prices are arranged directly between wholesale suppliers and purchasers.

The NYISO's Day-Ahead and real-time auctions result in a two-settlement process that sets the price of energy and transmission service (for bilateral transactions) based on market and grid conditions at specific times and geographic location. Thus, the established prices are "Locational Based Marginal Prices" (LBMP). The scheduling party to any bilateral energy

transaction will be charged a transmission usage charge that reflects these same market, grid and geographic conditions.

The first settlement is based upon the Day-Ahead bids and the corresponding Day-Ahead commitment, Day-Ahead dispatch of energy resources, and Day-Ahead prices. The second settlement is based upon the real-time bids and the corresponding real-time commitment, real-time dispatch of energy resources, and real-time prices. Market Participants may participate in the Day-Ahead or real-time markets or both. Roughly 94% of energy is scheduled in the Day-Ahead market, while the remaining 6% is accounted for in the real-time market. About 40% of the energy settled in the Day-Ahead market is scheduled through bilateral contracts rather than through the NYISO markets.

As a result of the Day-Ahead commitment process, a set of energy resources including Demand Side Resources are scheduled for dispatch, or load reduction, in each hour of the next day and LSEs that have bid into the market are scheduled to buy a certain amount of load at the Day-Ahead price. LSEs may use a price-capped load bid to limit their purchase to no more energy than that which can be obtained at the price specified in their bid, or below. The Day-Ahead market establishes forward contracts for energy sales, energy purchases and ancillary service sales. Subsequently, during real-time operation, changes in operating conditions, the influence of additional real-time supply offers, and variations in actual load can cause the real-time schedules and prices to be different from the Day-Ahead schedules and prices. Differences in generation levels and in load consumption, as compared to the first settlement values, are settled at the second settlement, or real-time price for energy and Ancillary Services. LSE's Day-Ahead scheduled purchases that exceed their real-time consumption are sold back at real-time prices and any real-time energy consumption not scheduled Day-Ahead is bought by the LSE at the real-time price. Similarly, but with certain exceptions, Generator's Day-Ahead scheduled sales that exceed their real-time output are sold back at real-time prices and any real-time energy output not scheduled Day-Ahead is bought from the supplier at the real-time price.

The NYISO has designed its market to complement the real-time dynamics of conditions on the grid. To make the most efficient use of the available resources, NYISO continually adjusts the energy and reserve schedules on resources through the use of its real-time multi-period simultaneous co-optimization software algorithms to select and utilize the lowest costs resources available to meet system requirements. By more efficiently scheduling these resources, NYISO is optimizing the efficiency of the market by reducing the level and extent of resource over- or under-commitment.

B. Ancillary Services

The power grid is a dynamic system that requires constant balancing or regulation of supply, grid power flows and customer loads that constantly fluctuate. The NYISO automatically adjusts energy resource output to balance momentary fluctuations in intertie flows and load, maintain Operating Reserves and Regulation Service and call for voltage support, all of which are needed to keep the system within electrical and safety tolerances. Should the power system face an interruption, the NYISO uses its Black Start resources to restore service. These Ancillary Services are provided by resources that are selected, scheduled and controlled by the NYISO.

There is no LSE procurement responsibility for any ancillary service;[3] rather, all wholesale purchasers pay a unit cost per megawatt of withdrawal based on the cost NYISO incurred in procuring the service on their behalf. The opportunity to self-supply these ancillary services is financial only. There is no market for Voltage Service; rather it is purchased for qualified suppliers at a tariff-based cost per tested VAR which cost is also recovered from a uniform charge per megawatt hour of withdrawals.

Ancillary Service markets include:

- Operating Reserves: MWs of available energy on resources, that are either synchronized to the grid or non-synchronized, that can be called upon if the grid has an unexpected need for more power on short notice to respond to the unexpected loss of resources or transmission facilities. Participation of Demand Side Resources in the Operating Reserves market is discussed below. Synchronized reserves are purchased from operating generating units with additional available output that can be provided quickly or loads that can reduce their energy use in the same amount of time. Non-synchronized Operating Reserves are off-line generating units that can be started quickly.

- Regulation Service: MWs of available energy on synchronized resources dispatched every six seconds to correct for short-term changes in electricity use that might affect the stability of the power system and to maintain desired frequency. Real-time control signals are sent every six seconds to regulation providers to adjust their output to match changes in demand and dampen system frequency excursions. Participation of Demand Side Resources in the Regulation Service market is discussed below.

Reactive Power & Voltage Control service corrects for reactive power and voltage fluctuations caused by customer operations. This service helps maintain voltage within limits set by the National Electric Reliability Council for the efficient and reliable operation of the system.

Black Start and System Restoration Service is a cost-based ancillary service procured by the NYISO to restart the bulk transmission system after a black out from an identified set of qualified resources. Additional Black Start and System Restoration Service may be provided for portions of the NYS Power System that remain under Transmission Owner control. Generators are identified in these Transmission Owner plans, and are paid by the NYISO with revenues collected from wholesale purchasers in the local Transmission Owner service territory. All payments are cost-based; there is no market for Black-Start service.

Energy Imbalance Service is an Ancillary Service that the NYISO provides through its five-minute real-time settlement.

C. Bid Protection Cost Guarantee and Day-Ahead Margin Assurance Payments

To the extent a supplier does not recover its accepted Day-Ahead bid costs for Energy, Operating Reserves or Regulation Service in its Day-Ahead settlement or its real-time bid costs from its

[3] With the exception that Con Edison procure local Black Start

real-time market settlement, with certain criteria and exceptions such as in-day de-rates, the NYISO will provide a supplemental payment to cover the difference between bid costs and market revenues. Supplemental payments protect bid costs in the three-part energy bid (start-up, minimum generation and incremental energy), and the bid cost in the accepted availability bids submitted for Operating Reserves and Regulation Service.

A flexibly scheduled supplier, including a Demand Side Resource, that buys out of its Day-Ahead schedule for Energy, Regulation Service or Operating Reserve schedule in a manner that reduces its Day-Ahead Margin[4] may be eligible for a supplemental payment restoring its Day-Ahead Margin. These supplemental payments are also available to certain suppliers who were derated or decommitted in real-time by the NYISO to maintain reliability.

D. Energy and Ancillary Service Mitigation

The NYISO monitors its markets for actions that that depart significantly from the conduct that would be expected under competitive market conditions, and that substantially distorts competitive market outcomes. When the NYISO identifies a non-competitive offer that has a significant market impact, the NYISO is permitted to "mitigate" by replacing the non-competitive offer with a "reference" offer that is representative of the offer that a competitive supplier would be expected to submit under similar circumstances. The goal is to mitigate the market effects of non-competitive conduct, while avoiding unnecessary interference with competitive price signals.

The NYISO's authority to apply mitigation extends to energy offers that substantially exceed a Generator's costs, withholding a Generator from the energy market for the purpose of increasing prices, and to offers that are designed to increase "guarantee payments" that are not directly reflected in the NYISO's market clearing prices. In addition, the NYISO is permitted to apply financial penalties after-the-fact to discourage market behavior that cannot be addressed by mitigation.

III. DEMAND SIDE RESOURCE PARTICIPATION IN ENERGY AND ANCILLARY SERVICE MARKETS.

A. Day-Ahead Demand Response Program ("DADRP")

The DADRP provides Demand Side Resources with an opportunity to offer their load curtailment capability into the Day-Ahead Market as an energy supply resource. Resources submit offers specifying the hours and amount of load curtailment they are offering for the next day, and the price at which they are willing to curtail. Offers are structured like those of generation resources: DADRP resources may specify minimum and maximum run times and the hours that they are available. As a supplier in the NYISO's Energy market, DADRP resources have a one MW minimum offer requirement. DADRP resources also have a minimum offer level of $75 /MWh. They are eligible for Bid Production Cost guarantee payments to make up for any difference between the market price received (the Day-Ahead LBMP for scheduled load

[4] The Day-Ahead Margin is the difference between the Supplier's accepted Day-Ahead offer price and the Day-Ahead LBMP , Operating Reserves settlement or Regulation Service settlement for the hour.

reduction) and their curtailment initiation cost which (routinely $500/MWH) across the day. Load scheduled in the Day-Ahead Market is obligated to curtail the next day. Failure to curtail results in the imposition of a penalty for each such hour equal to the product of the MW curtailment shortfall and the greater of the corresponding DAM or Real-Time Market price of energy. Individual Demand Side Resources or aggregations of Demand Side Resources that meet eligibility requirements may enroll in DADRP.

B. Demand Side Ancillary Services Program ("DSASP")

The DSASP, introduced in June 2008, provides Demand Side Resources that meet the telemetry and other qualifications required of other ancillary service providers, an opportunity to offer their load curtailment capability into the Day-Ahead and/or Real-Time Market to provide Operating Reserves and Regulation Service. DSASP resources must qualify to provide Operating Reserves or Regulation Service through standard resource testing requirements. Offers are submitted through the same process as generation resources: resources specify the Ancillary Service they are offering (Spinning or Non-Synchronous Reserves, and/or Regulation, if qualified) along with the hours and amount of load curtailment for the next day, and the price at which they are willing to curtail. Real-time offers may be made up to 75 minutes before the hour of the offer. As a supplier in the NYISO's co-optimized Energy and Ancillary Service markets, DSASP resources have a one MW minimum offer requirement; aggregations of Demand Side Resources are permitted to meet the one MW minimum. There is no cap on the MWs of DSASP operating reserve or Regulation Service that can be awarded. Although DSASP resources are not scheduled for energy in the DAM, they are required to submit energy offers, which are used in the co-optimization algorithm for dispatching Operating Reserves resources. Similar to the DADRP, the energy offer floor price is currently $75/MWh.

If awarded, the DSASP resource is paid the Day-Ahead or real-time price for the ancillary service product provided, as appropriate. The NYISO also makes supplemental payments to protect the availability bid and Day-Ahead margin of the DSASP resource in a manner comparable to the protection offered Generators. The NYISO imposes performance factor adjustments on DSASP resources in a manner comparable to those imposed on Generators. These are used to adjust any Day-Ahead margin protection that might otherwise be payable.

Those providing Operating Reserves will be expected to respond to a reserve pick-up call by the NYISO, by providing the load reduction requested (which would be no more than the capacity award). To conform to reliability rules established by North American Power Coordinating Council ("NPCC") and the New York State Reliability Council ("NYSRC"), the NYISO requires DSASP resources offering synchronized Operating Reserves to be capable of reducing their load for a full hour, a requirement comparable to requirements for Generators offering this service. Behind-the-meter supply resources are limited to providing non-synchronous reserves. Reserves are purchased from loads anywhere in the state (statewide reserves), from those located east of Central East and those on Long Island. Separate clearing prices are paid to those selected to provide reserves statewide or east of central east (which includes the Long Island requirement). Reserve pick-ups are called based on the energy offers also provided with the availability bid, from low cost to high cost. Although no energy LBMPs are paid to DSASP resources

responding to a reserve pick-up, the DSASP resource can limit its susceptibility to be called upon by raising its energy offer.

DSASP resources scheduled to provide Regulation Service in real-time are paid a capacity payment and a movement payment, the latter of which depends on the amount of actual Regulation Service they provide in real-time. They must be capable of responding to Real-time control signals sent every six seconds requiring that they adjust their load on the system to match changes in demand and dampen system frequency excursions. No energy LBMPs are paid to DSASP resources responding to Regulation Service basepoints.

C. Emergency Demand Response Program ("EDRP")

EDRP provides Demand Side Resources an opportunity to earn the greater of $500/MWh or the prevailing LBMP for energy consumption curtailments provided when the NYISO calls on the program's resources to reduce load to assist in resolving reliability issues. EDRP resources receive at least a 2-hour advance notice, and a Day-Ahead advisory when possible. Payment for the period of their load reductions, at a minimum, is a payment for four hours of verified load reduction. EDRP resources do not participate in the capacity market and any response they provide is voluntary – non-response does not affect future eligibility or payment level. Demand Side Resources that are not wholesale customers participate through a Curtailment Service Provider who aggregates the demand response they can provide with others in the same zone and enrolls it with the NYISO monthly or seasonally. EDRP resources are typically deployed when Special Case Resources are called.

D. Special Case Resources

SCR provider participation in the wholesale market is included in the discussion of the Capacity Market.

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Attachment 6

2014 – 2011

Con Edison Demand Response Program Review*

Con Edison Contingency Program

Program	Acronym	Purpose	Incentive
Distribution Load Relief Program (NYC and Westchester County)	**DLRP**	Activated by Con Edison in response to system critical situations (Condition Yellow or voltage reduction). Events last for 4 or more hours. Premium paid for customers who pre-commit load.	Customers in the Summer Reservation Payment program receive a reservation payment of $15.00 or $6.00 per kW-month pledged and performed, depending on location, and performance payments equal to $1.00 per kWh reduced. Reservation Payment customers who pledge an enrollment amount equal or greater than the enrollment in their first year can receive a Three Year Incentive bonus of $5 per kW per month at the end of the third year if all performance criteria is met. Customers in the Voluntary program are paid only a performance payment equal to $3.00 per kWh reduced.
Direct Load Control (NYC and Westchester County)	**DLC**	Activated by Con Edison in system critical situations (condition yellow or voltage reduction). Con Edison residential, religious and small business (demand less than 100 kW) customers with central air-conditioning. Allows Con Edison to remotely adjust thermostat settings.	Customers will receive a free programmable thermostat and an incentive payment of $25 for residential customers per unique address, and $50 for small commercial customers per unique building site.

Con Edison Peak Shaving Programs

Program	Acronym	Purpose	Incentive
Commercial System Relief Program (NYC only)	**CSRP**	Event activated when day-ahead forecast is 96% or greater of forecasted summer system peak to relieve system peak load. Premium paid for customers who pre-commit load. A Customer must provide least 50 kW of load reduction or 50 kW of load delivery. An Aggregator must provide at least 100 kW of load reduction or 100 kW of load delivery.	Customers in the Summer Reservation Payment Program receive a reservation payment of $10 per kW per month pledged and performed for months with fewer than 5 events and $15 per kW per month during and after a month with 5 or more events. Performance payment equal to $1.00 per kWh for each kW reduced during an event. Reservation Payment customers who pledge an enrollment amount equal or greater than the enrollment in their first year can receive a Three Year Incentive bonus of $10 per kW per month at the end of the third year if all performance criteria is met. Customers in the Voluntary program receive a performance payment equal to $3.00 for each kWh reduced

Residential Smart Appliance Program Extension: CoolNYC (NYC only) [Pilot program]	**CoolNYC**	Event activated when day-ahead forecast is 96% or greater of forecasted summer system peak to relieve system peak load. Con Edison will have ability to turn off window or wall A/Cs when an event is called. Available to Con Edison residential customers with window or wall A/C units and broadband connection.	Participants receive a free smart modern outlet (Modlet), remote thermostat and gateway device allowing control via a web portal and smartphones. Participation in event hours results in an incentive payment of $25.
Residential Smart Appliance Program (NYC only) [Pilot program] Three year pilot program concluded in 2012.	**RSAP**	Event activated when day-ahead forecast is 96% or greater of forecasted summer system peak to relieve system peak load. Con Edison will have ability to turn off window or wall A/Cs when an event is called. Available to Con Edison customers with a minimum of two window or wall A/C units, an AMR meter.	Participants receive a free home energy management system with installation and participation in 80% of all event hour's results in an incentive payment of $10 for each wall or window A/C unit enrolled and $10 for the combination of other enrolled appliances.

NYISO Programs

Program	Acronym	Purpose	Incentive
Emergency Demand Response Program	**EDRP**	Deployed in energy shortage situations to maintain the reliability of the bulk of power grid. EDRP is a voluntary program.	Energy Payment: Equal to the greater of $.50 for each kWh curtailed, or the real-time zonal locational-based marginal price, but no less than $.50 per kWh curtailed paid to curtailment service provider/aggregator.
ICAP Special Case Resource	**SCR**	Deployed in energy shortage situations to maintain the reliability of the bulk power grid. SCR are paid for a commitment.	Energy Payment: Equal to the greater of $.50 for each kWh curtailed, or the real-time zonal locational-based marginal price for an event, but no less than $.50 per kWh curtailed paid to RIP Reservation (capacity): Monthly Capacity payment based on ICAP auction clearing price. (2013 Approximately $14 per kW)
Day Ahead Demand Response Program	**DADRP**	Allows energy users to bid their load reductions, or "negawatts", into the Day-Ahead energy market.	Market based.
Demand Side Ancillary Services Program	**DSASP**	Provides the opportunity to bid load curtailment capability into the DAM and/or Real-Time Market to provide Operating Reserves and regulation service.	Market based.
Targeted Demand Response Program	**TDRP**	Deployed in targeted areas within Load Zone J under certain specific conditions and in response to a request for assistance from the Transmission Owner. There are 9 sub-load pockets within Zone J. While TDRP targets SCR customers, participation is completely voluntary.	Energy Payment: Equal to the greater of $.50 for each kWh curtailed, or the real-time zonal locational-based marginal price, but no less than $.50 per kWh curtailed paid to curtailment service provider/aggregator

*These programs description are as of July 7, 2014.