NYISO Distributed Energy Resource (DER) Pilot Program Guide

October 2017

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About the NYISO

At the heart of New York's electric system is the NYISO, operating the high-voltage transmission network, administering and monitoring the wholesale electricity markets, and planning for the state's energy future. The NYISO was created in 1999 to provide fair and open access to the electrical grid and to facilitate the implementation of New York State's restructuring of its electric utility industry. We are responsible for the reliable operation of New York's 11,000 miles of high-voltage transmission and the dispatch of over 700 electric power generators. We administer bulk power markets that trade an average of $7.5 billion in electricity and related product annually.

Competitive wholesale electricity markets preserve system reliability with pricing signals that attract investments to the grid when and where they are needed. They place a value on energy that reflects system conditions, and shift the risks for investment in the grid from ratepayers to investors. By creating an atmosphere of financial discipline, NYISO markets drive efficient solutions to meet reliability needs in a least-cost manner. The NYISO designs, refines, and administers its markets in a manner that seeks optimal economic efficiencies to provide reliable supply of electricity.

NYISO DER Pilot Program

Overview of the Pilot Program

The energy industry is in the midst of an exhilarating period of innovation. With unprecedented pace, new technology is pushing the boundaries of how electricity is produced, delivered, and consumed.

The NYISO is at the heart of that change in New York: meeting consumers' power needs, addressing public policy goals, and sustaining electricity's fundamental contributions to economic vitality. Change is constant, that is clear, but sustained reliability continues to be the hallmark of excellence in the NYISO's operations.

To support its strategic objectives, the NYISO has established a pilot program to demonstrate the integration of innovative DER technologies and concepts into its wholesale market systems. The NYISO DER Pilot Program is guided by the NYISO's DER Roadmap with a focus on objective learning.

The purpose of the NYISO DER Pilot Program is to inform market design efforts within the NYISO, build operational DER experience among the NYISO, utilities and market participants, and demonstrate market and grid operational coordination of any new or revised market rules to integrate DER and DER aggregations. The focus of the program is on understanding physical operation attributes of DER and the associated coordination.

Aligning with the NYISO DER Roadmap and in spirit of New York's REV objectives, the Pilot Program seeks to facilitate the testing of Pilot Projects that the NYISO can use as a learning platform for:

- Identifying and evaluate barriers to entry of DER
- Demonstrating coordination processes and procedures between the ISO, DER Coordinating Entity (DCE) and the Utilities' Distributed System Platform (DSP)
- Understanding technical capabilities and dispatchability of DER and DCEAs (DCE Aggregation)
- Demonstrating proof of concept of objectives laid out by the NYISO DER Roadmap
- Assessing performance of DCEAs
- Evaluating the impact of integrating DER into NYISO's various software systems

Pilot Participants and NYISO stakeholders should be aware that the Pilot Program rules and processes may not be included in the NYISO's final market design or specific market rules integrating DER into the wholesale markets. The Pilot Program may administer rules and processes to test concepts and gain valuable data to inform NYISO's market design efforts. Therefore Pilot

Participants may not have a similar experience in the implemented wholesale market design as they would in the Pilot Program. Lessons learned from the Pilot Program may also result in proposed changes to existing rules where applicable.

Value of the Pilot Program to NYISO Stakeholders and Pilot Participants

Although NYISO will use the Pilot Program to inform its internal efforts on integrating DER into its wholesale markets, some of the findings from the Pilot Program will also be shared with NYISO's stakeholders, which includes policymakers, regulatory staff, developers, utilities and end-use advocates. The opportunity for DER to demonstrate their capabilities of the existing market products and meet relevant performance requirements will give the broader stakeholder community a better understanding of the impact DER may have on New York's wholesale market. Outcomes of the Pilot Program will be considered as NYISO and its stakeholders discuss and seek to develop market rules that will affect DER as well as non-DER resources.

The NYISO believes that Pilot Participants will benefit from participation in the Pilot Program by being able to engage and exercise its DER technologies and solutions in a simulated environment of wholesale dispatch activity and gain actual experience coordinating DER aggregation dispatch with the NYISO and the relevant Utility.

Pilot Program Timeline

Pilot Project applicants may begin submitting proposals in October 2017. NYISO anticipates accepting its first Pilot Projects in Q1 2018 and will limit initial enrollment to a maximum of five (5) Pilot Projects, however individual Pilot Projects will only be able to participate for a maximum of 12 months in the Pilot Program. The Pilot Program will be active until April 2020 and when there is availability for NYISO to accommodate new Pilot Projects due to reasons such as completion of a Pilot Project or changes in NYISO resourcing support, the NYISO will inform its stakeholder community and periodically open enrollment to new applications. NYISO will also publish any new or revised Pilot Program information such as modified program rules, selection criteria, or objectives that would impact new Pilot Project applications.

For a detailed and up-to-date timeline of the NYISO Pilot Program, please visit the NYISO DER Pilot Program website at: [TBD].

DER Pilot Objectives

The objectives for DER Pilot Projects under the Pilot Program is guided through the NYISO's DER Roadmap and seek to inform NYISO's market design efforts on DER integration into its wholesale markets. The objectives have also evolved from the outcomes of stakeholder discussions within NYISO's working groups.

Interested Applicants should review the objectives below and describe in their applications how their proposed Pilot Projects address the objectives and provide significant learning value to NYISO and its stakeholder community. Applicants are also open to suggest additional pilot objectives that are being proposed for its Pilot Project and that NYISO should consider. NYISO believes that the below list will evolve over time as the NYISO and the industry become more familiar and gain more experience with DER.

1. Assess the capability of homogeneous and heterogeneous DER aggregations to provide energy and ancillary services and the associated benefits to the wholesale markets
    - Can a DER aggregation meet its instructed base point?
    - Can the DER aggregation remain within an acceptable output tolerance even when ramping within its full operating range?
    - Does performance depend on whether it is a homogeneous or heterogeneous DER aggregation?
    - Which existing market products (i.e. energy, regulation, and spinning reserves[1]) can DER aggregation effectively provide?
    - Can a Pilot Participant provide a set of aggregated operating parameters (e.g. ramp rate, upper operating limit, etc.) that accurately characterize the capability of its DER aggregation?

2. Develop and evaluate DER and DCEA measurement and verification (M&V) and monitoring and control (M&C) requirements
    - Can Pilot Projects achieve a specific one-way and round trip latency requirements for telemetry?
    - Does a Pilot Project's aggregated telemetry and metering data deviate from the individual DER metering data (after-the-fact review)? If there is significant deviation, what were the causes?
    - Are there alternative technologies or solutions that DER can utilize to meet NYISO's proposed metering and telemetry requirements for DER/DCEAs?
    - Are specific baseline methodologies more effective for performance evaluation of demand side resources within a DER aggregation than others?
    - Are specific DER metering configurations more effective for performance evaluation of DER than others?

[1] NYISO will not be evaluating the capability for DER aggregations to provide non-synchronous operating reserves in the Pilot Program.

- Does the performance of a statistically sampled population reflect the actual performance of an entire aggregation?

3. Establish and evaluate an operational coordination framework between NYISO, utilities, DCE, and DER
    - What does NYISO need to consider for its DER coordination framework to provide effective and timely communication to all involved parties?
    - What does NYISO need to consider to make its market process feasible for DCEAs?
    - What concepts are there that can address potential challenges for DER to simultaneously provide wholesale and non-wholesale (e.g. retail, end-use) market services? If so, how do they seek to resolve the challenges?

4. Establish and evaluate DER and DCEA registration processes
    - What registration information is required for each DER aggregation?
    - What registration information is required for an individual DER within a DER aggregation?
    - What is an effective process for reviewing distribution mapping, interconnection, and utility account information of DER within a DER aggregation registering with the NYISO?

Program Limits

The Pilot Program will be limited to an active, state-wide enrollment of 50 MW that can be allocated to a maximum of five (5) individual Pilot Projects. Both program limits will be adhered to at all times that the Pilot Program is active. Active enrollment will be coordinated through the Pilot Program enrollment/registration and completion process. The NYISO will also consider adjusting the maximum quantity of actively enrolled Pilot Projects (but not the total MW) in the future based on the expected NYISO resourcing needs and other operational factors.

To further minimize market and operational impacts, each transmission node within the New York Control Area (NYCA) will be limited to 10 MW of pilot capability from the active Pilot Projects in the Pilot Program.

Pilot Project Eligibility Requirements

An application for a DER Pilot Project will be considered only if it satisfies the following eligibility requirements:

- The Applicant is not required to be a NYISO Market Participant, however must execute a Pilot Participation Agreement with the NYISO upon acceptance into the Pilot Program, including a non-disclosure agreement (NDA).

- All DER must have a signed, executed interconnection agreement with the relevant Utility, as applicable (See the Final Review Process section of this guide). The NYISO will consider proposed Pilot Projects that are still in the process of executing a completed interconnection application for all DER, if applicable
- The DER within the Pilot Project must adhere to the following definition: a Supplier whose nameplate capability is 20 MW or less that participates in a [DER Aggregation] of
    i. one or more Demand Side Resources, or
    ii. a combination of two or more of the following resource types: Demand Side Resources, energy storage resources, Generators, and Intermittent Power Resources
- No DER within the Pilot Project can be participating in any NYISO wholesale market while in the Pilot Program, with the exception of DER participating in existing NYISO Demand Side Resource programs (*i.e.*, Special Case Resource Program, Emergency Demand Response Program, Day-Ahead Demand Response Program, and Demand-Side Ancillary Services Program). NYISO will review wholesale market Demand Side Resource participation on a case-by-case basis to ensure the Pilot Project can meet its existing wholesale market obligations.
- The Pilot Project cannot exceed an aggregated capability of 10 MW.
- The Pilot Project must have a minimum aggregation size of 100 kW if seeking to demonstrate energy and/or operating reserves and 200 kW if seeking to demonstrate regulation service. Preference will be given to applications seeking to demonstrate operating reserves and/or regulation service that also have a minimum aggregation size of 1 MW.
- The Pilot Project must be an aggregation of two or more DER connected at different utility interconnections. However, the NYISO may make an exception to test a single DER if the primary objective of a proposed Pilot Project is to test new concepts such as alternative communication technologies, measurement & verification methodologies, etc. where there is significant learning value despite testing only one DER.
- The Pilot Project must have an aggregation comprising of DER that are all electrically connected downstream of a single transmission node. The Applicant can verify the node mapping of its DER with the relevant Utility.
- The Pilot Project aggregation must be capable of receiving basepoint instructions and responding with its status with the ISO and Utility through real-time telemetry (typically 6-second scan rates) using the Inter-Control Center Communications Protocol (ICCP). The Pilot Project must elect to communicate directly with the ISO and Utility, or indirectly with the ISO through the Utility. The list of telemetry values are found in Table 1.
- The Applicant must be able to demonstrate full funding of its proposed Pilot Project, considering that it will not receive any compensation from the NYISO for participation in the Pilot Program.
- Each DER within the Pilot Project must have an hourly interval meter installed. The meter is not required to be of revenue grade.
- The Pilot Project must be willing to have a minimum active Pilot Demonstration Period duration of 1 month and at maximum 12 months.
- The Pilot Project must be capable of responding to 5-minute and 6-second basepoints as described in the Dispatch section of this guide.

- The Pilot Participant must be willing to share information with the NYISO and publicly with NYISO's stakeholder community with respect to the reporting obligations described in the Reporting Obligations section in this guide.

The NYISO Pilot Test Environment

The NYISO will be dispatching Pilot Projects outside of its production software environment. This approach relieves Pilot Program Participants of many of the obligations typically applied to Market Participants. It also gives NYISO better control to minimize the market and operational impacts that Pilot Projects may have.

The Pilot Projects in the Pilot Program will be dispatched through a test software environment, further defined as the Pilot Test Environment (PTE), and isolated from the NYISO's production software environment. The NYISO Pilot Program administrator will utilize information from Pilot Participants on the capability of their Pilot Project to create dispatches dependent on additional factors such as testing and operational needs.

Compensation in the Pilot Program

As Pilot Projects are dispatched through the NYISO PTE and outside of the wholesale market, they will not be compensated for any participation in the Pilot Program. A Pilot Project that injects or withdraws energy from the grid in response to a dispatch control signal from the NYISO's Pilot Test Environment (PTE) will 1) not be compensated by the NYISO for the energy injected, 2) need to settle energy withdrawals through each DER's utility, typically through an associated utility tariff 3) not be compensated by the NYISO for any action taken by the Pilot Participant in response to the NYISO's PTE dispatch control signal. Because the NYISO will not be compensating Pilot Projects for their participation in the DER Pilot Program, it will also not be applying financial penalties on the Pilot Projects that may be applied on Market Participants, such as performance deviations from NYISO dispatch instructions or tariff violations.

Program Application Process

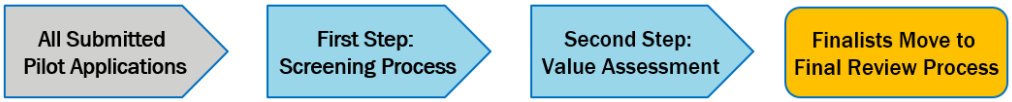

Figure 1. Pilot Program Application Process

Enrollment Overview

Pilot Program Enrollment

When there is availability for NYISO to accommodate new Pilot Projects, the NYISO will inform its stakeholder community and open enrollment for its Pilot Program. NYISO will also publish any new or revised Pilot Program information such as modified program rules, selection criteria, or objectives that would impact new Pilot Projects.

All clarifying questions regarding the Pilot Program can be submitted via email to pilots@nyiso.com. NYISO will provide its best effort to respond to all questions as timely and thoroughly as it can with a formal reply.

Each Open Enrollment will last 45 business days. At the close of each period, the NYISO will evaluate whether to extend the enrollment based on the applications received.

When NYISO closes Enrollment, the NYISO will no longer accept Applications until the next open Enrollment. After close of Enrollment, NYISO will begin its formal review process starting with a review of each submitted Application.

Pilot Project Application

All interested Applicants can obtain the necessary application material for the Pilot Program from the NYISO public website at: [TBD]. Each Applicant will be required to complete the following documents for each Pilot Project it is proposing for the Pilot Program.

- **Cover Sheet (Limited to 2 pages)** – executive summary of the proposed Pilot Project including the objective(s) it addresses and the value it brings to the NYISO and its stakeholder community.

- **Application Form** – this form contains a list of questions to help the NYISO understand the proposed Pilot Project, such as who the Applicant is, what is the Pilot Project and what its proposed Pilot Project is seeking to demonstrate. The Applicant is also required to provide preliminary registration information. If chosen, the Applicant will later update and finalize the information provided in the Pilot Registration Form, as necessary.

- **Project Team List** – the description of each team member that will be involved with the Pilot Project including the Lead Project Manager and the Pilot Project operators. The bios should describe the qualifications and experience of the individual team members.

- **Pilot Plan –** the Applicant will be required to provide a detailed plan describing the following:

    - The pilot objective(s) in the Pilot Program Guide that are being addressed by the proposed Pilot Project and how it seeks to measure and validate what is learned about the objective(s)
    - What objective(s) the Applicant is seeking to learn about that may be separate from that of the Pilot Program
    - What does the Applicant believes is the success criteria of the Pilot Project and how does it plan to succeed and track the Pilot Project's performance
    - What information and outcomes the Pilot Participant plans to share with the NYISO stakeholder community
    - Operational plan for ensuring that sufficient effort, funding and resources are scheduled and committed to conduct the Pilot Project
    - A measurement and verification plan including a process to acquire the necessary data for reporting and performance evaluation as described in Reporting Obligations section of this guide
    - A monitoring and control plan including how the resource will be monitored through real-time telemetry and additional details on how the individual DER telemetry will be aggregated. The Applicant should include in its Pilot Plan if the Pilot Participant can store individual DER MW output telemetry data for after-the fact review with the NYISO and the time-granularity of the telemetry data that will be stored (e.g. 6-sec data).
    - Any risks or challenges that the proposed Pilot Project may have in meeting its goals within the Pilot Program and the Applicant's mitigation plan

- **Supplemental Information –** any supporting documentation or reference material to support the Application that is not already addressed in the Application Form or Pilot Plan, including but not limited to the following:

    - Status of customer and utility engagement
    - Similar use-cases, projects and business model
    - Technical specifications and performance capabilities

Submission Details

All interested Applicants are to submit the following Pilot Program documents no later than the Enrollment Deadline Date posted on the NYISO website at the following link: [TBD], unless NYISO announces an extension of the Enrollment Period. All documents shall be submitted to the NYISO Pilot Administrator via email at pilots@nyiso.com.

Pilot Program Selection Process

First Step: Screening Process

The Pilot Program selection process is a multi-step process. In the first step, the NYISO pilot team will screen all Applications based on the below Screening Criteria.

Eligibility

- Does the proposed Pilot Project meet the Pilot Project Eligibility rules?
- Are there other Pilot Projects proposing to participate, or already participating at the Transmission Node where the Pilot Project is proposing to interconnect, and if so, will the total capability of all Pilot Projects at the Transmission Node 10 MWs or less?
- Does the Pilot Participant intend to share information about its Pilot Project to achieve the Pilot Program reporting needs?

Alignment with NYISO DER Roadmap

- Does the Pilot Project address the stated Pilot Program objectives and align to the goals of the NYISO DER Roadmap?[2]

Alignment with REV Goals

- Does the Pilot Project align with the goals of NYPSC's REV?[3]

[2] Link: http://www.nyiso.com/public/webdocs/markets_operations/market_data/demand_response/Distributed_Energy_Resources/Distributed_Energy_Resources_Roadmap.pdf

[3] Link: http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=%7b0B599D87-445B-4197-9815-24C27623A6A0%7d

Pilot Funding

- Has the application described how the Pilot Participant plans to fund the total cost of the Pilot Project?
- For any external funding sources supporting the proposed Pilot Project, are there letters of support or commitment?

Feasibility and Ease of Implementation

- Can the NYISO feasibly set up the proposed Pilot Project in its Pilot Test Environment (PTE)?

Readiness

- If the individual DER within the Pilot Project are not already in-service, will the DER be in-service within a reasonable timeline?
- Will the individual DER within the Pilot Project complete the relevant and required interconnection processes within a reasonable timeline?

Second Step: Value Assessment Process

For the second step, all applications that pass through the Screening Process will be reviewed by an internal NYISO review committee based on the Value Assessment Criteria below. These applications will also be provided to the relevant Utility for review. The Utility will only review applications that are in its service territory and shall provide written comments to the NYISO. The Utility's comments should: 1) highlight any concerns the Utility has with the proposed Pilot Project or 2) suggest enhancements that the Utility believes would better prove out communication between the Pilot Project, DSP and NYISO. Written comments by the Utility will be provided to the respective Applicant. **Please note that the criteria below are listed in descending order of importance.**

Ability to Meet NYISO Pilot Objectives with Clear and Feasible Pilot Plan

- Does the Pilot Project application provide a clear and comprehensive pilot plan of how it aligns with and can demonstrate specific Pilot Program objectives; is the plan likely to achieve those objectives?
- Will the proposed Pilot Project demonstrate an innovative and alternative concept that is replicable and can reduce barriers to entry for DER into the wholesale market and/or address DER integration issues?
- Does the test plan detail the time, effort and resources that may be required by the Pilot Participant to successfully execute its pilot plan?
- Does the Pilot Project application clearly and sufficiently describe the communication infrastructure between the NYISO and DCE, and additionally the DCE to each DER?

- Does the Pilot Project application include a clear process and methodology to aggregate individual DER meter and telemetry data, and to provide individual DER meter data to the NYISO for performance verification?

Capability to Demonstrate Energy and/or Ancillary Services[4]

- Does the Pilot Project application clearly identify the market services it intends to demonstrate (energy, regulation service, reserves)
- Is the Pilot Project capable of demonstrating multiple market services?
- Does the information provided about the Pilot Project reflect its capability to demonstrate the market services identified in its application?
- Are the metering and telemetry capabilities of the proposed pilot sufficiently described in the application and can it meet existing NYISO metering and telemetry standards for dispatchable resources?
- Does the proposed Pilot Project allow the NYISO to test alternative metering and telemetry standards?

Blend of Resource Types

- Does the proposed Pilot Project have a diverse set of resources (e.g. storage, demand response, firm generation, intermittent generation)?

Technology Maturity

- Are the individual DER comprised in proposed Pilot Project representative of the technologies that are anticipated to participate in the wholesale markets in the near-term?
- Do the individual DER use technologies commonly available to other entities?
- Have the DER technologies that will be used in the proposed Pilot Project demonstrated reasonable software and hardware component reliability for the purpose of the Pilot Program?

DER and Aggregation Deployment Experience

- Does the Applicant have the necessary expertise and experience to implement and operate the Pilot Project?
- Has the Applicant demonstrated experience in deploying DER (wholesale or non-wholesale) similar to what it is proposing for the Pilot Project?

[4] For reference, wholesale market resources that provide ancillary services are required to comply with the NYISO tariff and the requirements detailed in the NYISO Manual 2 – Ancillary Services Manual. Link: http://www.nyiso.com/public/webdocs/markets_operations/documents/Manuals_and_Guides/Manuals/Operations/ancserv.pdf

Testing Availability

- Do the individual DER in the proposed Pilot Project have other wholesale, retail or end-use customer obligations, and if so, how does the Pilot Project intend to avoid conflict between those obligations and Pilot Program obligations?
- Does the application clearly identify the conditions (e.g. number of hours per day, time of day, etc.) it will be available for testing?

Final Review Process

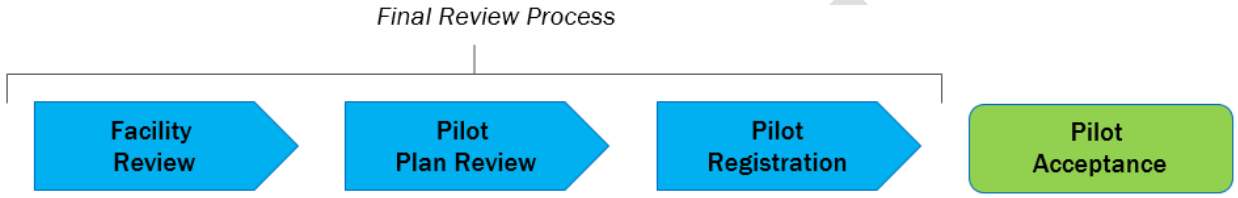

Figure 2. Final Review Process and Registration

The intent of the Final Review Process is to verify the feasibility of implementing an Applicant's proposed Pilot Project. The NYISO and the Applicant will review the approved utility interconnection agreements for each DER to confirm the DER can operate in the manner intended for the Pilot Project. The NYISO will also review with the Applicant the intended Pilot Plan to ensure that the intent, goals and expectations are aligned between the two parties. Additional details for the two reviews are listed below.

Facility Review

- The NYISO will review the interconnection status of a proposed Pilot Project with the Applicant
- The Applicant is to review the applicable utility interconnection details for each DER of the Applicant's Pilot Project with the NYISO. This review is to ensure that both the NYISO and the relevant Utility has visibility to the Pilot Project (and each DER) and that all relevant and necessary processes have been planned for or completed to formally permit the resources to interconnect to the grid, if applicable, and review if there are any safety or reliability concerns with the operation of the Pilot Plan.
- The Applicant should consult the utility if it has any questions regarding the utility interconnection process and the status of its interconnection application(s).
- The Applicant will not be required to enter its Pilot Project into the NYISO interconnection process.
- The NYISO will consider proposed Pilot Projects that are still in the process of executing a completed interconnection application for all DER, if applicable
- The NYISO will collect facility-level information such as utility account numbers from the Applicant

- The NYISO will review the transmission/distribution node mapping to each DER/facility with the Applicant and the Utility
- The NYISO will review the measurement & verification and monitoring & control details such as metering and telemetry specifications with the Applicant

Pilot Plan Review

- During this review, the NYISO will engage the Applicant in reviewing the Pilot Plan and how it will demonstrate its proposed objectives.
- The Applicant will educate NYISO on its resources' technical and operational capabilities. The Applicant will also address how it will provide demonstration of NYISO pilot objectives as well as any test objectives that the Applicant intends to demonstrate for its own purposes.
- The NYISO and the Applicant will discuss how to best dispatch the Pilot Project and agree on expectations and conditions of how often and when the pilot can be dispatched
- The NYISO and Applicant will review what data is to be exchanged between the two parties as well as supplemental information to be shared with the Utility. The review will include the communication method (i.e. telemetry, email, phone call, etc.) and the frequency of communication.
- The Applicant will review with the NYISO any wholesale and non-wholesale obligations it has and confirm the Pilot Project's availability for participation.
- The Applicant will review with the NYISO how it addressed the concerns and or suggested recommendations provided by the Utility in its written comments. NYISO shall consult with the Utility to determine if the Applicants response sufficiently addresses the Utility concerns.
- The NYISO and Applicant will discuss operational procedures and processes that are required for safe and reliable participation of the Pilot Project including review of operation personnel contact information of each party and procedures in the event of an emergency.
- The Pilot Plan is to be mutually agreed upon between the Applicant and the NYISO through an executed Pilot Participation Agreement.
- After acceptance into the NYISO Pilot Program, the NYISO and the Pilot Participant will perform a similar review with the relevant Utility.

Pilot Registration Process

After the Interconnection and Pilot Plan review, the NYISO and Applicant will begin registration of the Pilot Project into the Pilot Program via a Pilot Participation Agreement. The Applicant should review and ensure that it is able to comply with all terms and conditions within the NYISO Pilot Participation Agreement and all information requested for registration has been submitted to the NYISO for processing. Although the Applicant has already submitted a preliminary registration form as part of its application, the Applicant is to review, make any changes as necessary, and submit a final Pilot Program Registration Form for NYISO to properly model the Pilot Project in the NYISO PTE.

Formal acceptance into the NYISO Pilot Program is recognized after a Pilot Participation Agreement between the Applicant and NYISO is executed. Any public announcement of an accepted Pilot Project into the program must be approved by the NYISO prior to the announcement.

The NYISO will also set up training for the Pilot Participant's personnel as needed to support understanding of wholesale electricity market concepts and operations that would benefit the Pilot Participant's experience while in the Pilot Program.

Figure 3. Program Participation Process

Implementation of Pilot Projects into NYISO's Pilot Test Environment

Once a Pilot Project is formally registered and accepted into the Pilot Program, the NYISO will use the Pilot Project's registration information to begin the process of modeling the Pilot Project into the NYISO Pilot Test Environment (PTE). During this process, the NYISO may request additional information from the Pilot Participant to properly model the Pilot Project in its system. It is expected that the Pilot Participant will also be preparing its Pilot Project to meet its planned start date of its Pilot Demonstration Period. The relevant Utility will also be engaged if any set up is required by the Utility. When all parties have provided notification to the NYISO of their readiness to begin testing, the Pilot Project will move into its Pilot Qualification Period.

Pilot Qualification Period

The Pilot Qualification Period involves qualifying the ability for the NYISO to dispatch the Pilot Project and ensuring the Pilot Participant and the NYISO are aligned with dispatch expectations.

The initial step of the Pilot Qualification Period will likely be to test the communication link between the NYISO and the Pilot Project. The testing will include SCADA point testing to ensure accuracy of the data being exchanged, and communication of simulated dispatch control signals without the operation of the Pilot Project.

Once communications between the NYISO and the Pilot Project is qualified, the NYISO and the Pilot Participant will perform a capability test that will verify the Pilot Project's nameplate MW capacity, response rate, and other operating parameters that the Pilot Participant has provided in its Pilot Program Registration Form.

Additionally, any communication (*e.g.* telemetry) testing required with the relevant Utility as discussed during the Final Review Process will also be conducted prior to moving forward to the

Pilot Demonstration Period.

Pilot Demonstration Period

The Pilot Program seeks to allow Pilot Projects to demonstrate specific capabilities and objectives within an environment that simulates wholesale market operations but with actual dispatch control signals from the NYISO of 5-minute RTD basepoints and 6-second AGC basepoints.

	First Business Day of Week	Remaining Business Days of Week					
		2 Days Prior to Operating Day	1 Day Prior to Operating Day				Operating Day (Real-Time)
							*T = time of dispatch start
Time		1500	0500	1100	1300	1500	T-5 mins and T-6 secs
From	Pilot Participant	DSP	Pilot Participant	ISO	Pilot Participant	DSP	ISO
To	ISO	Pilot Participant, ISO	ISO	Pilot Participant, DSP	DSP	Pilot Participant, ISO	Pilot Participant
Information	Status Update and Weekly Commitment	Network Conditions Impacting Pilots	DA "Hourly Capability" Deadline	DCEA DA Schedule	Individual DER DA Schedule	Network Conditions Impacting Pilots	DCEA RT Dispatch
Communication Method	Teleconference	Report - Email	Spreadsheet - Email	Spreadsheet - Email	Spreadsheet - Email	Report - Email	Telemetry

Figure 4. Pilot Program Scheduling Process Timeline

The NYISO plans to use the process in Figure 4 to communicate operational information between the Pilot Participant, NYISO and Utility (*i.e.* DSP) to properly schedule and dispatch a Pilot Project. NYISO may amend the scheduling process at any time to address operational issues or inefficiencies of the process during the Pilot Program.

The NYISO and the Pilot Participant will regularly discuss 1) any status update that either party should be aware of and 2) the Pilot Participant's ability to participate in a specific week. If the Pilot Participant declares it is not available to participate in a given week, the NYISO will not expect the Pilot Participant to submit operational data for the entire week. If the Pilot Participant is available to participate, the NYISO will expect the Pilot Participant to submit operational data for each business day of the entire week, unless the Pilot Participant, NYISO and the relevant Utility agree to allow operation of the Pilot Project on non-business days.

Hourly Capability

Since the Pilot Program will be operated through the Pilot Test Environment (PTE) and outside

of the wholesale market, Pilot Projects will not submit Supply Offers containing financial information and testing of the Pilot Project will not be based on economic evaluation.

However, to properly schedule a Pilot Project for dispatch testing, the NYISO will need to know what the Pilot Project's capability is on an hourly basis. Therefore, the Pilot Participant will be required to submit an 'Hourly Capability' for its resource for each hour from HB8 to HB16, unless additional hours are agreed upon between the Pilot Participant, NYISO and the relevant Utility.

If the Pilot Project is unable to partially or fully offer its pilot capability, it should convey that in the Hourly Capability submission (e.g. UOL = 0 MW; no Available Services selected). Note that even though a Pilot Project may not receive a day-ahead schedule for a specific hour, the NYISO may dispatch the Pilot Project in real-time in accordance to its Hourly Capability submission. This is similar to a wholesale resource being dispatched by the NYISO in real-time based on its day-ahead/real-time bids without having a day-ahead schedule. The Pilot Participant may submit changes to its Hourly Capability submission after the 0500 day-ahead (Figure 4), however if the changes result in a decrease capability, the change would be considered a de-rating or unavailability of the resource.

The NYISO anticipates it will need each Pilot Participant to supply the following information for its Hourly Capability submission:

- Pilot Information (e.g. NYISO-assigned Pilot PTID, Pilot name, operator contact information, etc.)
- Aggregate and Resource-Specific Operating Limits (e.g. Min Gen, Min Load, Upper Operating Limit, Max Load, etc.)[5]
- Regulation Capacity
- Available Services
- Message – any special concerns or limitations that NYISO staff should be aware about

[5] Although the Pilot Participant is to supply both the aggregate as well as resource-specific (e.g. storage, demand response, generation, etc.) operating limits, the NYISO anticipates only using the aggregate operating parameters for dispatch scheduling.

PILOT PTID	10004	PILOT OPERATOR CONTACT	
PILOT NAME	PILOT 1	NAME	LARRY
BID DATE	24-May-17	CONTACT NUMBER	888-888-8888

	ATTRIBUTES									AVAILABLE SERVICES				MESSAGE
HOUR	INT GEN (MW)	FIRM GEN (MW)	STORAGE (MW)	DR (MW)	UOL (MW)	MIN GEN (MW)	MAX LOAD (MW)	MIN LOAD (MW)	REG CAP (MW)	ENERGY	10M SPIN	30M SPIN	REG	
HB8	0.00	0.60	0.00	0.15	0.75	0.00	-0.45	0	0.50	X			X	
HB9	0.80	0.60	0.00	0.15	1.55	0.00	-0.45	0	0.50	X			X	
HB10	1.20	0.60	0.00	0.00	1.8	0.00	-0.45	0	0.50	X			X	
HB11	1.60	0.60	0.30	0.00	2.50	0.00	-0.45	0	0.50	X			X	
HB12	1.80	2.50	0.30	0.15	4.75	0.00	-0.45	0	0.50	X			X	
HB13	1.80	2.50	0.30	0.15	4.75	0.00	-0.45	0	0.50	X			X	
HB14	1.80	2.50	0.30	0.15	4.75	0.00	-0.45	0	0.50	X			X	
HB15	1.60	2.50	0.30	0.15	4.55	0.00	-0.45	0	0.50	X			X	
HB16	1.20	2.50	0.00	0.00	3.7	0.00	-0.45	0	0.50	X			X	

Figure 5. Example of Hourly Capability Form for a Pilot Project

Scheduling

Through a submitted Hourly Capability, the NYISO will know the maximum capability that a Pilot Project has for each hour of a specific day. The NYISO will produce a day-ahead advisory schedule based on the submitted Hourly Capability, the resource parameters submitted during Pilot Registration and what the NYISO would like the Pilot Project to demonstrate.

The NYISO will have pre-defined dispatch profiles that can be scaled accordingly based on the Pilot Project's registered operating parameters, such as its response rate or upper operating limit. The set of pilot dispatch profiles will give the Pilot Project the opportunity to demonstrate its ability to provide energy, reserves and/or regulation depending on the goal of the Pilot Project. Some profiles may include the following or combinations of them:

- A profile that dispatches a Pilot Project for multiple, continuous hours within the range of the Pilot Project's full operating limits
- A profile that ramps the Pilot Project up or down
- A profile for regulation service that may not be energy-neutral and may vary in magnitude of regulation movement
- A profile that calls a Pilot Project for reserve pick-up

The NYISO will schedule a Pilot Project using pilot dispatch profile(s) based on the following inputs:

- Submitted Hourly Capability
- Registered operating parameters
- Intent of Pilot Plan (i.e. a Pilot Project not seeking to demonstrate regulation service capabilities will not be dispatched with a pilot dispatch profile that reflects regulation service)
- NYISO staff discretion based on actual market or grid conditions, consideration of Pilot Program objectives, and intent to mimic wholesale market activity

When the NYISO provides a day-ahead advisory schedule and real-time basepoints to the Pilot Project, it will not disclose what pilot dispatch profile(s) is being applied on the Pilot Project. The Pilot Project will primarily see its schedule as a specific scheduled MW for each 1-hour day-ahead as in Figure 6. It will also see its 5-min RTD and 6-sec AGC basepoint in real-time as described in Figure 7. After its dispatch, the NYISO will share with the Pilot Participant what pilot dispatch profile(s) were used and when they were applied on the Pilot Project for the purpose of informing the Pilot Participant.

RESOURCE NAME	RESOURCE PTID	DATE & TIME	MARKET	SCHED ENERGY	SCHED 10 MIN SPIN	SCHED 30 MIN SPIN	SCHED REG CAPACITY	MESSAGE
PILOT1	10004	05/22/2017 08:00:00 EDT	DAM	0.65	0.1	0	0.25	

Figure 6. Example of a Pilot Project's Day-Ahead Advisory Schedule

Dispatch

Comparable to wholesale market resources participating in NYISO's wholesale market, Pilot Projects will receive real-time dispatch control signals ("basepoints") with 5-minute look-ahead basepoints and 6-second AGC basepoints. The dispatch control signals will not be based on market conditions or the NYISO's production environment but will be generated through NYISO's Pilot Test Environment (PTE). The basepoints to each Pilot Project will not be derived from the AGC system that dispatches resources participating in wholesale market, such as those providing regulation service.

Although the basepoints will not be based on market conditions or the NYISO production environment, the NYISO will use its best ability to design the basepoints from the NYISO PTE to reflect what a wholesale market resource may experience. However, the NYISO does guarantee that basepoints that Pilot Projects experience in the Pilot Program will be similar to actual wholesale market participation.

Similar to resources participating in the wholesale market, the NYISO PTE will respect the operating parameters provided by the Pilot Participant during pilot registration. As an example, if the NYISO PTE receives telemetry data that shows a Pilot Project's measured MW output is diverging from its basepoints, the NYISO PTE will accordingly adjust its basepoints. As another example, the NYISO PTE will also provide basepoints that reflect the Pilot Project's registered response rate (i.e. ramp rate) capability. If any changes need to be made to the operating parameters registered for the Pilot Project, the Pilot Participant can submit a revised Registration

Form, highlighting the changes in its Pilot Project's operating parameters.

The dispatch process timeline for Pilot Projects shown in Figure 7 closely reflects what is used in the Real-Time Dispatch (RTD) in NYISO's wholesale market but will not be processed by the NYISO's Energy Market System (EMS), but instead from NYISO's PTE. At the top of the dispatch hour, the NYISO will provide the Pilot Project with a 5-minute look-ahead basepoint and four advisory basepoints representing the next four 15-minute intervals. At the top of the dispatch hour, the NYISO will also provide the Pilot Project with 6-second AGC basepoints throughout the entire 5-minute interval for which NYISO's PTE has dispatched the Pilot Project. The Applicant can also review the NYISO's Transmission and Dispatching Operations Manual 12, Section 6 for more details on how the NYISO typically dispatches wholesale market resources for informational purposes.[6]

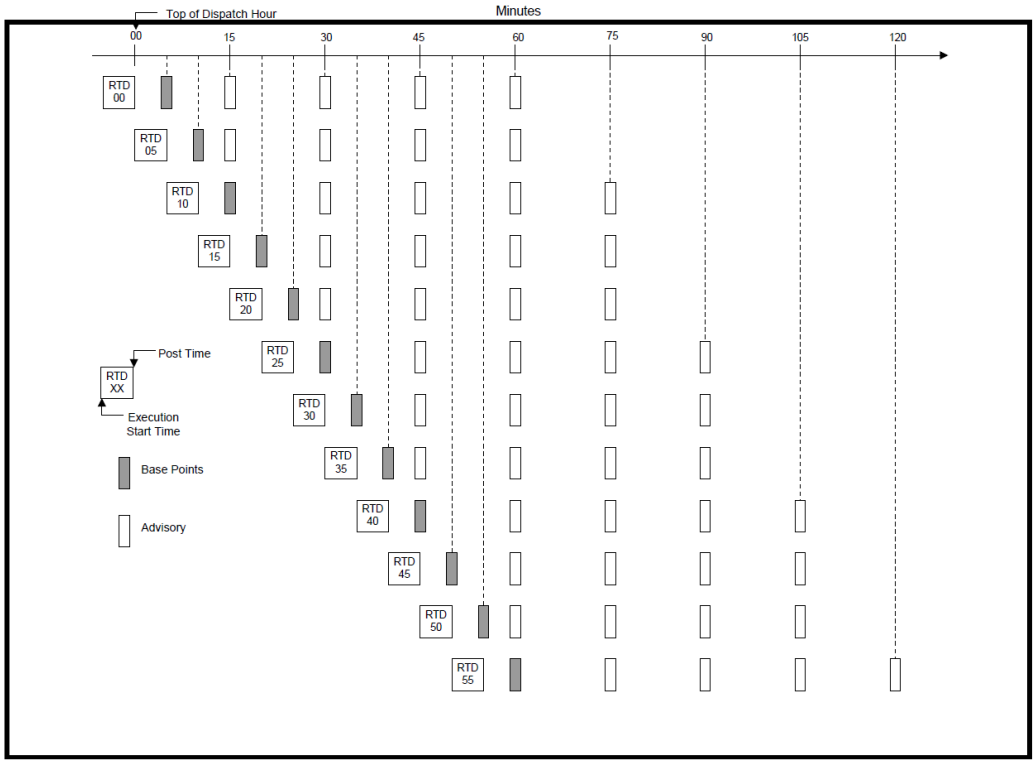

Figure 7. Dispatch Process Timeline

The dispatch control signals will be telemetered to the Pilot Project either directly or through the Utility using the Inter-Control Center Communication Protocol (ICCP). Resource status and

[6] http://www.nyiso.com/public/webdocs/markets_operations/documents/Manuals_and_Guides/Manuals/Operations/trans_disp.pdf

output data (e.g. analog data like MW output) will be telemetered from the Resource to the NYISO through the same means. See Table 1 for telemetry data requirements.

After-the-Fact Dispatch Evaluation

Similar to obligations of Market Participants who have resources participating in the wholesale market, Pilot Participants will be required to submit after-the-fact meter data. The purpose of reviewing after-the-fact meter data is to evaluate resource performance for learning purposes.

The Pilot Participant is to provide the aggregate and individual DER meter data to the NYISO for after-the-fact verification. The NYISO is requiring regular submission of the individual DER meter data for the purpose of evaluating the Pilot Participant's method for aggregating a set of individual DER meter data to generate a single, aggregate meter data. All meter data should be made available to the NYISO no later than five (5) business days after actual dispatch day. The Pilot Participant can submit the meter data directly to the NYISO, unless the Pilot Participant has made an agreement with the relevant Utility to have the Utility submit the meter data to the NYISO on behalf of the Pilot Participant.

Coordination with the Utility as a Distributed System Platform (DSP)

Ensuring safe and reliable dispatch of DER aggregations requires proper coordination with all operators involved. The NYISO expects a majority of DER to be located on the electric distribution system, but the NYISO has limited real-time visibility to network operations at that granularity. Cognizant of this limitation, the NYISO intends to learn in its Pilot Program what additional coordination information and protocols are required with the Utility (i.e. also known as the Distributed System Platform or DSP) to properly dispatch aggregations of DER without causing issues such as equipment rating violations within the distribution system. In its role as the DSP, the Utility serves multiple functions to integrate DER into the NYISO Pilot Program including guidance of node mapping, approval of applicable facility interconnection, verification of dispatchability, and role of maintaining reliable distribution system operation. As part of the Pilot Program, the NYISO, Pilot Participant and the relevant Utility[7] will have specific coordination protocols that must be

[7] The electric utility that has jurisdiction over the transmission or distribution network that the Pilot Project has an approved interconnection agreement with.

adhered to under specific events and circumstances.

Utility Registration

In addition to obtaining an interconnection agreement for each DER, the Pilot Participant will be responsible for meeting any applicable registration requirements of the applicable Utility. The Pilot Participant should consult the Utility regarding the applicable registration process for both an individual DER and an aggregation of DER participating in the NYISO DER Pilot Program. Registration coordination will be exercised with the NYISO and the relevant Utility to ensure that the Utility is aware of a Pilot Project and that it does not pose a risk to grid operations regarding aspects of reliability or safety. If a Pilot Project does not meet the pre-defined set of criteria identified by the applicable Utility as necessary for safe and reliable operation of its distribution system, the Utility shall advise the NYISO and the Applicant with written comments. The NYISO shall not begin operation of a Pilot Project until such operating condition(s) have been alleviated.

Regular Operational Coordination

Regular communication and coordination is represented in the Pilot Program Scheduling Process illustrated in Figure 4, however NYISO anticipates that communication and coordination between all parties may be further refined during the Pilot Program from experience. The Pilot Participant and the NYISO will maintain regular communication about Pilot Project testing activity through regular teleconferences and exchange of Hourly Capability submissions and day-ahead schedules. Any day-ahead schedules provided to the Pilot Participants will also be forwarded to the Utility by the NYISO to maintain situational awareness and evaluate impact on the utility network and feeder circuits. The Utility may participate in discussions regarding testing activity with the NYISO and the Pilot Participant.

The Pilot Participant is to provide through email its individual DER day-ahead schedule to the Utility based on its Pilot Project aggregation day-ahead schedule. Supplying DER-specific schedules to the Utility may address potential coordination issues and seeks to prevent NYISO dispatches of DER aggregations when they may be infeasible such as causing an operational violation or exacerbating network issues such as a distribution system constraint.

Operational coordination will also be maintained through real-time dispatch communication via telemetry as detailed in Appendix A: Detailed Telemetry Requirements of this Guide, and in the dispatch communication requirements of the Utility. Real-time dispatch communication provides operational visibility to both NYISO and Utility grid operations personnel to identify operational concerns and respond to time-sensitive events that may impact reliable grid operations.

Stop Operation Due to Abnormal Grid Operation, Safety Concern or Reliability Need by NYISO or Utility

All parties involved in the Pilot Program must also be prepared to respond to and take action on unplanned and time-sensitive events. These events and circumstances may include: abnormal grid events (e.g. feeder outage, line switching, overloading), safety concerns (e.g. natural disaster, downed conductors), reliability needs, and resource de-rates or outages. During these events, the interconnecting Utility or NYISO may require a Pilot Project to stop operation ("Stop Operation Order"). The Utility is to notify the DER Owner of a utility-initiated event requiring de-rate (partial outage) or Stop Operation Order of the Pilot Project by submitting a utility event notification. It is anticipated that for planned events, this notification would be provided by the Utility/DSP per Figure 4 as part of the Pilot Program Scheduling Process. For unplanned events, the Utility would send the utility event notification as soon as possible to the DER Owner. Once the DER Owner receives the utility event notification, the DER Owner should then take the necessary actions. If the Pilot Participant is not the DER Owner, the DER Owner must notify the Pilot Participant of the notification received from the Utility. The Pilot Participant is responsible for conveying any change in Pilot Project capability caused by a utility event to the NYISO so that the NYISO can take any appropriate action.

If there is a NYISO-initiated event requiring de-rate (partial outage) or Stop Operation Order of the Pilot Project, the NYISO will communicate the NYISO-initiated event to all affected parties including the affected Utilities by submitting a NYISO event notification.

In any scenario of a Stop Operation Order initiated by the NYISO or a Utility, the NYISO plans to respond by either sending an immediate zero dispatch control signal to the Pilot Project, or to completely disconnect communication to the Pilot Project. At the same time, the NYISO will contact the Pilot Participant's primary operator contact to confirm that the operator must stop all operation of the Pilot Project until further notice from the NYISO. If the primary operator contact cannot be reached, the NYISO will then contact the Pilot Project's alternate operator contact, and finally notify the Pilot Project's lead project manager.

When notified by the NYISO or Utility of the Stop Operation Order, the DER Owner and Pilot Participant is expected to comply with the instruction and take all reasonable steps to shut down its Pilot Project facility. Details of the shutdown procedure will be reviewed between the NYISO, Utility and Pilot Participant to ensure that all parties understand the procedure and ensure that it mitigates as much as feasibly possible any health and safety risks.

The Stop Operation Order will be lifted and the Pilot Participant can resume its Pilot Project

when the NYISO receives notification from the respective party that the outage/event has concluded and will formally send a Stop Operation Order Lift through written notice by email to the Pilot Participant and the relevant Utility.

Pilot Project De-Rate or Outage by Pilot Participant

In the event that a Pilot Participant needs to de-rate its registered Pilot Project operating capacity, or report a full outage, the Pilot Participant is to notify the NYISO and the relevant Utility by submitting a Pilot Project outage notification. If the de-rate or outage has occurred after a day-ahead schedule has been provided to the Pilot Project, the Pilot Participant is to notify the NYISO and the relevant Utility as soon as possible through phone to the primary NYISO and Utility operation personnel contacts and also update its Hourly Capability submission to reflect its outage event and note a 'de-rate' (partial outage) or 'out of service' (full outage) in the "Message" section of the Hourly Capability Form.

Final Pilot Review & Pilot Project Completion

After the Pilot Demonstration Period has concluded, the NYISO and the Pilot Participant will conduct review meetings as needed to discuss lessons learned, overall performance of the Pilot Project, debrief on any findings about the Pilot objectives, what worked well and what did not, and to conclude on the next steps for the Pilot Project.

NYISO reserves the right to formally authorize the completion of a Pilot Project. A Letter of Completion will be provided by the NYISO to the Pilot Participant after all Pilot Project review meetings are completed and NYISO deems that the Pilot Project has satisfactorily met the intent of its Pilot Plan. Upon conclusion of a Pilot Project, Pilot Participants will receive a Letter of Completion by the NYISO that formally designates the Pilot Project as complete and has exited NYISO's Pilot Program. After a Pilot Project is completed, the Pilot Program's limits will be updated to reflect its ability to accommodate additional capacity. Pilot Participants are welcome to present a summary of their completed Pilot Project at a NYISO stakeholder meeting.

Termination

The NYISO reserves the right to terminate a Pilot Project at any time if the Pilot Project demonstrates one or more deficiencies and the Pilot Participant has not shown sufficient action based on NYISO's discretion to remedy the deficiencies when given notification by the NYISO. Some

deficiencies may include consistent unresponsiveness to NYISO dispatch signals, extended resource outage (e.g. equipment failure), consistent unresponsiveness to NYISO inquiries (e.g. emails, calls) and failure to submit data to fulfill its reporting obligations as outlined in this guide. A Pilot Project's failure to follow any rules contained in this Guide, or in the Pilot Participation Agreement is also grounds for termination.

A Pilot Participant may terminate its Pilot Project if there is reasonable need to do so but must provide a formal letter of termination from the Pilot Participant including a description of the cause for termination.

Additionally, if there are any safety or reliability concerns that arise during the Pilot Project, the NYISO may halt the Pilot Project until the safety or reliability concern is remedied or no longer an issue, regardless of the cause of the concern. If the safety or reliability concern is prolonged, the NYISO or the Pilot Participant may seek to terminate the Pilot Project but re-apply at a later date.

Extension

If a Pilot Project is close to reaching the end date that was submitted and accepted by the NYISO in its enrollment into the Pilot Program, and the Pilot Participant and the NYISO mutually agree that there is still significant learning that can be gained from the Pilot Project, the NYISO will consider extending the duration of the Pilot Project on a 6-month basis.

Reporting Obligations

Where appropriate, the NYISO will keep its stakeholder community informed of what it has learned regarding potential impacts that DER may have on its wholesale market. NYISO's stakeholder community has generally supported NYISO in developing the framework for its Pilot Program and has shown interest in Pilot Project-specific information and general findings about DER and DER aggregations are shared with NYISO's stakeholders. NYISO views this information sharing as a benefit to NYISO, its stakeholders and the Pilot Participants as it raises DER awareness and informs members engaged in NYISO's governance process and who oversee the discussion, development and approval of future NYISO market rules that may apply to DER participation in the wholesale market.

NYISO Reporting Obligations to its Stakeholder Community

NYISO will share with its stakeholders the following information once a Pilot Project is accepted and enrolled into the Pilot Program.

- High level description of the Pilot Project objectives and DER technologies used
- Zone
- Associated transmission node
- Pilot Project capability (MW)

NYISO will share with its stakeholders the following information once a Pilot Project is complete and/or leaves the Pilot Program.

- Actual completion date
- Actual MWh test energy

NYISO will share updates with its stakeholders about the Pilot Program and Pilot Projects periodically in its stakeholder working group meetings. Updates on the program and project may consist of:

- Information on demonstrated capabilities of aggregations ("Can they…")
- Information on dispatch performance of general pilot population ("How well…")
- Information on effectiveness of proposed DER integration processes and methodologies
- General verbal feedback of pilot experience from Pilot Participants
- Suggested changes to Pilot Program or DER market design and rules

Presentation of Pilot Program data to the NYISO's stakeholder community will be masked and aggregated to disguise the identities of the Pilot Participants. However, Pilot Participants are free to share information about its own Pilot Project if the Pilot Participant chooses to do so, but shall not share NYISO-confidential information as described in the Pilot Participation Agreement.

Reporting Obligations between NYISO and Pilot Participants

Pilot Participants can expect to receive the following information from the NYISO during its participation in the Pilot Program:

- Operational instructions (e.g. basepoints)
- NYISO system data via public website and other established methods
- The test profiles used by the NYISO (after-the-fact)
- Performance metrics for the Pilot Project (based on aggregated meter data and telemetry)
- Detailed verbal feedback on its Pilot Project performance and lessons learned
- Weekly status and coordination meeting between each Pilot Participant and NYISO staff, as needed

The NYISO expects to receive the following information from the Pilot Participant during its participation in the Pilot Program:

- Information required for registration and modeling
- Factors impacting performance during Pilot Project
- Appropriate metering and telemetry data
- Cause and explanation of any de-rates or unavailability of resources in the Pilot Project
- After-the-fact MW dispatch activity of individual DER to meet aggregation basepoint instruction

Auditing

From time to time, the NYISO may find it reasonably necessary to audit a Pilot Project to verify performance and compliance with its Pilot Program requirements. The NYISO reserves this right for the duration of the Pilot Project. If an on-site audit is desired by the NYISO, the Pilot Participant should be able to accommodate such an audit within five (5) business days of being notified by the NYISO.

Other audits, such as meter data, may not require an on-site visit by NYISO staff, but only a transmittal of data to the NYISO. In such as case, the Pilot Participant should submit the requested data for audit to the NYISO within ten (10) business days from the day that it is notified.

Some areas of potential audit may include but not limited to:

- Metering and telemetry equipment details (e.g. configuration, specifications)
- Historical individual DER meter data
- Pilot Project operational procedures and protocols

The Pilot Participant must store and maintain all meter data for all DER within its Pilot Projects at least six (6) months after the completion or termination of its Pilot Project.

Appendix A: Detailed Telemetry Requirements

As mentioned in the Dispatch section of this guide, all Pilot Projects will be required to provide telemetered data (either directly to the NYISO or through the Utility – see Figure 8) to the NYISO using the Inter-Control Center Communication Protocol (ICCP) for the purpose of operational awareness as well as for evaluating the Pilot Project performance. A Pilot Participant is responsible for the communications infrastructure to send dispatch to all DER under its control and obtain telemetry from all DER under its control. It also assumes all responsibility for accepting NYISO scheduling and dispatch from the NYISO Pilot Program and provide telemetry back to the NYISO that indicates how its aggregated resource has responded to the NYISO dispatch.

Utilities may require a Pilot Participant to install an approved remote terminal unit (RTU) or analog telemetry equipment for the accurate and timely transmission of their data to the Utility Control Center if the Pilot Participant seeks to communicate to the NYISO through the Utility. For Pilot Participants seeking to communicate directly to the NYISO, they are to refer to the NYISO's Direct Communication Manual.

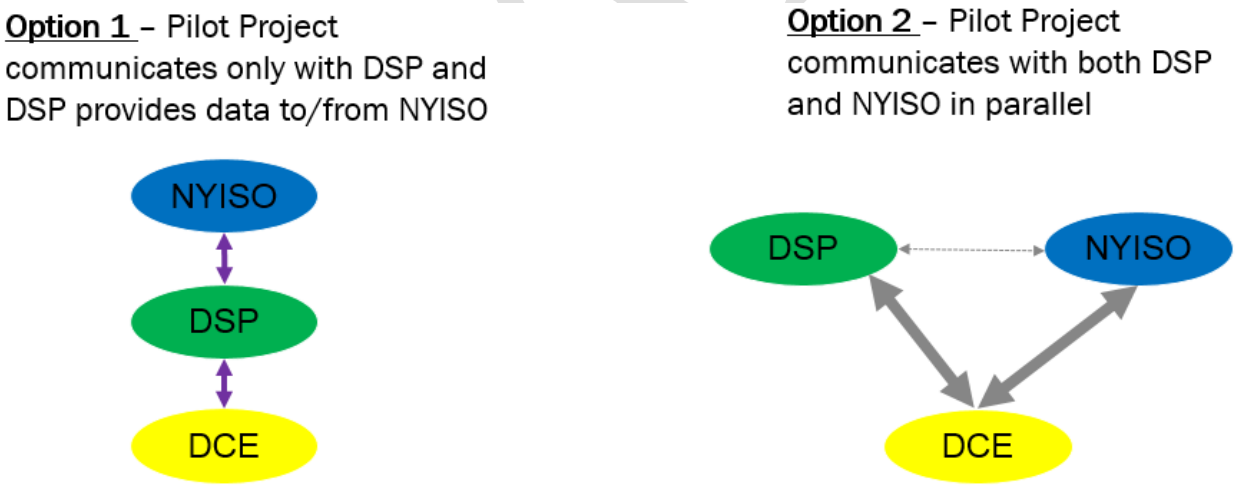

Figure 8. Options for Real-time Telemetry Data Communication Paths

The Pilot Participant shall make available to the NYISO the data per the data definition list below:

Table 1. Data List for Pilot Projects

Dataflow	Data Item	Description	Range	Notes

NYISO > Resource	NYISO Heart Beat	Indicates health of NYISO pilot system. Toggles every 6 seconds	0-1	
NYISO > Resource	Resource Desired Generation	6 Second Basepoint (MW)	+/- 32767	
NYISO > Resource	Resource Desired Dispatch	5 Minute Basepoint (MW)	+/- 32767	
NYISO > Resource	Reserve Pickup Flag	Indicates whether NYISO pilot system is in reserve pickup. Indicates a simulated emergency situation but the NYISO may not want the unit to go to max. It is critical for the unit to follow its basepoints	1-2	
NYISO > Resource	Regulation Flag	Indicates when demand-side resource is dispatched for regulation service	1-2	
Resource > NYISO	Resource MW	Resource actual generation total net output (MW)	+/- 32767	
Resource > NYISO	Resource Status	Resource online/offline status	1-2	
Resource > NYISO	DER MW	DER actual generation total net output (MW)	+/- 32767	Optional
Resource > NYISO	DER Status	DER online/offline status	1-2	Optional

Note: In the above table, "Resource" refers to the wholesale market resource. In the case of a DER aggregation, the aggregation is the wholesale market resource.

Appendix B: Brief Overview of Energy, Operating Reserve and Regulation Service Markets

The following overview of the NYISO's Energy, Operating Reserve and Regulation Service market products is to provide some familiarity of what is expected of wholesale market resources. The overview is a condensed and high-level description of key requirements and obligations of resources providing these market products in the NYISO-administered wholesale markets today. The information describes specific, existing market rules that may be informative for Applicants seeking to participate in the Pilot Program, and does not include proposed or potential future market rules. The summary also describes requirements on wholesale resources that are participating in NYISO's live market systems, and may not be applicable to Pilot Projects in the Pilot Program.

Individuals interested in additional information regarding these market products can view the following NYISO manuals and tariffs on NYISO's website:

- For Energy, review NYISO Day-Ahead Scheduling Manual 11[8] and Transmission and Dispatching Operations Manual 12[9]
- For Operating Reserves and Regulation Service, review NYISO Ancillary Services Manual 2[10]

Energy Market

The energy market provides a mechanism for Market Participants to buy and sell Locational Based Marginal Price (LBMP) energy and to bid various kinds of bilateral transactions.

Suppliers may sell energy directly into the market at LBMP or be party to a bilateral contract selling directly to purchasers. LSEs and others may purchase energy at LBMP by submitting bids and/or they may be party to a bilateral contract purchasing directly from a supplier.

Parties to a bilateral contract may elect to bid a transaction as a firm point-to-point

[8] http://www.nyiso.com/public/webdocs/markets_operations/documents/Manuals_and_Guides/Manuals/Operations/dayahd_schd_mnl.pdf

[9] http://www.nyiso.com/public/webdocs/markets_operations/documents/Manuals_and_Guides/Manuals/Operations/trans_disp.pdf

[10] http://www.nyiso.com/public/webdocs/markets_operations/documents/Manuals_and_Guides/Manuals/Operations/ancserv.pdf

transaction, in which case they are agreeing to pay congestion charges to secure delivery of the requested energy. Alternatively, they can enter a non-firm point-to-point transaction, in which case they indicate a willingness to accept the scheduled delivery of power only if there is no congestion; i.e., they are not willing to pay congestion charges.

The NYISO energy market uses a two-settlement process. The first settlement is based upon the day-ahead bids and the corresponding schedule and prices determined by the day-ahead security constrained unit commitment (SCUC). The second settlement is based upon the real-time bids and the corresponding real-time commitment (RTC) and real-time dispatch (RTD). Market Participants may participate in the day-ahead market (DAM) and/or the real-time market (RTM). As a result of the day-ahead commitment process, a set of generators is scheduled to be available for dispatch in each hour of the next day and a set of LSEs are scheduled to buy a certain amount of load at the day-ahead price.

The generators designated by SCUC to be available for the next day are dispatched against the LSE bid-in load and losses. From the dispatch, LBMPs are computed, and forward contracts are established for generation and load accordingly. Subsequently, during real-time operation, changes in operating conditions, the influence of additional real-time supply bids, and variations in actual load will cause the real-time schedules and prices to be different from the day-ahead schedules and prices. Difference in generation levels and in load consumption as compared to the first settlement values are settled at the second settlement, or real-time price.

Ancillary Services Market - Operating Reserve Service

Operating Reserve service provides backup generation and/or demand response in the event that the NYISO experiences a real time power system Contingency requiring emergency corrective action. In order for the New York Control Area (NYCA) to respond in a timely fashion, the reserves must be available from Generators or Demand Side Resources located within the NYCA and within specific regions, as required by the NYSRC.

The different types of operating reserves that the NYISO procures are listed below. The definition of each type of operating reserve types includes the term "Behind-the-Meter Net Generation Resource"[11] which is a particular type of Supplier subject to special rules related to the

[11] A Behind-the-Meter Net Generation Resource is a facility participating in the wholesale market that has on-site generation capability that routinely serves a "Host Load," and has excess generation capability after serving that Host Load. Depending on the particular configuration of the facility, a Behind-the-Meter Net Generation Resource may be eligible to participate in the NYISO's energy, capacity and ancillary service markets. For additional

provision of Operating Reserves.

Types of Operating Reserves

- 10-Minute Spinning Reserve – Operating Reserves provided by qualified Generators and qualified Demand Side Resources located within the NYCA that are already synchronized to the NYS Power System and can respond to instructions from the NYISO to change output level within 10 minutes. Spinning reserve may not be provided by Behind-the-Meter Net Generation Resources that are comprised of more than one generating unit that are dispatched as a single aggregate unit.
- 10-Minute Non-Synchronized Reserve (10-Minute NSR) – Operating Reserves provided by Generators that can be started, synchronized, and loaded within 10 minutes. These reserves are carried on quick-start units, such as jet engine type gas turbines. Operating Reserves may also be provided by Demand Side Resources where the demand response is provided by a Local Generator or by Behind-the-Meter Net Generation Resources that are comprised of more than one generating unit that are dispatched as an aggregate unit.
- 30-Minute Spinning Reserve – Operating Reserves provided by qualified Generators and qualified Demand Side Resources except Behind-the-Meter Net Generation Resources that are comprised of more than one generating unit and dispatched as a single aggregate unit located within the NYCA that are already synchronized to the NYS Power System and can respond to instructions from the NYISO to change output level within 30 minutes.
- 30-Minute Non-Synchronized Reserve (30-Minute NSR) – Operating reserves that can be provided by Generators, Behind-the-Meter Net Generation Resources that are comprised of more than one generating unit that are dispatched as an aggregate unit, that can be started, synchronized, and loaded within 30 minutes. Operating Reserves may also be provided by Demand Side Resources where the demand response is

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background on NYISO's Behind-the-Meter Net Generation (BTM:NG) Resource, please see the BTM:NG fact sheet:
http://www.nyiso.com/public/webdocs/markets_operations/services/planning/Documents_and_Resources/CRIS_Transition/BTMNG%20Fact%20Sheet.pdf

provided by a Local Generator.

The NYISO may schedule Suppliers that make themselves available to provide Operating Reserves up to the following maximum Operating Reserve levels:

1. For Spinning Reserves, the Resource's emergency response rate multiplied by ten.
2. For 10-Minute Non-Synchronized Reserves, or for non-synchronized 30-Minute Reserves, the Resource's Normal Upper Operating Limit (UOL_N) or Emergency Upper Operating Limit (UOL_E), whichever is applicable at the relevant time (the Resource may offer one product or the other depending on the time required for it to start-up and synchronize to the grid).
3. For synchronized 30-Minute Reserves, the Resource's emergency response rate multiplied by 20. This represents the amount of spinning reserve, above and beyond 10-minute spinning reserve, that the Resource could convert to energy within 30 minutes.

However, the sum of the amount of Energy or Demand Reduction each Resource is scheduled to provide, the amount of Regulation Service it is scheduled to provide, and the amount of each Operating Reserves product it is scheduled to provide shall not exceed UOL_N or UOL_E, whichever is applicable.

Suppliers will thus be selected based on their response rates, their applicable upper operating limit, and their Energy Bid through a co-optimized Real-Time commitment and dispatch process that minimizes the total cost of Energy, Regulation Service, and Operating Reserves. As part of the process, the NYISO shall determine how much of each Operating Reserves product particular Suppliers will be required to provide in light of the Reliability Rules and other applicable reliability standards, including the locational Operating Reserves requirements specified above.

Ancillary Services Market - Regulation Service

Regulation and frequency response services are necessary for the continuous balancing of resources (generation and NYCA interchange) with load, and to assist in maintaining scheduled Interconnection frequency at 60 Hz. This service is accomplished by committing Generators including Limited Energy Storage Resources (LESRs) and Demand Side Resources (Regulation Service Suppliers) whose output or demand is raised or lowered (predominately using Automatic Generation Control (AGC)) as necessary to follow moment-by-moment changes in load. The service is in addition to operating reserve services required for system contingency purposes. The NYISO offers regulation and frequency response services to serve Load within the NYCA.

Regulation and Frequency Response requirements are established by the NYISO consistent with NERC criteria. The Regulation Service requirements may include locational requirements and consider transmission constraints. AGC signals for Regulation Service are transmitted to the individual units via the Transmission Owners. Regulation Service providers may also receive Regulation Service signals directly from the NYISO. Receiving regulation signals directly from the NYISO does not eliminate the need to receive signals directly from the TO.

The AGC function calculates an area control error (ACE) and allocates this error to Regulation Service providers scheduled by RTD. The ACE is allocated to all Regulation Service resources proportionally based on the amount of Regulation Movement MW they are able to provide in the next six seconds using their Regulation Movement Response Rates, their current physical limitations, and security constraints. AGC will determine the Unit Desired Generation (UDG) for each Resource by combining the Resource's Regulation requirement (if any) with its ramped basepoint derived from its RTD 5-minute basepoint, if any. The NYISO computer system will send UDGs to TOs that will in turn retransmit the UDGs to Regulation Service Resources in their control area. Regulation Service balancing payments and charges for all NYCA resources will be assigned by the NYISO directly to individual suppliers based on their monitored performance.

The amount of Regulation Capacity (MW) and Regulation Capacity Response Rate (MW/Minute) that is required for the NY Control Area is established by the NYISO and can vary on a seasonal and hourly basis. The NYISO Transmission and Dispatching Operations Manual[12] describes how the Regulation Service requirements are defined for the New York Control Area.

[12] Available from the NYISO Web site at the following URL:
http://www.nyiso.com/public/markets_operations/documents/manuals_guides/index.jsp