

Energy Storage Guide

March 2018

1st Edition

Introduction

Energy storage will play an increasingly significant role in helping to meet New York's electric system needs. This includes peak load reduction, renewable firming and time shifting, carbon reduction, and increased resilience. To further New York's Clean Energy Standard requirements of 50% renewable generation by 2030 and a 40% reduction in carbon emissions compared to 1990 levels, Governor Cuomo launched an initiative to deploy 1,500 megawatts of energy storage by 2025 on a path toward a 2030 energy storage goal that the Public Service Commission will establish later this year. To this end, NYSERDA is funding pilot projects, technical assistance, and resources that reduce the market and institutional challenges to the deployment of distributed energy storage in the State. These include the non-equipment "soft costs" such as siting, customer acquisition, interconnection, and financing which can comprise up to 25% of the installed system cost.

NYSERDA has engaged NY-BEST to help in reducing energy storage soft costs by reducing the complexities that developers face in understanding market rules, tariffs, utility procurements, and value stacking opportunities. This Guide to Distributed Energy Storage in New York State is complemented by the separately released [Energy Storage Services Fact Sheet](#). This Guide provides an overview of existing value streams for distributed storage and methods by which these values can be stacked. It is designed to assist energy storage project developers with deploying bankable and potentially scalable business models in New York. This document is still being changed and updated, to include the most up to date and accurate information possible. This is a pre-release version of the document and will continue to be updated based on feedback. Any questions, or comments, on this guide should be directed to admin@ny-best.org or energystorage@nyserderda.ny.gov. Stakeholder input is important for this document to be as useful as possible.

The New York State Approach to Energy Storage on the Electric Grid

Energy storage resources in New York State can provide services and interface with the electric grid at the transmission and distribution system levels. There are several different areas of opportunity for energy storage to participate and serve the New York State electricity system:

- At a policy level, the [Reforming the Energy Vision](#) (REV) initiative, launched by Governor Cuomo in 2014, includes a comprehensive set of actions geared toward building an integrated energy network that is able to harness the combined benefits of the central grid with clean, distributed, locally generated power. The goals of REV include spurring clean energy innovation, bringing new investments into the State, reducing energy costs, and improving consumer choice.
- Operationally, the New York Independent System Operator (NYISO) manages New York's high-voltage power grid and manages the competitive wholesale electricity markets for the entire state. The NYISO administers the ISO Transmission Tariff, implements and operates New York's Open Access Same-Time Information System (OASIS) and runs New York's power markets, which provide revenue opportunities to energy storage systems. The NYISO is governed by the Federal Energy Regulatory Commission (FERC).
- New York's electric distribution system is operated primarily by Investor-Owned Utilities (IOUs) in most of the state. The New York Power Authority (NYPA), a state power authority, municipal electric utilities including the Long Island Power Authority and rural cooperatives make up the balance of the State's

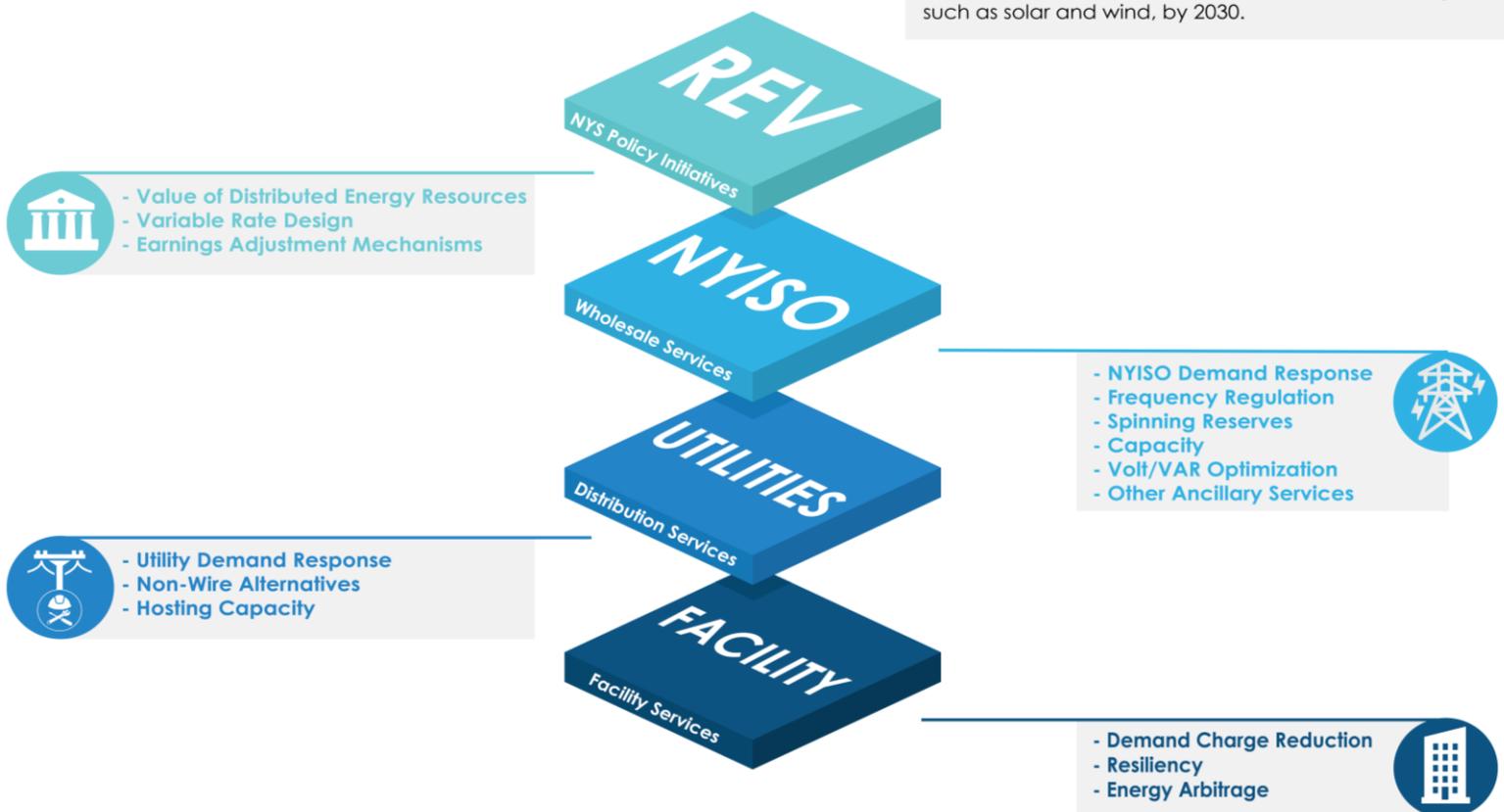
distribution system providers. Investor-Owned Utilities are responsible for reliably supplying electricity in their service area and for implementing many new regulatory requirements adopted by the NY Public Service Commission (PSC) as part of the REV initiative, thus creating opportunities for energy storage systems to receive compensation. These include demand response and non-wires alternatives (NWA) which are sometimes referred to as non-wires solutions (NWS) (alternatives to traditional wire and transformer procurements), and changes to make rates more reflective of the time and location in which energy is either consumed on site or exported through what historically has been renewable generation net metering.

- At the facility-level storage can provide value by providing electricity bill savings. Storage systems can lower peak demand and reduce facility demand charges. Storage can also provide arbitrage savings by charging when electricity is the cheapest or excess on site generation is available and discharging when electricity is more expensive. In addition, storage can provide emergency power and increase power quality for sensitive electronic equipment.

These four pathways are summarized below:

Layers of Opportunity for Energy Storage in New York State

The combined actions within this infographic support New York State's Clean Energy Standard, which requires 50 percent of New York's electricity come from renewable energy sources, such as solar and wind, by 2030.



As new regulatory and market mechanisms are created through these layers, the opportunities for storage to serve the grid will grow. This Guide will be updated on a regular basis to ensure timely and accurate information.

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Value Stacking

Please see the [Energy Storage Fact Sheet](#) on NY-BEST's website to learn more about available services and roles energy storage systems can play. This document assumes readers have an in-depth understanding of energy storage systems.

Value Stacking Multiple Revenue Streams

The table below introduces the three categories of energy storage revenue in the state, which is followed in the next section by a more detailed explanation of certain key considerations.

	Examples	Considerations
Customer Bill Reduction	<ul style="list-style-type: none"> Demand Charge Reduction Energy Arbitrage Resiliency 	<ul style="list-style-type: none"> The Demand Delivery Charge under the applicable tariff. The value of resiliency and the type and quantity of critical energy loads at a given facility. Time-of-use energy rates. System sizing to ensure the system has enough capacity to achieve resiliency and adequate demand charge reduction.
Distribution System Value Streams	<ul style="list-style-type: none"> Utility Demand Response VDER Con Edison (Con Ed) DMP NWA (Non-Wires Alternative) 	<ul style="list-style-type: none"> Systems participating in NWA or Con Edison's DMP may be limited by contractual obligations from stacking other values. Under Con Ed's Demand Management Program (DMP), or utility demand response programs, the system will be penalized if unable to meet its demand response targets. Review and understand the development of the baseline for demand response programs. Demand Response compensation varies greatly by utility territory. Evaluate potential benefits of adding energy generation to storage to access VDER (Value of Distributed Energy Resources) compensation.
Wholesale System Value Streams	<ul style="list-style-type: none"> NYISO Demand Response NYISO Supply-Side Market Services (Frequency Reg, ICAP – Installed Capacity, Volt Var Optimization, Reserves) 	<ul style="list-style-type: none"> NYISO services have capacity thresholds for market participation that the storage system must meet. Evaluate whether compensation from NYISO markets is great enough to justify increased capacity. It is vital to understand how the ISO's Dual Participation rules will impact possible revenue streams for the system. Understand the implications of contractual obligations on limiting which revenues can be pursued. Interconnection challenges; systems over 5 MW need to be approved by the NYISO on a case-by-case basis, presenting a challenge for project developers in predicting their project timelines, while systems under 5 MW are governed by the Standardized Interconnection Requirements (SIR). Three different baseline measures exist for the four NYISO Demand Response programs. Developers must consider how these baseline measures will be impacted by system operations to maximize customer bill reduction. Optimal selection will vary based on the specific facility's energy usage.

Current Key Considerations for Value Stacking in New York

Dual Participation Issues

Currently, resources participating in the NYISO demand response programs (Special Case Resource or Emergency Demand Response Program) have the option to also participate in utility level demand response programs. The NYISO is also in ongoing conversations with utilities to explore the possibility of additional dual participation opportunities, including how a resource on the distribution system could provide supply-side wholesale market services (e.g., NYISO will explore whether Non-Wires Alternative (NWA) resources are eligible to provide wholesale market services). However, to ensure grid reliability and energy security, many operational, market, and legal challenges must be addressed prior to defining further opportunities for dual participation. These challenges are currently being addressed in the [NYISO DER Roadmap](#) proceeding, and in the recently released document: [The State of Storage: Energy Storage Resources in New York's Wholesale Electricity Markets](#). In April 2018, FERC is hosting a [technical conference](#) to discuss the role they can play in allowing dual participation of energy storage systems in distribution and wholesale markets. The findings from this conference will be used to create an order facilitating the dual participation of energy storage systems in wholesale and distribution markets.

Behind-the-Meter (BTM) vs. Front-of-the-Meter (FTM)

Project developers should understand the different roles that Behind the Meter (BTM) and Front of the Meter (FTM) resources can play, and the different opportunities that are available for each. The chart below describes different pathways by which BTM and FTM energy storage resources can serve the grid. Project developers will need to consider whether to use FTM or BTM storage. BTM energy storage systems are those located with a host load. The primary benefits of an energy storage system to a host load may include enabling flexibility in electricity consumption for peak load shaving, demand charge management, and responding to time-of-use commodity supply prices. FTM distributed energy storage systems are those typically injecting energy into the distribution system behind a meter where there is no customer load. FTM applications may take one of these three forms; i) stand-alone energy storage; ii) energy storage with a DER, such as community solar; or iii) energy storage connected directly to utility distribution system equipment, such as a substation.

The table on the next page highlights applicable value streams for FTM and BTM systems. Please note, "limited" is used to indicate that the value stream is potentially accessible but there are limitations either in the form of being only partially accessible or accessible only in certain cases.

Value Stream	Value Stream Available if Located Behind-the-Meter?	Front-of-the-Meter	
		Value Stream Available if Located on the Distribution System?	Value Stream Available if Located on the Transmission System?
Customer Demand Charge Reduction	Yes	No	No
Energy Arbitrage	Yes	Yes	Yes
Utility Demand Response Programs¹	Yes	Limited ²	No
Con Ed Demand Management Program	Yes	No	No
NYISO Demand Response	Yes	Limited ³	Limited ²
NYISO ICAP	Limited ⁴	Limited ⁴	Yes
NYISO Frequency Regulation	Limited ⁴	Limited ⁴	Yes
NYISO Reserves	Limited ⁴	Limited ⁴	Yes
NYISO VVO	Limited ⁴	Limited ⁴	Yes
NWA	Yes	Yes	No
Emergency Power	Yes	Limited ⁵	No
NYSERDA Programs	Yes	Yes	No
VDER	Yes ⁵	Yes ⁶	No
Hosting Capacity	TBD	Yes	No
EV Integration	TBD	TBD	TBD

Systems with Contractual Performance Requirements

Today, the storage market in New York is being driven in large part by localized utility load relief opportunities. These can provide significant funding for the design and construction of energy storage resources. However, these programs include contractual obligations that may limit the accessible value streams. It is important for project developers to understand how participation in these programs will impact access to various value streams. Additionally, participation in Con Edison’s Demand Management Program (Con Ed DMP), which provides a per kW incentive for the installation of energy storage systems in their service territory, precludes energy storage systems from receiving compensation from any programs except utility and NYISO demand response programs. The [value stacking reference chart](#) can be a valuable tool for project developers to understand which value streams will limit their opportunities in other areas.

Changes to Energy Storage Market Opportunities

The Governor’s recently announced 1,500 MW energy storage goal for the State by 2025 is a pathway to a 2030 energy storage goal that will be established by the Public Service Commission later this year. To implement the

¹ Another option for FTM systems focusing on utility DR would be to participate in Con Ed’s SC-11 Buyback which permits systems to export energy onto the grid, receiving wholesale LMP for the energy produced. Unfortunately, this is not economic, since the retail rates are higher than their wholesale counterparts, resulting in a negative value stream in most cases.

² The system would need to be connected such that it could charge from the grid, and provide DR on the system’s baseline load. Since it is for a FTM system, there is no load other than the battery system itself and the compensation through DR will not be significantly more than the cost of charging the system through retail rates.

³ The system would be limited by its capacity, and likely need to be aggregated in order to meet the requirements of NYISO demand response programs. Since it is for a FTM system, there is no load other than the battery system itself and the compensation through DR will not be significantly more than the cost of charging the system through retail rates.

⁴ The system would have to receive approval from the NYISO, have adequate capacity, and be arranged so it could export energy onto the grid. Please see the [dual participation](#) section for more information.

⁵ The system would need to be part of a utility-level microgrid, where it could power a limited number of critical facilities or buildings.

⁶ The system would need to be co-located with solar or other distributed generating resources

Governor's directive, NYSERDA and DPS are working with stakeholders to develop an Energy Storage Roadmap that identifies market backed policy, regulatory and programmatic actions that can be taken to build this market. The Roadmap which is anticipated to be released for public input in the later part of the second quarter 2018 will include immediate and near-term actions as well as short-term solutions that can bridge the longer time horizons that some of these market changes may require. This roadmap will form the foundation that enables the Commission to establish a 2030 goal and deployment mechanisms, in conjunction with NYSERDA and LIPA, by December 31, 2018. Developers are encouraged to actively engage with DPS and NYSERDA in this process as this will play a major role in bringing additional market opportunities to energy storage deployment. Please contact the NY-BEST or NYSERDA team for more information.

Interconnection Process

The NYISO individually evaluates the interconnection of all DERs over 5 MW. This process takes longer for energy storage systems than other DERs, due in part to utilities unfamiliarity with energy storage systems and need to ensure they will not negatively impact the grid. Until streamlined by the NYISO, project developers should familiarize themselves with the requirements and procedures to efficiently proceed through [interconnection](#).

DERs under 5 MW must abide by the Standardized Interconnection Requirements (SIR), which is approved by the NY PSC and implemented by distribution utilities in New York. The SIR provides a streamlined interconnection process for connection to the distribution grid. In late December 2017, the PSC changed the Standard Interconnection Requirements (SIR) to include energy storage. The changes are currently out for public comment, and will be implemented in the coming months. More information on the SIR process can be found at the [DPS website](#). Some storage resources between 50 kW and 5 MW may require a more complex utility interconnection process, if their impact on the grid is found to need further research, such as when they are being installed on secondary or constrained networks.

Optimizing Demand Charge Reduction

Reducing demand delivery charges ("demand charges") can provide a significant source of compensation for energy storage systems, and is a familiar operation to most project developers. The storage system operates to reduce a facility's peak demand, resulting in a lower electric bill from reduced demand charges. This opportunity is largest in areas where the distribution grid is most constrained, and demand charges are the highest. More information on these locations is in the Energy Storage Fact Sheet: Appendix B located at <https://www.ny-best.org/resource/energy-storage-soft-costs-resources>.

Service Class Selection for Demand Response⁷ – Receiving Standby Service

Project developers should evaluate and ensure the host facility is billed under the optimal rate for that customer's service classification. This decision should be approached holistically and with a firm understanding of the impact of energy storage on a customer's electricity bill. The standby rate⁸ applies only to customers who have their own

⁷ Con Ed's 2/22/18 tariff filing included a provision that would allow energy storage systems to export energy to the distribution system as part of their participation in DR programs. This order expands the benefit of DR participation in Con Ed's service territory.

⁸ Please see: <http://energy.pace.edu/projects/chp-tools> for background on the standby rate.

generation source on-site in specific situations, which includes storage, solar, and CHP. The standby rate entirely changes how delivery charges are billed. Most significantly, it calculates demand based on daily, rather than monthly, peaks. Depending on the configuration, a customer may be required or, more likely, may elect to switch to the standby rate when they install storage. There is a [proceeding](#) under way at the PSC to expand standby rates to additional customers, which has already started in Con Ed's service territory.

The demand charge is a \$/kW item on a customer bill that is based on the customer's peak demand during certain hours of the month. For the majority of demand-billed customers, this charge is based on the highest *single* peak each month, or for customers on a time-of-day rate, the *single* highest peaks during certain time intervals. Certain vendors have found it optimal to switch their customer to the standby rate, which is only applicable to customers with on-site generation or storage, under certain circumstances that are detailed in utility tariffs. When on the standby rate, a customer's demand charge is based on the sum of *daily* demand peaks (Monday-Friday, 8AM-10PM in Con Edison's service territory). Select vendors have found that switching their customers to standby rates can optimize demand response participation and demand charge reduction. For example, electing to switch to the standby rate can allow for the flexibility to respond to a demand response event while neglecting the facility peak on a given day that the demand response event and facility peak is not coincident. If the demand charge is based on daily peaks rather than a monthly peak, and a vendor forgoes dispatching during the facility's highest peak during a particular month in order to participate in a utility or NYSIO program, then the potential economic impact to the demand charge savings will most likely not be as significant.

Demand response programs are compensated based on the amount a facility reduces its energy consumption from the facility's baseline during demand response events. DR programs are established in tariff proceedings, but the contract for DR only lasts for one year, and must be renewed. The baseline calculation varies depending on the demand response program. Routine operation of an energy storage system can have the unintended effect of reducing this baseline and, therefore, the compensation for demand response participation. Since standby rates have the maximum demand measured on a daily as opposed to monthly basis, one day without the storage system operating will have less of a negative impact on the electricity bill. This can allow operators to forgo demand charge reduction on certain days, preserving the baseline and optimizing DR revenue.

The standby rate will entirely change the methodology by which a customer's utility will bill for delivery charges. Switching a customer requires holistic and experienced analysis in order to optimally benefit from the standby rate. For example, a ConEd SC-9 customer on a standard monthly rate will receive the monthly demand charge (\$/kw), an energy delivery charge (\$/kWh), and other fixed charges that are detailed in the ConEd electric tariff, and visible as line items on the customer bill. On the standby rate a customer will receive the as-used daily demand delivery charge (\$/kw), a contract demand delivery charge (\$/kw), and other fixed charges associated with the standby rate. For Con Ed SC-9 customers on the standby rate (Rate IV, low tension service), will receive the contract demand delivery charge, which is set based on the customer's highest potential demand multiplied by \$7.87/kW. While contract demand should be set as low as possible, significant surcharges (12-24x the contract demand) are applied for customers that exceed their contract demand. Con Ed has a standby reliability credit available for customers that are able to reduce their demand below their contract demand during the

measurement period⁹. More information on requirements for the standby reliability credit can be found [here \(on page 12\)](#).

A customer’s load profile will have to be analyzed under each billing structure to accurately predict the impacts of a standby rate. Nevertheless, this evaluation and understanding of the standby rate is vital to successful value stacking, and thus providing the most value to BTM customers.

Understanding NYISO Demand Response

The NYISO uses three types of baselines between the four demand response programs, as can be seen in the table below. More information on the NYISO Demand Response programs can be found [here](#) (NYISO Demand Response FAQs) and [here](#) (NYISO Demand Response Presentation).

Baseline Type	Reference Period Used	Demand Response Program
Average Coincident Load (ACL)	Prior equivalent capability period – average of highest twenty resource loads during top forty NYCA peak load hours in the same season (summer/winter) of previous year	SCR (Special Case Resources) for capacity auctions (<i>sets the maximum that can be bid for SCR</i>)
Customer Baseline Load (CBL)	Highest five consumption days of last ten “like” days where DR event or schedule did not occur – there is a weather sensitive adjustment option (this is most similar to the Utility baseline)	EDRP (Emergency Demand Response Program), DADRP (Day-Ahead Demand Response Program, and SCR Energy (<i>used to determine the performance payment for SCR</i>)
Real-time Baseline	Actual load just prior to the beginning of a real-time schedule	DSASP (Distributed System Ancillary Services Program)

System operators need to take these different baselines into consideration when determining optimal operation. Compensation from NYISO Demand Response programs depends greatly on ensuring the system receives a favorable baseline.

Value of Distributed Energy Resources (VDER)

The state has recently developed a new tariff for distributed energy resources to receive compensation. Initially, *storage will only be eligible for this value stream when co-located with solar* or other distributed generation. The Public Service Commission has indicated that VDER eligibility will expand to include standalone storage and other DERs in 2018. Each of the utilities has developed plans to implement VDER in their service territory in accordance to an [order](#) from the NY PSC. Projects are required to have a smart meter capable of measuring hourly electric imports and exports from their system. Energy storage can be used to maximize the benefits from this value stream, significantly improving the compensation for DERs through VDER tariff. VDER compensation is available for projects up to 5 MW. It is important for project developers to note that the VDER compensation mechanism is still being developed. New rules regarding how energy

⁹ The standby reliability credit is not available for standalone energy storage systems. Con Ed defines a standalone energy storage system as are those systems installed separate from other customer load, and are generally operated to participate in energy, capacity, or ancillary services markets.

storage systems are compensated under VDER are rapidly changing, and this guide will be updated to include changes to VDER during Quarter 2 of 2018. If you have questions about VDER compensation, check [here](#), or reach out to the NY-BEST team.

Maximizing VDER compensation will require thoughtful optimization by project developers, including comparing the value of self-consumption vs. grid injections at certain times and locations. In addition to this business complexity, current VDER compensation will present an operational challenge since project developers need to track self-generated (green) electrons and grid-supplied (brown) electrons, since they are compensated differently according to PSC rules. This can make the decisions complex. The opportunity for VDER compensation will vary depending on the metering configuration of the storage system, and the service territory where the system is located because the utilities are not presently implementing VDER compensation in the same manner. We expect these challenges to be reduced by the PSC during Q2 of 2018. VDER compensation is in the form of bill credits on a retail customer’s bill, which can be the host site or an offsite off taker in the case of remote net metering or community DG.

VDER aims to provide accurate compensation for distributed energy resources accounting for the range of values and benefits DERs provide to the electric grid, and importantly, recognizing the location and time at which electricity is exported to the grid. These values are combined into what is commonly referred to as the “value stack”, this stack includes:

Component	Basis for Payment	Term and Frequency of Value Reset
Energy	Day ahead hourly locational based marginal price from NYISO + electrical losses of 7% (which vary by utility and voltage levels)	Term fixed for 25 years value changes hourly with LBMP, but has been fairly stable over time
Capacity	3 options: (1) kWh Injections during all hours of year (default) (2) Injections during 460 summer hours 2-7pm during June, July and Aug (3) Injections during single highest hour of NYS electric demand (only option for dispatchable technologies including standalone storage)	Term fixed for 25 years, value changes monthly based on NYISO spot auction
Environmental Value	Higher of Tier 1 REC price/kWh or the Societal Cost of Carbon/kWh minus RGGI price	Term and value fixed for 25 years (REC price changes with each new procurement but project rate is locked in)
Demand Reduction Value (DRV)	Injections during utility’s top 10 peak hours; only for projects not receiving MTC	Term fixed for 25 years, value updates every 3 years
Location Specific Relief Value (LSRV)	For areas within identified LSRVs for injections during top 10 peak hours of zone	Term fixed for 10 years and value fixed for 10 years; availability after year 10 is dependent on local grid needs

NYSERDA and E3 Consulting have made a calculator available to estimate the project compensation under the value stack. The calculator can be found [here](#) along with other resources for understanding VDER compensation, and should serve as a valuable resource for project developers.

Value Stacking Reference Chart

The numbered links in the table below provide more specific information on stacking each of the services. Please see the key below for more information. Stacking more than two values will require increased capacity of the storage system, and can encounter additional challenges.

Value Streams	Demand Charge Reduction	Energy Arbitrage*	Utility DR Programs	Con Ed DMP	NYISO DR Programs	NYISO Market Services	NWA	Emergency Power	NYSERDA Programs	VDER	Hosting Capacity	EV Integration
Demand Charge Reduction		1	2	3	4	5	6	7	8	9		
Energy Arbitrage*	1		10	11	12	13	6	7	8	14		
Utility DR Programs	2	10		15	16		6	7	8			
Con Ed DMP	3	11	15		17			7				
NYISO DR Programs	4	12	16	17			6	7	8			
NYISO Market Services	5	13					6	7	8			
NWA	6	6	6		6	6		6	6	6		
Emergency Power	7	7	7	7	7	7	6		7	7		
NYSERDA Programs	8	8	8		8	8	6	7		8		
VDER	9	14					6	7	8			
Hosting Capacity												
EV Integration												

- Stackable with no Regulatory Constraints
- Stackable with Regulatory Challenges
- Contract Dependent
- Not Stackable due to Regulatory Constraints
- To Be Determined

*Please note that energy arbitrage refers to both wholesale and retail energy arbitrage, and will rarely serve a primary source of compensation for an energy storage system.

**ICAP Tag reduction is not included in this table, but is a possible source of revenue stacking that is available for large, interval-metered customers

Other Considerations for Future Value Streams

NYISO Distributed Energy Resources (DER) Roadmap

This [document](#) lays out the ISO's plan for integrating DERs into the grid. It should serve as a guide for interested parties to understand how future value streams may develop. The ISO plans to implement market enhancements that permit dispatchable DERs to be compensated for their specific capabilities, and to permit their participation in the wholesale markets. Among the biggest challenges for energy storage is that it currently cannot participate simultaneously in both wholesale and retail markets, except for certain demand response programs, which is discussed above in the dual use section. This prevents storage from maximizing its compensation, and presents a barrier to the adoption of these technologies. Additionally, the roadmap lays out plans for more aggregation of DERs as a wholesale resource. This is likely further down the road than other value streams, but it is important for project developers in the New York market to keep track of this process and participate in the development of new compensation mechanisms for energy storage systems. Please follow the NY-BEST [policy section](#) for information on the roadmap and other proceedings. FERC recently issued [Order 841](#), which is a final rule requiring that each RTO/ISO create a participation model for storage in the capacity, energy, and ancillary service markets. FERC's final rule was intended to remove barriers to energy storage in organized wholesale markets. The final rule was issued February 15, takes effect 90 days after publication in the Federal Register (mid-May 2018), and compliance filings by the RTO/ISOs are due 270 days after the effective date, with an additional year to implement the tariff revisions. The NYISO's DER Roadmap, released prior to FERC's Order 841, will be impacted by the order, though it is generally already aligned with what FERC is requiring of all RTO/ISOs.

Investor-Owned Utilities

Distributed System Implementation Plans (DSIPs)

The DSIPs are a source of public information which are updated every two years that provide a comprehensive and holistic view of utilities' statuses and their plans to improve their processes and decision-making regarding distributed resources such as energy storage. The DSIP process does not include discussions of project approval, rate design, or cost recovery mechanisms. The Commission has explicitly affirmed that these issues will be dealt with through other rate cases and other REV-related proceedings. The DSIPs focus on how the utilities will facilitate, integrate, and manage the increasing presence of distributed energy resources on the grid. More information on each utility-specific DSIP can be found [here](#). These documents can shed light on future value streams, as the utilities respond to the increasing penetration of distributed resources on the grid.

Electric Vehicle Integration and Hosting Capacity

The utilities and ISO are working to determine how EV charging equipment and DERs can be deployed statewide without a negative impact on the grid. At present, this is being done by identifying locations with excess capacity and installing EV charging equipment in those areas, but this creates a limitation to where the equipment can be installed. Energy storage systems can be used to lessen the stress this creates on the grid by increasing the circuits' hosting capacity, increasing the viability of implementing

EV charging equipment in more constrained locations. The timeline for this process is unclear, but the PSC and utilities have identified this as a challenge that will need to be dealt with to allow more EVs to come on line in New York State. More information is expected to be released in future Distributed System Implementation Plans.

Energy storage systems can be used to absorb excess power flow from the grid, and then release this energy later; thereby relieving transmission congestion and increasing the hosting capacity of the grid. Hosting capacity refers to the distribution system's ability to incorporate DERs effectively into the grid. The utilities have been directed by the PSC, in its March 9th, 2017 order, to build energy storage systems to determine the effectiveness of storage for supporting their operations. Such systems will serve a variety of use cases, including, increasing hosting capacity, managing peak loads, and integrating renewable energy sources and electric vehicles. The lessons learned from these deployments will be used in the development programs to value the services provided by energy storage resources, including hosting capacity and other energy storage services. This process will largely be aligned with EV and DER integration, to prevent the resources from having negative effects on the grid. The [Joint Utilities](#) have stakeholder working groups focused on each of these areas.

Earnings Adjustment Mechanisms (EAMs)

EAMs are rate changes being developed under REV that are meant to provide outcome-based incentives to create new performance expectations for New York utilities. Utility-specific proposals for the EAMs are expected to be completed in their upcoming rate cases. The process is nearing a conclusion, and NY-BEST will make information about each utility's proposal available when they are released. As of now, utilities will share a similar framework based around four new EAMs to promote the goals of the REV initiative. These EAMs are summarized below:

- ***The System Efficiency EAM*** is a combination of peak load reduction and load factor improvement. Each utility will propose a system efficiency target and a strategy to achieve this goal. This includes DER utilization targets. The utility must demonstrate that the proposal is cost-effective and include an earnings incentive. These proposals will have to be approved by the DPS (to ensure the best interests of the public).
- ***The Energy Efficiency EAM*** will be tied to targets recommended by the Clean Energy Advisory Council, an advisory and steering committee for the Clean Energy Fund. Metrics will be based upon system-wide outcomes and require approval of the DPS.
- ***The Interconnection EAM*** is based on the number of interconnected DERs and project developer satisfaction with the interconnection process.
- ***The Customer Engagement EAM*** was developed due to the importance of customer participation to the success of REV. Utilities have been directed to propose an EAM tied to customer uptake in innovative programs.

More Resources

The following resources provide greater detail on the available programs and opportunities for energy storage in New York State:

- [Con Ed Demand Management Program](#)
- [Energy Storage Services Fact Sheet](#)
- [NYISO Distributed Energy Resources](#)
- [NYISO Market Participation](#)
- [Public Service Commission](#)
- [NYSERDA Energy Storage Program](#)

Appendix A: Value Stacking Reference Chart Expanded

1. **Energy Arbitrage (Demand Shifting)** and **demand charge reduction** are among the easiest values to stack. Both feature system deployment to reduce peak load, and shift energy use to times when energy is less expensive. Click [here](#) to return to the table.
2. **Utility demand response** and **demand charge reduction** are more difficult to stack, since in many cases they require different types of operation from the storage system. In order to maximize the benefits from utility demand response programs, the energy storage system needs to be operated such that the baseline load is high enough that significant reductions can be made during demand response events. Please see the [utility demand response](#) section for more information on maximizing the benefit from utility demand response, and what benefits may result from switching to the standby rate. Click [here](#) to return to the table.
3. The **Con Ed Demand Management Program** provides funding for the implementation of energy storage, and other DERs. The program requires projects to participate in the NYISO and utility demand response programs, which creates several issues for stacking this value with **demand charge reduction**. Chief among these issues will be the need for the system to be fully charged for periods of peak load, which may increase the load at other times of day and may influence demand charges for the facility. The challenges will mirror those faced by developers trying to stack utility DR and demand charge reduction. More information on Con Ed DMP can be found [here](#). Click [here](#) to return to the table.
4. The ease of achieving **demand charge reduction** while participating in **NYISO Demand Response** varies by NYISO demand response program. For the ISO SCR program, there are challenges very similar to those faced by developers stacking utility DR and demand charge reduction where benefits from both services cannot be maximized due to how the baseline is developed, in the case of ISO SCR it is based on demand from the previous year. It is likely that these challenges will be magnified for EDRP, DADRP, and SCR (Energy Portion), since the baseline is based on the highest demand in 5 of 10 “like” days where the energy cost would be extremely high, meaning that developers will be hard pressed to develop a favorable baseline. Please click [here](#) to learn more about the NYISO DR programs. Click [here](#) to return to the table.
5. Stacking **NYISO market services** (including frequency regulation, ICAP market, Reserves, and Volt-Var Optimization) with **demand charge reduction** can be extremely difficult or impossible because of the dual use issue described above. The system providing NYISO market services is usually a front-of-the-meter system, while demand charge reduction is behind-the-meter. Participation in these wholesale

markets requires advanced metering and bars the resource from participating in any distribution level value streams, making it very difficult. Click [here](#) to return to the table.

6. Stacking any values with **NWA funding** is completely dependent on the utility, specific NWA, and the contractual obligation. This must always be evaluated on a case-by-case basis, and through discussions with the utility. NWA Opportunities can be found [here](#). Click [here](#) to return to the table.
7. Stacking **emergency power** with all other services is straightforward. The primary concern is ensuring the facility can disconnect from the grid and provide electricity to the site in the event of a grid outage (a.k.a. 'islanding'). Outages can be unpredictable, which can result in operational challenges as system operators must ensure the system is fully charged when an outage occurs. There is some degree of planning possible, for example, before a large storm a system must charge rather than focusing on providing other benefits, to ensure that it can be counted upon for reliability. Click [here](#) to return to the table.
8. Similar to NWA, stacking **NYSERDA program** funding with other values varies by the specific program and location of the resource, although projects utilizing nearly any of the value streams for a viable project that meets the eligibility criteria of the applicable PON could be eligible for NYSERDA funding. Please see the [NYSERDA Energy Storage program website](#) for more information on available solicitations. It is important to note that a resource cannot receive funding from Con Ed DMP and NYSERDA for the same project, although NYSERDA funding can enhance the power or energy capacity of the energy storage system if additional system needs beyond Con Ed's DMP requirements will be provided. Click [here](#) to return to the table.
9. Stacking **VDER (Value of Distributed Energy Resources)** compensation and **demand charge reduction** presents regulatory barriers, that we expect to be removed in Q2 of 2018. As previously discussed, VDER compensation is only available for storage resources co-located with solar in the near-term. This stack requires thoughtful optimization by project developers comparing the value of self-consumption vs. grid injections at certain times and locations. The time intervals when VDER compensation is greatest incentivizes systems to discharge energy during periods of system-wide peak load, which may be when demand at the facility is highest. Therefore, savings from reduced demand charges will need to be compared to VDER compensation, and the storage capacity utilized accordingly. The system operator should be cognizant of how the storage system impacts load at the facility, and use this information to inform customers of how demand charges will change. The implementation of VDER compensation for standalone energy storage is still being developed and will likely be clarified in the coming months. Future versions of this guide will be informed by the lessons learned. Click [here](#) to return to the table.
10. Stacking **energy arbitrage** and **utility demand response** programs is straightforward from a regulatory perspective, with the primary concern being how utility demand response baseline rules impact demand shifting. Systems would likely need to prioritize utility DR due to the importance of the baseline measure, which may have a slight negative impact on energy arbitrage. The impact would likely be minimal and a system could still achieve significant bills savings and receive compensation through utility demand response programs. More information on stacking [utility demand response](#) can be found earlier in the

document. In general, energy arbitrage will not be a primary source of compensation for energy storage systems, and will likely occur as a byproduct of other services. Click [here](#) to return to the table.

11. Other than project developers being required to dispatch during DMP call-times, there are no regulatory concerns for project developers when stacking **Con Ed DMP** funding with **energy arbitrage**. Click [here](#) to return to the table.
12. The only concern when stacking **NYISO demand response** and **energy arbitrage** is the impact on the baseline. The majority of the time, however, these two values will be complementary and the negative impact on the baseline measure through energy arbitrage are minimal. Please return to the [NYISO Demand Response](#) section to learn more about how the different baselines are determined. A possible concern for stacking NYISO Demand Response is that systems over 5 MW require evaluation on a case-by-case basis, presenting a challenge for project developers to predict their timelines. Click [here](#) to return to the table.
13. Stacking **NYISO market services** with limited **energy arbitrage**, only impacting demand from the FTM energy storage system itself, is simple for project developers, with one exception. In order to participate NYISO markets, the resource must ensure it has enough capacity to satisfy the requirements of the applicable market. This results in increased demand due to the need for full capacity of the storage system, which may have an effect on energy arbitrage. Additionally, systems over 5 MW need to be approved by the NYISO for interconnection on a case-by-case basis, presenting a challenge for project developers in predicting their project timelines. More information can be found in NY-BEST's [energy storage fact sheet](#). Click [here](#) to return to the table.
14. Stacking **energy arbitrage** and **VDER compensation** is simple, and at this point there are no challenges for project developers to stack these values. This may change when VDER is implemented for standalone energy storage, but will be reevaluated by NY-BEST at that time. More information on the VDER process can be found [here](#). Click [here](#) to return to the table.
15. Stacking **utility demand response** and the **Con Ed demand management program** is simple, and is a requirement for participation in Con Ed DMP. The system may face scenarios when DR event periods do not align with Con Ed DMP peak periods, where the system would be required to prioritize the DMP peak period. This may impact the compensation from DR programs. This complication should be evaluated on a case-by-case basis. Click [here](#) to return to the table.
16. Stacking **utility demand response** and **NYISO demand response** is possible, but depends on when the system peaks occur, as both require the resources to reduce demand during times of system peaks. If the system peaks are on the same day, but different times of day, it can be extremely difficult to reliably respond to both programs. Storage systems attempting to stack these values need to ensure that the system has enough capacity to satisfy the required load reduction of both programs. Additionally, operators should make sure to take into account the different baselines that are used for both programs. Click [here](#) to return to the table.
17. Stacking **NYISO demand response** and the **Con Ed demand management program** is simple, and systems participating in Con Ed DMP are required to participate in NYISO ICAP-SCR program. Since the

call periods for these programs may occur at different times, challenges for the system operators may arise. These challenges need to be evaluated on a case-by-case basis to ensure the system is not penalized for missing call windows. Click [here](#) to return to the table.

Please contact the NY-BEST or NYSEDA Soft Costs Teams with any questions about this guide.