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Interconnection of Distributed Generation in New York State: A Utility Readiness Assessment

Final Report

September 2015

Report Number 15-28

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Interconnection of Distributed Generation in New York State: A Utility Readiness Assessment

Final Report

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and

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1 Introduction

In Phase 1 of the New York State Public Service Commission's (PSC) Reforming the Energy Vision initiative (REV), the State's investor-owned utilities have been tasked with streamlining their interconnection application processes for distributed generation projects.[1] Related to these reforms, New York State has an existing Standardized Interconnection Requirement (NY SIR), which was established in 1999 and has been periodically revised since. Building on the NY SIR, the REV Phase 1 effort facilitates the development of uniform contract terms and procedures, aims to expedite the processing of interconnection applications and agreements, and to provide greater certainty to all parties.

The REV's Phase 1 objectives reflect a rising need to adapt to a changing energy landscape. Distributed generation (DG) grid interconnections in New York are, for example, growing at an accelerating rate. Deployments, particularly of solar electric (also known as photovoltaic or PV) systems, have reached new heights over the past six to eight months (see Figure 1 and Figure 2). Meanwhile, an increasing number of innovative information technologies, electronic controls, and other digital economy advances are demonstrating their potential to benefit electric distribution system operations and management.

REV Phase 1 aims include addressing development of a utility-customer engagement Web platform for interconnections called the New York Interconnection Online Application Portal (IOAP). Each utility is required to implement an IOAP that allows for online application submittal along with automated management and screening, including any needed impact studies such as load flow or fault level based on the DG penetration levels. Moreover, the online portal and its integrated processes are expected to furnish customers with greater transparency about the overarching interconnection process as well as accelerate utility feedback on their applications.[2]

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[1] See Case 14-M-0101, Order Adopting Regulatory Policy Framework and Implementation Plan (February 26, 2015). Phase II of the REV on planning for DG is not addressed in this study. However, some data collected during the interconnection process will be needed with higher penetration, and for utilities' integration of DG into their system planning and operations.

[2] Each utility is required to have a functional IOAP in operation by the time of their initial Distributed System Implementation Plan (DSIP) filing. Progress reports must be filed by July 1, 2015, and completion demonstrated in each utility's DSIP filed on December 15, 2015.

Figure 1. Annual growth of distributed generation (kW) in New York State (2000 – Q1 2015)

Graph does not include DG data from PSEG Long Island.

Source: New York State Department of Public Service

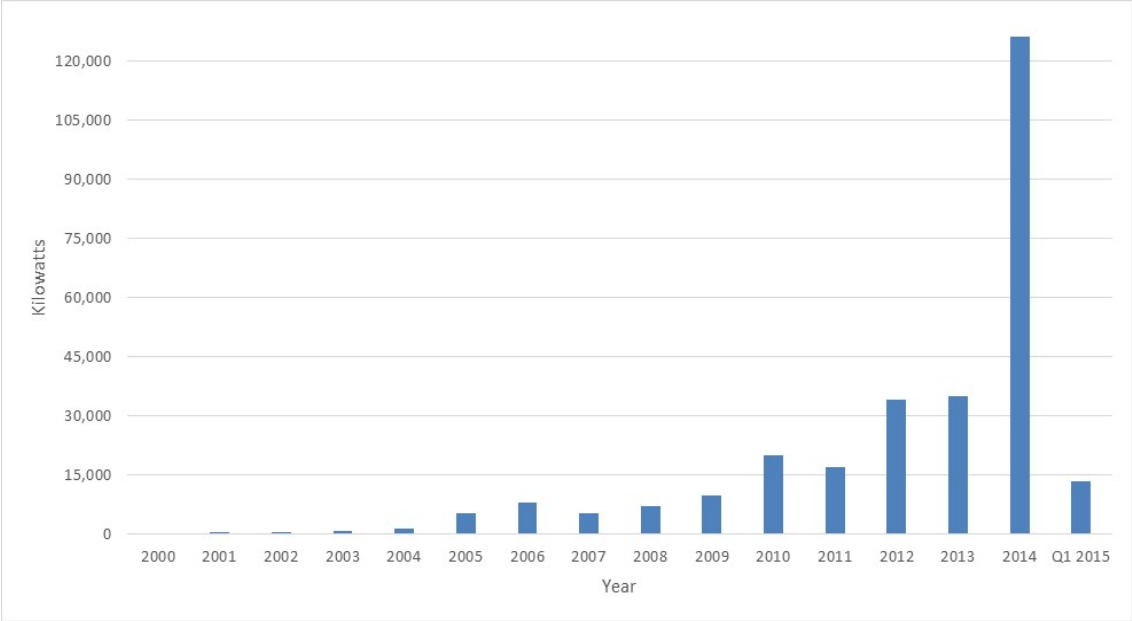
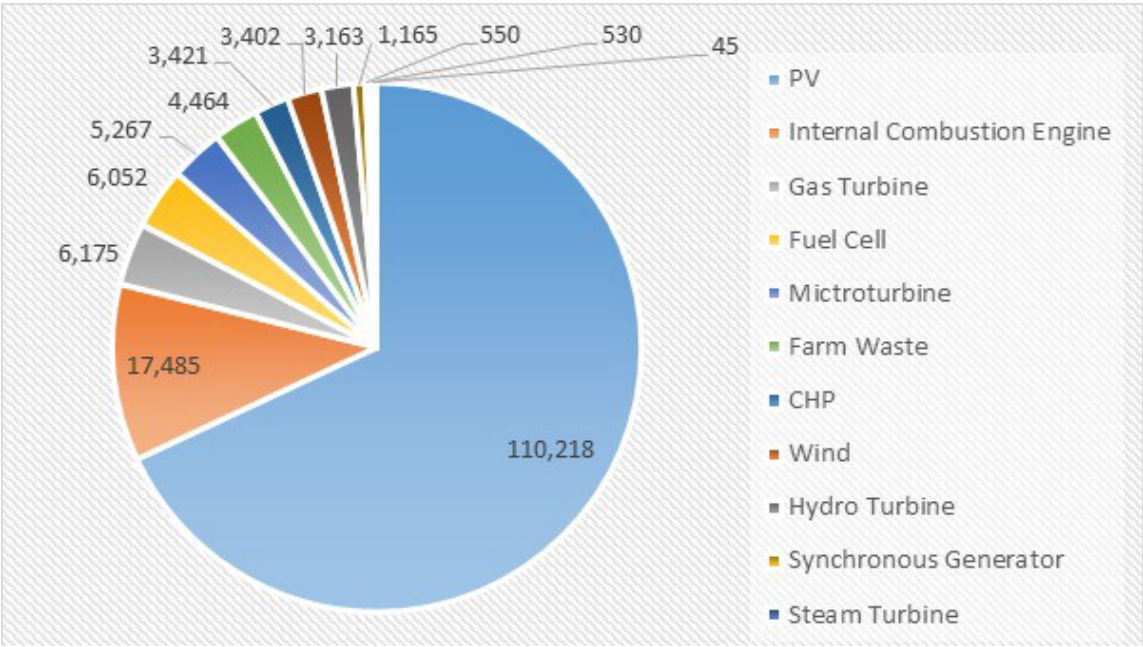


Figure 2. DG systems in service (kW) that were processed under NY SIR, 2000 – Q1 2015

A total of 161,936 kW of DG capacity has been grid interconnected as of Q1 2015. Chart does not include DG data from PSEG Long Island.

Source: New York State Department of Public Service



However, the baseline as far as current utility interconnection processes and systems present different starting points upon which to develop paths to achieving REV's Phase 1 goals within established timeframes. For a number of reasons, the scope, comprehensiveness, and degree of automation of each utility's current interconnection procedure varies. Therefore, the degree to which each utility is presently able to fulfill the IOAP's stated functional outcomes also varies. To provide guidance, this report gives a comprehensive gap analysis to discern the existing capacity and preparedness of each of New York's utilities to design, develop, and implement an IOAP, as defined by the REV Order—and to do so in such a way that complements broader REV objectives (e.g., structural market reforms).

1.1 NY Standardized Interconnection Requirements (NY SIR)

The New York State Standardized Interconnection Requirements (NY SIR) were established in 1999—and most recently updated in February 2014—to provide a framework for processing applications to interconnect distributed generation systems. The NY SIR's jurisdiction currently encompasses systems up to 2 MW, although the 2015 REV Order directs the implementation of a process to raise that threshold to 5 MW. Applicable to the State's investor-owned utilities (IOUs)[3], the NY SIR lays out six-step and 11-step procedures by which utilities are mandated to process interconnection applications. The six-step procedure is intended to facilitate expedited application processing for DG systems 50 kilowatts (kW) or less, while the 11-step approach provides a more detailed application processing arrangement for larger systems (50 kW to multi-MW) that often require an impact study, known as coordinated electric system interconnection review (CESIR). Per a revision instituted in 2009, the NY SIR also requires that interconnection application status be available online in a Web-based format and at a customer-specific level. The current SIR also directs that the utility website shall also provide the ability to applicants with systems 25 kW and less to submit their application for interconnection via the Web.

Since its creation, the NY SIR has been adopted by all of New York's IOUs. However, legacy practices and differing interpretations of the requirement have translated to a diversity of application processing practices and an array of nuanced approaches. The resulting inconsistent administration of the NY SIR across the participating utilities is recognized as a barrier to achieving New York State's broader REV goals.

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[3] PSEG Long Island is not an IOU. PSEG Long Island operates the Long Island Power Authority's (LIPA) transmission and distribution system under a 12-year contract. PSEG LI generally follows the NYSIR and is included in this study.

1.2 Reforming the Energy Vision (REV)

The NY SIR was developed to define the steps along with their associated timelines for completing the interconnection application process. However, existing utility approaches for receiving, evaluating, and approving PV interconnection applications are not uniform, adding time, cost, and uncertainty to DG project development. Differing utility interpretations of the NY SIR have, to date, prevented the NY SIR's standardization aims from being fully realized, thus slowing the application submittal process and impeding project development. Improvements to the status quo that support a quicker, more transparent interconnection application process offer an opportunity to better align growing clean distributed energy resource interconnection practices with REV goals.

Phase 1 of REV explicitly calls for a streamlining of New York State's current interconnection approval processes to reduce the administrative burden, increase transparency, and adequately prepare for greater amounts of DG deployment. In Phase 1, using the NY SIR as a framework, PSC's February 26, 2015 Order (Order) provides that each utility must establish the following functionalities while working toward a consistent statewide look and feel:

- Ability to apply online.
- Automatically managing the application approval process.
- Responding in a consistent and timely manner.
- Providing standardized contract forms and terms.
- Enabling transparency into the process.
- Supporting the status tracking of times to approval and who is responsible.
- Sharing information via a publicly maintained queue.
- Providing automated technical screening and impact studies.
- Improved timeliness for identification of study requirements.

A facet of this undertaking includes streamlining the standard utility interconnection application process via a functional online portal, which allows DG customers to apply and check application status online, in addition to integrating with utilities' existing application management systems to improve efficiency.

1.3 Transitioning the NY SIR to Alignment with REV: A Gap Analysis

The Electric Power Research Institute (EPRI) was commissioned by the New York State Energy Research and Development Authority (NYSERDA) in conjunction with the New York Department of Public Service (DPS) to explore utility opportunities to further streamline current NY SIR interconnection processes, and instituting an IOAP aligned with the REV Order's specified level of functionality. In particular, the EPRI research effort seeks to determine each utility's current interconnection application practices and processes to develop a baseline for understanding the individual and collective readiness of New York's utilities to meet REV's Phase 1 goals.

The objectives of EPRI's gap analysis include:

- Charting each utility's existing interconnection functionalities, practices, and capabilities including the conditions and approaches associated with the processing of interconnection applications.
- Determining each utility's means to implement an online portal as stipulated by REV Phase 1 by, among other things, diagnosing existing tools and work flows in addition to their integration with utility functions.

This report distills findings from EPRI's analysis, providing a combination of summarizing tables and charts along with accompanying narrative to objectively portray the utility status quo, gaps in utility processes for achieving REV Phase 1 IOAP compliance, and future options. The analysis is intended to support the further development of standardized and streamlined utility interconnection processes and, in turn, reduce the costs, uncertainties, and time requirements—for both applicants and utilities—of submitting and managing DG interconnection applications.

1.3.1 Study Approach and Scope

As depicted in Table 1, over the course of three weeks, EPRI conducted detailed, on-site interviews and follow-up communications with each of New York's six utilities[4] to gather relevant project information. These day-long sessions involved intensive interviews of a range of utility personnel to:

[4] Note that Iberdrola encompasses subsidiaries NYSEG and RG&E. However, as both were interviewed concurrently, for simplicity, this report will refer to them collectively as Iberdrola (NYSEG/RG&E).

- Discern, among other things, baseline utility interconnection application practices and management procedures (e.g., current processes, practices, and protocols for receiving and processing interconnection applications).
- Characterize infrastructural and resource portfolio issues.
- Capture planned application process improvements.
- Discuss opportunities and approaches for designing, developing, and implementing an IOAP.

Extensive follow-up ensued between EPRI and the utilities to fill knowledge gaps and address outstanding questions.

Table 1. Dates and locations of interviews between EPRI and utilities

	Location	Dates
National Grid (NGRID)	Syracuse, NY	May 19, 2015
Consolidated Edison (ConEd)	New York City, NY	May 20, 2015
Iberdrola (NYSEG/RG&E)	Binghamton, NY	May 26, 2015
Orange & Rockland (O&R)	Spring Valley, NY	May 27, 2015
PSEG Long Island (PSEG LI)	Hicksville, NY	June 1, 2015
Central Hudson (CenHud)	Poughkeepsie, NY	June 2, 2015

The accumulated quantitative and qualitative data was subsequently organized to convey a baseline of each utility's business and technical review processes, provide a gap analysis for successfully meeting the interconnection functional requirements, and lay out barriers and potential solutions. The contents of the entire research effort are encapsulated in this report and presented in the following manner:

- **Chapter 1 – Introduction.** Provides context and background for the gap analysis study.
- **Chapter 2 – Landscape of Current Utility Interconnection Procedures.** Conveys a foundational understanding of each utility's present day interconnection operations to provide the necessary context and perspective for a subsequent gap analysis.
- **Chapter 3 – Utility Self-Assessment Summaries.** Presents individual utility assessments, written in their own words, summarizing the unique DG markets in which each utility operates, the current resources and procedures involved in processing DG interconnection applications, and the status of each utility's use and development of software and other tools to administer the DG application process. The summaries also convey which utility-identified areas for improvement to potentially implement to meet REV Phase 1 objectives.

- **Chapter 4 – Readiness Assessment and Gap Analysis.** Considers the baseline status of interconnection processing for New York's utilities and identifies a range of barriers to accommodating REV's Phase 1 interconnection functionality goals. It assesses the readiness of current interconnection practices according to statistical, process-oriented, and functional indicators, and identifies specific obstacles to achieving the REV Phase 1 objectives on a statewide level along two categories: application management processes and technical review processes.
- **Chapter 5 – Implementation: Opportunities and Challenges.** Details the technical and utility business process areas that must be either adapted or developed to meet REV Phase 1 compliance. It additionally portrays the relative degree of difficulty associated with each finding. Finally, it relates suggestions communicated by utility sources, on ways to improve (e.g., automate and streamline) the current interconnection request process.
- **Appendices A, B and C.** Contain raw data and supporting study materials, including a glossary of interconnection terms, screenshots of the existing IOAP user interfaces, and each of the in-depth interview (IDI) questionnaires that were completed by utilities.

2 Landscape of Current Utility Interconnection Procedures

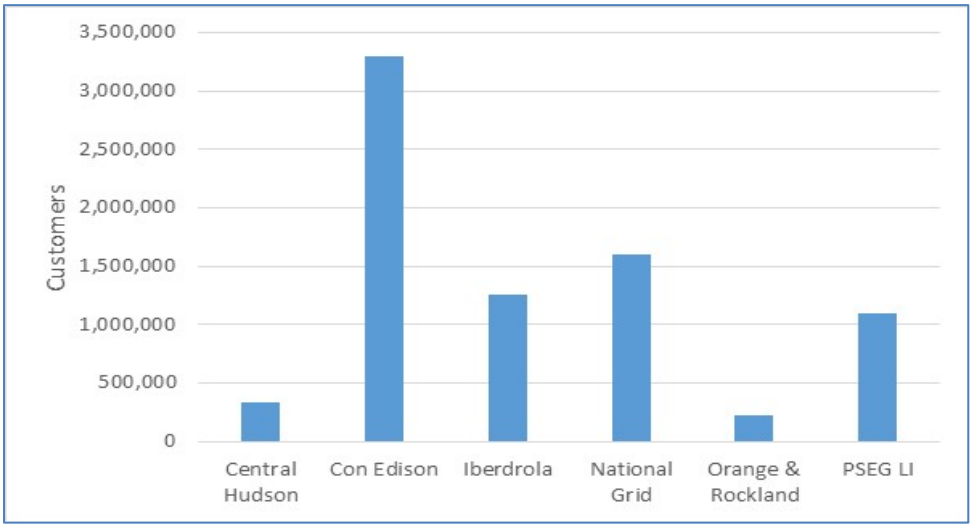
This chapter conveys a foundational understanding of each utility's present day interconnection operations to provide context and perspective for a gap analysis described in Chapter 4. It first describes, at a high level, comparative utility features and interconnection-related metrics to shed introductory insight on some of the general factors that are influencing utility approaches to interconnection application management. Subsequently, Chapter 3 provides a more thorough accounting of the range of processes and systems that are now in use among the examined utilities to manage interconnection applications. Issues discussed span the following categories: website functionality, customer communication, billing and payment procedures, screening tools, technical analysis, metering procedures, electronic mapping, utility staffing, and others. This section concludes with a list of leading practices that are currently either in use, under development, or being considered by utilities in New York.

2.1 Comparative Utility Approaches

Differing customer bases, scale of interconnection applications, grid information and infrastructures, among other factors are all drivers of the variable landscape of current interconnection procedures used by New York's utilities. The following is an introductory snapshot of utility characteristics and historical interconnection trends that provide brief context to current utility interconnection methodologies. As depicted in Figure 3, New York's utilities serve a broad range of customers. Consolidated Edison services the largest number of total customers in the state, with roughly 3.3 million customers under its purview. Conversely, Orange & Rockland's 220,000 customer population is the smallest of the group.

Figure 3. Total customers in New York State for Each Utility

Source: Self-assessment summaries provided by utilities

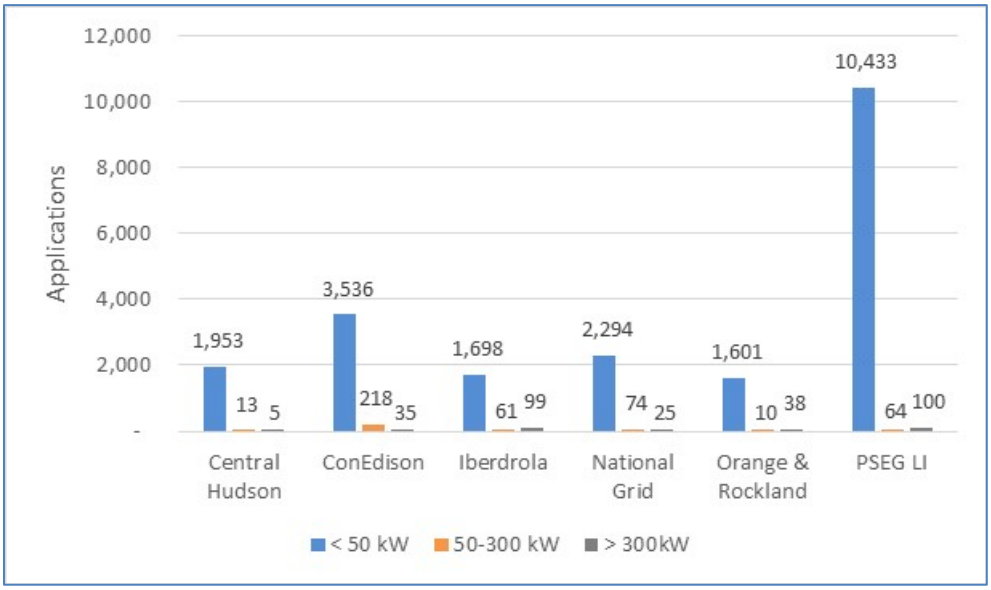


	Total Utility Customers in New York
Central Hudson	300,000
Consolidated Edison	3,300,000
Iberdrola	1,255,659 (NYSEG: 882,714 -- RG&E: 372,945)
National Grid	1,600,000
Orange & Rockland	220,000
PSEG Long Island	1,100,000

The size of the utility customer base does not, however, neatly correlate with established DG interconnections and interconnection application volumes. Regional incentives, retail rates, distribution grid characteristics, and other factors play more definitive roles in driving interest and activity in DG, including grid-connected solar. For example, despite having only the 4th highest number of total customers, PSEG Long Island has, over the past 12 months, received over 10,000 interconnection applications (Figure 4). The other five utilities each received between 1,649 and 3,789 applications in that time span. The difference between the size of the utility customer base and DG interconnections is also evident when examining historical data (Figure 5).

Figure 4. Utility interconnection applications by DG system size category (May 2014 to May 2015)

Source: Self-assessment summaries provided by utilities

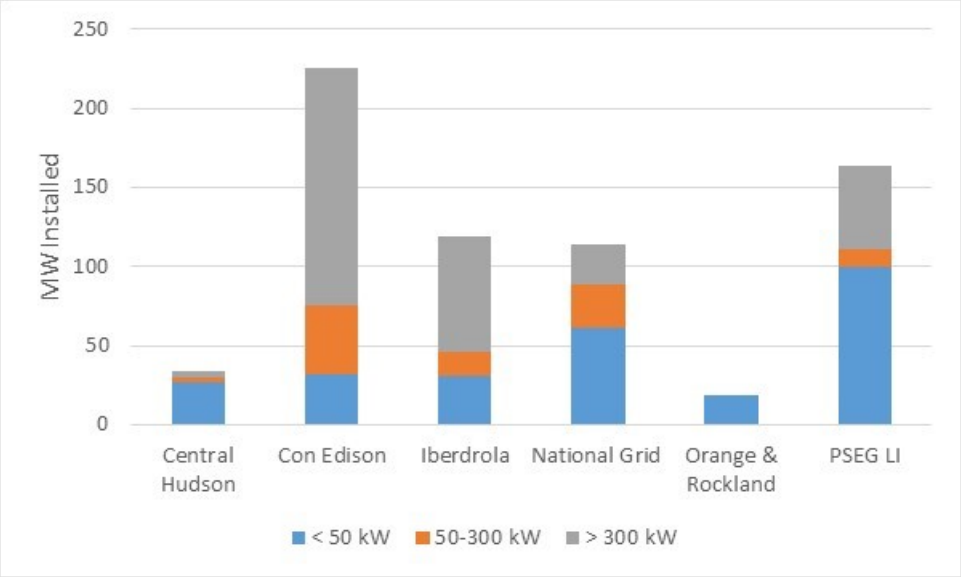


	≤ 50 kW	> 50 kW to 300 kW[a]	> 300 kW[a]
Central Hudson	1,953 (99.1%)	13 (0.7%)	5 (0.3%)
Consolidated Edison	3,536 (93.3%)	218 (5.8%)	35 (0.9%)
Iberdrola	1,698 (91.4%)	61 (3.3%)	99 (5.3%)
National Grid	2,294 (95.9%)	74 (3.1%)	25 (1.0%)
Orange & Rockland	1,601 (97.1%)	10 (0.6%)	38 (2.3%)
PSEG Long Island	10,433 (98.5%)	64 (0.6%)	100 (0.9%)
Total	21,515 (96.7%)	440 (2.0%)	302 (1.4%)

[a] These totals cover the majority of interconnection applications from May 2014 through May 2015, however, it does not include significant volumes of applications over 50 kW that were submitted on or right before the June 1 grandfathering deadline. For example, National Grid received over 300 such applications, which would have raised the volume of the two size categories above 50 kW, including significant volumes of applications over 50 kW that were submitted on or right before the June 1st grandfathering deadline. For example, National Grid received over 300 such applications, which would have raised the volume of the two size categories above 50 kW.

Figure 5. Interconnected DG by utility (total MW installed) as of May 2015

Source: Self-Assessment Summaries provided to EPRI



	System Size Categories			Combined Total
	< 50 kW	**50-300 kW**	**> 300 kW**	
Central Hudson	26.752 MW	2.536 MW	4.582 MW	33.87 MW
Consolidated Edison	31.9 MW	43 MW	150.6 MW	225.5 MW
Iberdrola	31.035 MW	15.138 MW	72.898 MW	119.071 MW
National Grid	60.7 MW	28 MW	25.5 MW	114.2 MW
Orange & Rockland	18.7 MW	7.9 MW	6.2 MW	32.8 MW
PSEG Long Island	99.35 MW	11.75 MW	52 MW	163.1 MW
Total	268.437 MW	100.424 MW	305.58 MW	674.441 MW

To date, meanwhile, the vast majority of interconnection applications have been for small residential systems below 50 kW; these account for between 91% and 99% of all received applications, depending on the utility. But applications appear to be ramping up for larger-sized systems in response to the Net Metering Transition Plan[5] and NY-Sun MW Block program.[6] If these two factors materialize into interconnected projects, larger projects may begin to exceed the collective capacity of smaller DG systems. Table 2 relates the outlook that each of the New York utilities has for future interconnection applications over the next two years.

Grid infrastructure complexities represent another significant differentiator among the utilities, and have driven the interconnection processes currently used by utilities. For example, Consolidated Edison has a significant networked structure, as opposed to the other five utilities that are primarily radial. For this reason, its technical reviews make use of internally created software that was developed for specialized analysis of networked customers. Also, Iberdrola (NYSEG/RG&E) stands out among the group given that 70% of its distribution miles are below 5 kV, thus affecting technical review protocols. This facet of the utility's infrastructure is reflected in Iberdrola's (NYSEG/RG&E) use of software models in technical reviews to ensure DG systems are compatible with its grid structure. In general, these and other variables have contributed to the developed process and tools employed by the utilities to complete their technical reviews of received applications.

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5 See: http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId={7DAD7284-CE8C-4CFF-BEE9-8202D50B1F6C}

6 See: http://ny-sun.ny.gov/For-Installers/Megawatt-Block-Incentive-Structure

Table 2. Projected yearly applications by utility (2015-2017)

Source: Self-Assessment Summaries provided to EPRI

	System Size Requirements		
	<50 kW	**50-300 kW**	**>300 kw**
Central Hudson	2015: 1,640 2016: 2,624 2017: 4,198	2015: 16 2016: 26 2017: 41	2015: 34 2016: 54 2017: 87
Consolidated Edison	3,410-5,130	450-700	230-350
Iberdrola	3,396	122	198
National Grid	2015: 3,540 2016: 4,255 2017: 4,971	2015: 161 2016: 187 2017: 213	2015: 90 2016: 110 2017: 130
Orange & Rockland	>3,500	>100	>70
PSEG Long Island	45,842	1,886	554

2.2 Documented Utility Practices: Commonalities and Differentiations

A range of utility interconnection practices, approaches, and managing philosophies exists among the examined New York power companies. Some are shared across the utilities, while others are unique. The following sections explore identified commonalities and differences documented across a collection of 12 core subject matter areas listed in Table 3.

Table 3. Organization of interconnection themes for utility landscape overview

1. Website Functionality	7. Billing and Payment Procedures
2. Application Status Communication	8. Software Tools and their Integration
3. Customer Communications	9. Screening
4. Customer Information: Privacy and Security	10. CESIR Process
5. System Size Delineations	11. Electronic Mapping (GIS)
6. Utility Staffing and Internal Communication Flows	12. Metering Procedures

2.2.1 Website Functionality

Distributed generation websites are available for each of the utilities, and contain documents explaining the steps of the interconnection process, a link to the NY SIR guidelines, and other resources. Per Table 4, utility website functionality and information related to the interconnection application process varies fairly widely. Email, fax, and postal service are accepted means of receiving applications for all utilities, although those and other methods are used to differing degrees depending on the utility's resources and preferences.

Table 4. Itemization of existing utility website functionalities

	Apply Online	Detailed Application Status Available	All Forms Available	FAQ	Overview of Expedited Process	Overview of CESIR Process	Screen Criteria Available	DG Maps Available	Links to Reference Material	Educational Videos
Central Hudson	Yes	Yes	Yes	No	No	No	No	Yes,	Yes	No
ConEd	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes, fault mitigation maps for synch. gen.	Yes	Yes, net meter demo video
Iberdrola	No	No	Yes	No	Yes	Yes	No	No	Yes	No
National Grid	No	No	Yes	Yes	Yes	No	Yes, ESB 756	Yes, for networks	Yes	No
O&R	Yes	Yes	Yes	No	Yes	No	No	No	Yes	Yes, net meter demo video
PSEG LI	No	No	Yes	Yes	Yes (flow charts)	Yes (flow charts)	Yes	No	Yes	No

Consolidated Edison, Orange & Rockland, and Central Hudson have incorporated online application portals directly into their websites. These portals allow customers to log in (typically using account information), enter application information, attach supporting documents, and electronically submit the application. These utilities report that nearly 100% of their applications are received through portals. Consolidated Edison and Central Hudson allow customers to use electronic signatures, while Orange & Rockland's website contains language indicating the customer's submission of an online application

constitutes a signature. After submittal of the online application, data automatically uploads to an internal database, where it is manually reviewed for completeness and accuracy. Of the six utilities, Consolidated Edison, Central Hudson, and Orange & Rockland, respectively, rank 1st, 5th, and 6th in the number of total customers they serve in New York; they also represent the 2nd, 4th, and 6th highest volumes of yearly interconnection applications received (based on 2014 data).

National Grid, Iberdrola (NYSEG/RG&E), and PSEG Long Island provide a downloadable application form on their websites for customers to complete; after filling out the application, customers attach it to an email with other necessary supporting documentation, and send it to an email address specified on the website that serves as a central repository for information intake. When the application arrives, utility staff reviews it for completeness and manually enters its information into the customer information database. These three utilities serve the 2nd, 3rd, and 4th most customers in New York; they also represent the 1st, 3rd, and 5th highest volumes of yearly applications received (based on 2014 data).

2.2.2 Application Status Communication

In addition to accepting online applications, the websites of Consolidated Edison, Orange & Rockland, and Central Hudson allow customers to log in and view application status. To view sample status pages for these three utilities, refer to Appendix B. Each status page contains an itemized list of steps (e.g., "App. Reviewed for Completeness," "Preliminary Approval Granted," etc.) and completion dates for each step. Central Hudson's status page uses a Comments column to communicate information that may be relevant to an individual step, and Consolidated Edison and Orange & Rockland incorporate a column for "Responsible Party" or "Pending from Customer," which indicates whether additional information or documents are needed from the customer for the application to progress.

Iberdrola's (NYSEG/RG&E) website features a tool that provides customers with a user name and password specifically for accessing online application status. Each step of the NY SIR is listed in the status tool, and appears green if complete, yellow if pending, or red if it has not yet begun. However, completion dates are not available for each step, the number of steps listed is relatively small, and there is no detailed information available beyond the name of the step and whether it has been completed. As such, customers rarely use the tool, and instead call or email Iberdrola (NYSEG/RG&E) for dates or other detailed information regarding their application status. National Grid and PSEG Long Island also report that their customers typically call or email to inquire about status, as there is currently no way for them to track detailed status online.

2.2.3 Customer Communications

The way in which customers make first contact with the utility tends to depend on the size of the DG system. For systems below 50 kW, first contact usually occurs when the utility receives the customer's application. However, for systems above 50 kW, customers often prefer to contact the utility by phone or email to discuss the viability of the system, documents and information that is required in the application, and the feasibility of the system's location. Central Hudson is exploring the possibility of sending automated emails to better notify customers of status at various points in the interconnection process. Currently, each utility manually emails its customers at important points in the interconnection process (e.g. application receipt, review, approval, start/end of CESIR, final authorization), and to notify customers of any additional documents or information that may be required for the application to progress.

A "go-to" DG email address is provided to customers of all six utilities. In each case, several utility employees have access to the inbox and can respond to customer requests. Utilities indicate the reason for this setup is to ensure that the appropriate employees are kept in the loop, and to prevent a lapse in customer service should some of the employees be out of the office for extended periods. For larger applications (typically above 300 kW), utilities assign an engineer to act as a project manager and interface with customers; however, customers can continue to email the DG inbox, and the engineer will still receive their communications.

2.2.4 Customer Information: Privacy and Security

All of the utilities incorporate both external and internal safeguards to protect customer privacy and personal information. Those utilities that provide a means for customers to check application status online require that a unique username and password be created. In addition, the portals supported by Central Hudson and Orange & Rockland automatically generate unique project IDs that are sent to applicants via email and are required during the initial log-in process to access the customer's project status/information.

Internally instituted privacy measures include training of utility personnel regarding the appropriate handling of customer information, formal sign-off by customers authorizing utilities to share information with developers, and data transfer and database access protocols. To the latter point, in order to determine if special measures need to be taken for particular data transfers, National Grid has, for example,

established four data classifications from the lowest to the highest level of sensitivity: Publicly Available, Internal Use Only, Confidential, and Strictly Confidential. The Publicly Available and Internal Use Only categorizations do not require encryption protection when being transferred, whereas the Confidential and Strictly Confidential taxonomies do.

Utility IT system architecture provides another line of defense against compromise of customer information. For example, Consolidated Edison purposefully has not incorporated a live link between its online application portal and its back-end billing system, which contains its customers' most vital personal identifiable information.

2.2.5 Approval Path Delineations

Interconnection applications follow different approval paths based on the level of technical review required. Each utility employs a slightly different size categorization as an initial basis for determining the application's approval path, as shown in Table 5.

Table 5. Size classifications of interconnection application approval paths (by utility)

Source: Self-assessment summaries provided by utilities

	Central Hudson	ConEd	Iberdrola (NYSEG/ RG&E)	National Grid	Orange & Rockland	PSEG LI
Expedited Process	≤ 50 kW	≤ 25 kW	≤ 25 kW	≤ 50 kW	≤ 50 kW	≤ 25 kW
Screening Step	> 50 kW to 300 kW	> 25 kW to 2 MW	> 25 kW to 250 kW	> 50 kW to 300 kW	> 50 kW to 2 MW	> 25 kW to 200 kW
Full CESIR	> 300 kW to 2 MW	Not Applicablea	> 250 kW to 2 MW	> 300 kW to 2 MW	Not Applicablea	> 200 kW to 2 MW

[a] No size delineation for a full CESIR. A CESIR is performed for projects that cannot pass technical reviews.

The paths in Table 5 are not absolute, as utilities exercise a high degree of discretion in determining the level of technical review to which an application is submitted. In addition to system size considerations, the level of review is also largely dependent on the system's size relative to other factors (e.g., customer load and distribution system characteristics) and whether or not the system is inverter-based. Moreover, in keeping with the NY SIR's statement that utilities are encouraged to follow the expedited process whenever possible, exceptions to the approval paths in Table 5 are made if the utility's screens or

software models indicate that a system above 300 kW is viable without triggering a full CESIR. Given the variability in the level of technical reviews, grid infrastructure, and sizing classifications at present, utilities do not uniformly adhere to a common method for determining approval paths.

2.2.6 Utility Staffing and Internal Communication Flows

Generally speaking, each of the utilities has an assigned division (e.g., Technology Engineering) that handles the general administration and processing of interconnection applications. Engineers in the utility's Distribution Planning or System Protection departments also perform initial screening of larger systems, as well as full-blown CESIR reviews. (Some utilities, e.g. Central Hudson, do however rely on third-party consultants for CESIRs on a case-by-case basis). Sometimes other staff will also be involved, such as those working in the utility call center to handle billing inquiries.

As depicted in Table 6, a range of full-time equivalents (FTEs) are assigned to contribute to the application process across the New York utilities. Few of the assigned personnel are dedicated to interconnection functions on a full-time basis. (Exceptions exist, as Consolidated Edison states that they have 7 FTEs dedicated to overseeing interconnection applications for systems 25 kW and less). Instead, many utility staff are reported to contribute labor time on an "as-needed" basis, which may total between 5-50% of their annual labor utilization.

During periods when spikes in applications occur, many of the utilities also hire third-party contractors to keep pace. The availability of contracted help lends a degree of flexibility for these utilities to handle near-term volume growth in applications. Third-party contractors are periodically used by about half of the utilities for completing CESIR studies. For example, National Grid only uses third-party contractors if volume is abnormally high. Similarly, Iberdrola (NYSEG/RG&E) only uses third party contractors when CESIR volumes surpass their processing capabilities, which they estimate happens on about 25% of CESIR studies.

Others currently have such low CESIR volumes that they have not required third-party services. Orange & Rockland is one such utility, performing only four CESIR studies in the 12 months ending May 27, 2015, all of which were completed in-house. Still, the utility received 38 applications for systems greater than 300 kW during the same time span. Orange & Rockland recognizes that third-party contractors are a potential option should volumes increase significantly in the future. Other utilities that do not use third-party contractors for CESIR studies are PSEG Long Island and Consolidated Edison. Central Hudson is the only utility that bases its use of third-party contractors on the type of application

submitted. For inverter-based systems, Central Hudson provides Milsoft's WindMil model of detailed system data and protection settings to a third-party consultant to complete the CESIR. However, CESIR studies for non-inverter-based systems are performed in-house.

Table 6. Utility full-time employees (or equivalent)[a] contributing to interconnection application processing

Source: Self-assessment summaries provided by utilities

	Central Hudson	ConEd	Iberdrola	NGrid	O&R	PSEG LI
Available staff to process expedited applications	2 FTE	10.75 FTE	1.5 FTE	7 FTE	3 FTE	3 FTE
Available staff to process technical reviews	0.3 FTE	5 FTE	8 FTE	2.6 FTE	2 FTE	1 FTE

[a] Third-party contractors are available to augment staff during times of high volume. Additionally, given that utility staff does not spend 100% of its time processing expedited applications and/or technical reviews, utilities use differing methods to estimate the equivalent level of full-time workload dedicated to each.

2.2.7 Billing and Payment Procedures

At different points in the interconnection process, it may be necessary for utilities to collect from the customer an application fee, a CESIR cost or deposit, or funds for infrastructure upgrades that may be required for the interconnection project to be installed. Although the utilities have similar methods for collecting these funds, they have different approaches to determining CESIR fees and notifying customers of the status of their payments.

Each utility is primarily paid by applicants via a check in the mail. Central Hudson permits customers to make online payments using a third-party website that is separate from its interconnection application website; however, it reports that few customers use this feature and instead mail checks. The utilities maintain billing records separately from their DG databases; some express concerns about allowing online payments due to the potential for compromise of customer billing information.

Consolidated Edison does not usually collect CESIR fees, except as engineering time that is required to implement required service upgrades post-engineering study. When charged, these fees are usually rolled into upgrade costs. Historically, Consolidated Edison's CESIR fees amount to less than $10,000, with a typical example in the past year being about $4,100. Iberdrola (NYSEG/RG&E) does not currently charge a CESIR fee for net metered customers, and PSEG Long Island has a standard CESIR fee of $2,400. The CESIR fees of Central Hudson and National Grid vary depending the extent of the study, with Central

Hudson's typical CESIR fees for inverter-based systems running from $15,000 to $20,000, and with National Grid's typical CESIR fees running from $10,000 to $40,000. Orange & Rockland charges a $6,000 up-front fee, but only applies it to actual labor and upgrade costs. If the final CESIR cost ends up lower than that amount, then it reimburses the customer for the difference; if the final cost is more than that amount, then it collects more from the customer.

If a preliminary technical review indicates that system upgrades are needed before an interconnection can be completed, the utility communicates the expected costs of these upgrades to the customer, and waits until it has collected the funds before implementing the upgrades. As with the CESIR, the costs of these infrastructure upgrades are highly variable between the utilities as summarized in Table 7.

Each utility requires payment of the application fee before beginning a CESIR, and the utilities that charge standard CESIR fees also require either the payment of these fees, or a signed letter of intent before the CESIR commences. Through the online status checking tools built into their portals, Orange & Rockland and Central Hudson provide the status of amounts paid/due to the utility by the customer at different steps in the interconnection process. Consolidated Edison communicates payments due and invoices directly to the customer via normal case correspondence with their Energy Services group. Similarly, Iberdrola (NYSEG/RG&E), National Grid, and PSEG Long Island communicate status of customer invoices and payments via phone or email.

Table 7. Number of applications over 50 kW requiring infrastructure upgrades in the past 12 months (by price range)

	Central Hudson	ConEd	Iberdrola	National Grid	Orange & Rockland	PSEG LI
$0 to $9,999[a]	4 (22.2%)	2 (0.8%)	1 (0.6%)	10[b] (10.0%)	1 (2.1%)	4 (2.4%)
$10,000 to $49,999[a]	2 (11.1%)	2 (0.8%)	5 (3.1%)	15[b] (15.0%)	0	7 (4.3%)
$50,000 to $99,999[a]	0	9 (3.6%)	0	15[b] (15.0%)	0	0
$100,000 and up[a]	1 (5.6%)	1 (0.4%)	16 (10.0%)	10[b] (10.0%)	0	0

[a] Note: Utilities only track cost of upgrades to utility-side equipment per the SIR. However, customer upgrade costs (e.g., purchase of a 32R or Beckwith Relay) are not tracked, nor are cases where a customer is given a quote and then cancels the project.

[b] Note: National Grid's application quantities were calculated based on the percentages it provided for each price range.

2.2.8 Software Tools and Their Integration

As illustrated in Table 8, the utilities use a wide range of software tools and varying degrees of integration between software during the interconnection application process. Orange & Rockland and Consolidated Edison have integrated their online portals with their DG databases, such that data from the application automatically feeds into the DG database and no manual data entry is required. Central Hudson's online portal instead feeds applications directly into the utility's customer information database, and from there employees copy and paste application data into the DG database. National Grid, Iberdrola (NYSEG/RG&E), and PSEG Long Island, upon receiving emailed application forms, manually type information from the applications into their DG databases.

Aside from the DG database, each utility maintains a customer information database for all of its customers, both DG and non-DG related. National Grid, Consolidated Edison, and Orange & Rockland have built the DG database into their existing customer information database. For example, Consolidated Edison received roughly 56,000 new construction applications in 2014 through its Project Center portal, but only 7% of these involved DG interconnection requests. In contrast, the DG databases for Iberdrola (NYSEG/RG&E), PSEG Long Island, and Central Hudson are separate from their customer information databases. When staff for the Iberdrola (NYSEG/RG&E), PSEG Long Island, and Central Hudson look up information pertaining to the interconnection application, they check the DG database, rather than the overall customer information database. Iberdrola (NYSEG/RG&E) and Central Hudson use Access for their DG database, while PSEG Long Island uses Microsoft Excel.

Software systems for the utilities have been customized and automated to varying degrees. For example, Iberdrola (NYSEG/RG&E) has added functionality to its Microsoft Access DG database, which automatically generates meter exchange work orders, contracts, a list of any additional items/actions required from the customer, and final authorization letters. Meanwhile, Central Hudson has customized its Access database to automatically feed customer data into a software tool called DEW for technical reviews. Orange & Rockland and Central Hudson were both pursuing strategies for extensive automation of the application management process at the time the REV Order was released.[7] , but placed these efforts on hold.

[7] These pursuits were largely deferred pending the outcome of this report and further progress in the REV Proceeding.

Most of the software tools used by utilities are independent of one another. Information from the interconnection application is typically entered manually into a software model, and the engineer makes a judgment based on its output. The data used in these models, such as system ratings, loads, and DG locations, are not readily available for four of the six utilities. Although PSEG Long Island and Orange & Rockland report relatively complete records, the other four utilities indicated there are significant gaps in their data that need to be filled. For example, Consolidated Edison and Iberdrola (NYSEG/RG&E) do not currently have formal GIS systems, while Central Hudson and National Grid report that their engineer's reviews sometimes reveal that internal data is inadequate, incomplete or less than reliable. In these cases, manual review is currently required to confirm the data's integrity; if found not to be reliable, the reviewer must either verify the data in the field, or check another database repository.

Table 8. Tools used by utilities during interconnection application process

Source: Self-assessment summaries provided by utilities

Application Process Step	Central Hudson	ConEd	Iberdrola	National Grid	Orange & Rockland	PSEG LI
Application received	Web Portal	Project Center	Email	Email	Project Center	Email
Application reviewed for completeness	Mainframe, Access, Excel	Pega	Email	Email	NUCON	Email
External application tracking (sharing detailed information with customer about application status)	Web Portal	Project Center	Email, phone	Email, phone	Project Center	Email, phone
Add DG system to utility mapping	ESRI	GIS (in development), Vision Maps	GIS (in develop-ment)	SmallWorld	NRG	GIS
Screening or technical review	OMS, Excel (DEW for > 50 kW)	PVL	CYME, GIS	SmallWorld, FeedPro, MATLAB	NRG	Excel
Full CESIR	Inverter Based – WindMil Non-Inverter Based – Aspen	PVL	Aspen, Cyme	Cyme, Aspen, SmallWorld, Excel, ABB EMS	DEW	Excel, Cyme, Aspen

Screens are applied to interconnection applications based on rules of thumb that each utility has developed from past experience. These screens are applied manually by all six utilities.

The screens for inverter-based systems meeting a utility's expedited process criteria (see Expedited Path in Table 5 for each utility's general size criteria) are generally very basic. At all six utilities, the individual who reviews the application for completeness and accuracy is also trained to look up the customer's load, system size, and the transformer size—all of which can be found in internal databases. If this data meets the utility's requirements, the same individual approves the application within days and notifies the customer.

Specialized screens are developed for systems above the expedited process criteria as a means of facilitating the review process. As shown in the "Screening or Technical Review" row of Table 8 (see "Case 1: Expedited or Screening Step"), a wide range of software is used at this step across the utilities. Software selection is based on the type of screening analysis required and the expediency with which the software can interact with the DG database.

For example, Central Hudson uses DEW because the utility created a customized software template that allows its application database in Access to upload data directly to DEW models. This has streamlined the screening step by saving manual entry time during the processing of technical reviews. Meanwhile, PSEG Long Island has formalized a screening guide that is posted on its website to improve visibility with customers. Given that it receives by far the highest volume of monthly interconnection applications, PSEG Long Island credits its use of screens for allowing it to process such high volumes of applications. In PSEG Long Island's case, the application data resides in a Microsoft Excel DG database, and when a technical review is required, the information is entered into a separate Excel spreadsheet containing the screening formulas. From there, an individual reviews the results to verify if it passes or fails. If an application passes the screening, then it is approved without undergoing a CESIR.

2.2.9 CESIR Process

On average, about 2% of total interconnection applications are above 50 kW. Of the applications above 50 kW, approximately 26.4% require a CESIR. These applications have not passed the screens that have been applied to them and, as such, an engineer is assigned to perform a technical review, which involves using software to determine what upgrades are necessary to make the project feasible. The engineer

communicates these requirements to the customer by email or phone, along with an estimate of the infrastructure upgrade costs and the CESIR fee. Once up-front payment or a signed letter of intent is received, the CESIR is performed and the upgrades are completed.

As shown in Table 8, the range of software tools used when performing CESIR studies is unique to the utility performing the analysis. Each utility retrieves data from one or more internal customer databases, and feeds the data by differing means into its analysis software. While Orange & Rockland and Consolidated Edison indicate that they use one dedicated software program for analysis during CESIR studies (Orange & Rockland uses DEW, Consolidated Edison uses PVL). The other four utilities tend to use multiple programs. In National Grid's case, five different software programs may be used during the CESIR process.

Among the factors that utilities unanimously cite as being most likely to cause delays in processing CESIRs are the lack of a site plan, missing or incorrect information in the customer's application, slow response time from developers when documents are requested, and temporary spikes in application volumes that have in the past been triggered by incentive deadlines. Each utility reports that nearly all applications for systems above 300 kW contain missing or incorrect information, and are also typically missing some supporting documents.

2.2.10 Electronic Mapping (GIS)

All of the utilities perform electronic mapping of newly interconnected DG assets, although via different methods and at dissimilar frequencies. For example, National Grid maps a DG system once its application is approved and the applicant receives utility permission to construct, while Consolidated Edison, Orange & Rockland, and PSEG Long Island map the DG system when it the applicant received permission to operate.

Meanwhile, Central Hudson visually plots its distributed generation in an ESRI map, which is updated daily from its DG database. Orange & Rockland submits GIS updates several times a day. And PSEG Long Island adds a DG system to a list of completed projects when it becomes operational, and sends that list to the mapping department once per month for addition to GIS.

Although Consolidated Edison does not have a formal GIS system, it does add DG systems to its Vision Maps program once the systems have been approved; from there, the system data can be integrated with a software tool called PVL that is used for technical reviews. Consolidated Edison indicates that it will take several years to build a formal GIS system. Iberdrola's (NYSEG/RG&E) existing distribution assets are in GIS, but its DG interconnections were not added to GIS until the beginning of 2015; therefore, the process for adding DG systems is still under development and has not yet been formalized.

2.2.11 Metering Procedures

Meter exchanges for DG customers have become a source of difficulty for all six utilities. NY SIR stipulates the meter be replaced with a new meter within 10 business days of application approval for the expedited process. Utilities have noticed that not all customers are fully committed to go forward with the project at this point in the interconnection application process. Therefore, it is not uncommon for customers to either refuse the meter installation, or to cancel the project after finding out the meter was exchanged and request their old meter be re-installed. Iberdrola (NYSEG/RG&E) and National Grid both indicate that these occurrences have been more common in 2015 than in any prior year. Iberdrola (NYSEG/RG&E) estimates they collectively happen up to 10% of the time, and National Grid estimates they have historically happened 40% of the time, but in recent months have occurred on as many as 60% of expedited applications. Utilities believe this problem stems from developers submitting the application without their customer's knowledge and/or final commitment and without the customer understanding that the application initiates the meter swap.

Five of the six utilities replace the old meter without notifying the customer, using equipment to assure that the customer's circuits are not interrupted. Meanwhile, National Grid only schedules meter exchanges when the customer is home, and turns off its main circuit breaker before the exchange to prevent unexpected circuit interruption. Even though customers must be home and aware of the meter exchange for National Grid to complete it, the incidence of cancelled meter exchange is still high, with customers often cancelling their project at a later time and requesting the old meter to be re-installed.

2.3 Leading Practices

Based on a thorough review of the application management and technical review processes used by all six utilities, a number of interconnection application processing "leading practices" emerge. Although the following list is not comprehensive, it highlights notable leading practices currently in use or being explored by the utilities. Each practice enhances the customer experience and supports the values of efficiency and transparency conveyed in REV Phase 1 and NY SIR. These practices include:

- **Highly informative and easily navigable DG website –** The utility's DG website is easy to navigate and contains expansive informational resources that communicate to the customer the steps of the interconnection process, what is needed from the customer to begin the process, the location of the NY SIR document, and other valuable information. Practices that stand out include a Frequently Asked Questions page on the website and the use of multimedia instructional videos to guide the customer through the net metering process.
- **Pre-application step –** The utility incorporates a pre-application step, in which it reviews the proposed DG system and location, and apprises the customer of what to expect during the interconnection process.
- **Online application portal –** The utility provides an online portal where customers can log in and submit applications. Customers are able to attach any necessary supporting documents to their applications and sign them electronically.
- **Single contact email provided to customers –** A single contact email is provided to customers, which the customers can use for all of their communications with the utility. One group within the utility is designated to check that email inbox and respond to the customer's needs, thus ensuring that everyone within the group is kept in the loop and the unavailability of an individual does not adversely affect the utility's ability to serve the customer.
- **Application checklists –** The utility provides a checklist of all information and documents that are required from the customer to constitute a complete application.
- **Automated DG database data entry –** When customers submit an online application, the information contained within it is automatically transferred into a DG database. This automation frees up labor resources by eliminating the need to enter the data manually and helping to minimize data transcription errors.
- **Automated status emails –** Automatic emails are sent to the customer to notify them when key steps in the application process are reached or when something is required from them before the application can progress (e.g. application receipt, approval, start/end of CESIR, final authorization, etc.).
- **Online status tool –** The utility's online portal incorporates a tool that allows customers to check the status of their applications online. The tool breaks out each step of the interconnection process into detailed sub-steps, with a completion date, an expected completion date, and comments for each. The tool also lists the status of all amounts paid by the customer to the utility for the interconnection application. If the customer must provide documents, information, or payment before the application can progress, the requirements can be communicated clearly in the status tool.

- **Private and secure application storage –** A customer's confidential information is kept private and secure, and is only accessible by the utility's staff and by those whom the customer appoints as authorized agents.
- **Extensive use of screening –** Feasibility screens are extensively applied to applications as a means of streamlining the technical review process and approving applications that do not require CESIRs.
- **Automatic detection and flagging of potential interconnection problems –** The utility's system is designed to automatically flag potential problems for manual review, such as duplicate applications (two different developers applying for the same address), inactive applications, and multiple applications being submitted in close proximity to one another.
- **Automated document generation –** At key points in the interconnection process, the utility's systems can automatically generate documents that would otherwise have to be created manually (e.g. meter exchange orders, application review letters, final authorization letters).
- **Data reliability and accessibility –** Load data, equipment ratings, and other applicable data is complete, updated in real time, is reliable, and is easily accessible. Duplicate or inactive applications are reviewed regularly, and when necessary, removed from the DG database to ensure its integrity. GIS contains all DG resources, and is updated in real time whenever a resource is added to, modified, or removed from the system.
- **Online payment –** Customers may pay application fees and standard CESIR fees online, rather than only having the option to mail a check.
- **Mapping of optimal DG areas –** The utility provides regularly updated maps on its website that show customers and developers optimal areas for DG installations.
- **Developer education –** The utility provides access to technical requirements and conducts proactive educational programs for likely repeat interconnection applicants, such as training sessions, workshops, or presentations. Through these programs, the utility regularly interacts with developers, enabling both to better understand each other's practices, perspectives, and challenges.

3 Utility Self-Assessment Summaries

To help frame the range of utility interconnection practices being used in New York, this chapter provides high-level summaries of each utility's current processes, written in their own words. These summaries also convey areas identified for future improvement that can potentially be implemented to meet IOAP objectives. These self-assessments relate the specific circumstances surrounding each utility, as well as the protocols and tools used to govern interconnections and provides context and perspective for the IOAP Readiness Assessment and Gaps Analysis found in Chapter 4.

3.1 Central Hudson Self-Assessment

Table 9. Utility Snapshot: Central Hudson

Customers	Apps per Month	Online Portal	Portal Software	App Processing Time	Dedicated FTEs (or equivalent)	Notes
3.3 million	350	Yes, since 2009; handles DG and other service change applications	Internally developed; linked w/internal customer project management, work management, billing, and metering systems	• <25 kW: 1-2 days • >25 kW: variable pending feasibility / technical study	• Expedited Applications: 10.75 FTEs • Technical Reviews: 5 FTEs	Exploring ways to refine/automate existing processes (including load flow analysis for systems <200 kW), and improve customer visibility into the technical evaluation process.

Central Hudson Gas and Electric Corporation (CH), headquartered in Poughkeepsie, NY in the Hudson Valley, provides electric service to approximately 300,000 customers. CH currently processes about 160 DG preliminary interconnection applications per month. Most interconnection applications are for solar electric systems, and roughly 95% of those applications are residential. Non-inverter-based distributed generation systems are received only occasionally. The number of interconnection applications received has grown steadily over the last three years (457 in 2012 compared to 1,658 in 2014). Interconnection requests for larger systems (300 kW to 2 MW) have also increased in the last few months. Considering recent applications received, CH is approaching 90% of their available non-wind, net-metered DG capacity (72 MW, or 6% of capacity).

In 2009, an online portal was developed to accept customer applications for DG interconnection, which is still being successfully used by contractors and CH customers today. Customers or contractors (developers) can initiate the application by providing an existing account number and address. Ninety-five percent of all applications are currently submitted via the portal. The majority of applications received are less than 50 kW (99% of the total number of applications) and do not require further technical evaluation beyond verifying the existing transformer size. These applications are processed within five to 10 business days.

In the last few months, CH has seen a large increase in the number of preliminary applications submitted, in particular for systems greater than 1 MW. This increase seems to coincide with the grandfathering clause for remote net-metering. Requests have tripled from 2013 to 2014 and growth is expected to continue in 2015. To date, the level of effort to process applications has been about 2 full-time equivalent staff. Both in-house and contractor support is being utilized.

The existing CH customer application portal is internally developed software used for managing DG application requests and provides applicants with visibility into status. This portal has worked well and can continue to handle foreseeable growth in the number of DG application submissions. However, to increase automation and enable a more streamlined process CH has been exploring upgrades to the portal. CH has investigated several key automation steps including notification emails, tracking time windows per the SIR, and internal work management processing that they had explored.

Currently these changes, among others, are on hold pending REV 1 guidance from the State. Once received, CH's IT staff does not foresee any issues to implement these improvements. Future enhancements will be critical to reduce time needed to review and administer approvals. In addition to these automation steps, CH also had plans to redesign the existing externally facing Web portal with a more streamlined one, in order to provide a more user-friendly self-service interface for customers.

The proposed Web portal enhancements would help to improve the look and feel for the customer/contractor and increase the websites functionality. CH believes that there is also the potential to automate some basic technical screens in a phased approach that will provide the customer with more visibility on whether or not his/her application can be fast-tracked or requires further review and study. Other practices that are expected to support the CH interconnection process and/or customer visibility and interactions in the future are:

- Allowing payment for application fees through the portal.
- Automatically sending email approvals and status updates based on preliminary reviews.
- Validating and collecting distribution system data that currently is unavailable.

Recommendations for the SIR from Central Hudson:

- Adjust the meter change deadline within the SIR to a date at which the installation is more finalized. This scheduling can help to reduce incidences where customers are not yet committed to a project, and thus turn away the meter crew.
- Require the applicant to also submit a signed (by the customer) agreement with their application that illustrates the customer is committed to a lease or purchase.
- Address how distributed storage capacity is to be calculated/included against the net-metering cap.

Opportunities for improvement that CH is considering or already implementing:

- Increasing the automation for the existing portal to process applications more efficiently and reduce the amount of time spent administering applications.
- Distribution management systems (DMS) will enable volt/var optimization in the future with implementation planned over the next five years.
- Collect and validate data within distribution tools to allow for faster, more efficient technical reviews, screening, and feeder impact studies.

Gaps to achieving REV Phase 1 objectives:

- The website does not currently have the capability for the applicant to view the status of all amounts paid and/or due to the utility
- There is currently a high degree of manual work required for technical reviews (screening, impact studies, etc.)
- There is currently quite a bit of distribution system data that is unavailable but is in the process of being collected and validated. This is approximately five years away from being finalized and is needed as the foundation to any technical review, whether manual or automated. However, the current roadmap only includes improving primary data. Secondary data is also required for many solar electric installations as it can significantly impact voltage drop.

3.2 Consolidated Edison Self-Assessment

Table 10. Utility Snapshot: Consolidated Edison

Customers	Apps per Month	Online Portal	Portal Software	App Processing Time	Dedicated FTEs (or equivalent)	Notes
3.3 million	350	Yes, since 2009; handles DG and other service change applications	Internally developed; linked w/internal customer project management, work management, billing, and metering systems	• <25 kW: 1-2 days • >25 kW: variable pending feasibility / technical study	• Expedited Applications: 10.75 FTEs • Technical Reviews: 5 FTEs	Exploring ways to refine/automate existing processes (including load flow analysis for systems <200 kW), and improve customer visibility into the technical evaluation process.

Consolidated Edison (ConEd) in New York City provides electric service to approximately 3.3 million customers in the New York metropolitan area. Applications for interconnection of DG are coming in at the rate of approximately 350 per month. ConEd processed 3,500 in 2014 and expects more than 4,000 in 2015. Solar electric systems of 40 kW or less are the most common application. There are currently 2,500 DG applications in the queue; 88% of these applications are for solar electric systems and 89% are less than 25 kW rated AC power. The number of connection requests is increasing.

In 2009, ConEd developed an online Project Center portal where customers can submit DG interconnection applications in the same repository as any other electric service change application. This Project Center is an internally developed software used for all new construction requests. Out of approximately 56,000 applications in 2014, 4,000 applications were for DG interconnection. This number represents 7% of all electric service change applications.

For DG interconnections, the customer (or developer, with customer's consent) self-initiates the application in Project Center with account and address information. Once the request is submitted, Project Center packages all documents and information and creates a case in the Customer Project Management System (CPMS). If the application is 25 kW or smaller, ConEd's assigned Energy Services Representative reviews the application for completeness and, if all paperwork is complete and accurate, approves the project for construction, usually within 1-2 business days. All other applications would go

through an initial technical feasibility evaluation, after the application has been verified as complete, to determine feasibility of the project as-is or if a more detailed study is needed. This technical evaluation is needed for approximately 10%, or 400 applications per year. Of these applications, approximately 50 to 75 require a full CESIR study.

The Project Center portal is linked in with ConEd's internal customer project management system (CPMS), which also links into other ConEd systems such as work management (WMS), billing (CIS), and metering. Once applications are submitted, the Customer Project Managers receive and review the applications. They are automatically placed in ConEd's internal work management system for tracking. Customers can log into the Project Center to review the latest status of their application as well as the remaining steps to completion. All related documentation is also available to the manager and the customer. ConEd believes that having the DG application processed in the same system as all other service requests is the right approach because the system is already tied in to all relevant internal systems, all Energy Services personnel use this system for all case types, and use of an existing system lowers development cost to customers.

Currently, ConEd is exploring areas to further refine/automate their existing processes. These refinements are being considered currently as part of the REV process as well as other non-REV efforts. ConEd is also considering how to improve customer visibility into the technical evaluation process beyond the current steps that are visible. ConEd believes it may be possible to automate load flow analysis for smaller systems utilizing their power system analysis tool (PVL). This in-house system was developed specifically designed to handle their network systems. PVL also has a mapping application for grid assets. It currently uses physical address rather than GIS.

ConEd believes they have already made significant gains in streamlining the fast track applications (the vast majority of those received) by applying the Project Center portal. For other less common and larger applications the initial engineering feasibility or study review is critical. ConEd makes every effort to approve applications through a feasibility study (typically two weeks to perfm feasibility study) and avoids performing CESIR studies where possible.

Currently there are nine engineers available to work on feasibility and CESIR studies, in addition to other work functions. Because most customers are served by the low voltage (LV) network, there are a number of special conditions considered in ConEd CESIR studies. These considerations include:

- Effect of net metered system's output on local area network protectors.
- Fault current potential of synchronous generators and the effect upon substation breakers.
- For export through Network Protectors using Smart Grid Pilot Program, effect of solar on high voltage feeders.

Other practices that ConEd expects to support the interconnection process include:

- Utilizing the mapping function within PVL to provide more accurate inputs into load flow modeling.
- Developing a mobile device app to interface with Project Center and increase accessibility/visibility of case status.

Opportunities for improvement that ConEd is considering:

- Automation of load flow analysis may be possible for smaller systems, helping to streamline the otherwise manual engineer review.
- Improved quality assurance checks on existing online customer portal to reduce the percentage of incomplete submittals.
- Adjust meter exchange deadline in SIR to a date at which the installation is more finalized to reduce incidences of customers turning away meter crew.

Gaps to achieving REV Phase 1 objectives:

- Removing the human element would be problematic; there are many considerations unique to the system and the local grid that cannot be picked up by a software program.
- All the tools required for feasibility and CESIR studies would have to communicate well with one another, which would require a significant investment of time and resources; Con Ed's tools in particular differ from other utilities due to their network structure.
- Much of the data that would be required for fully automated impact studies does not exist. Additionally, data resides in different databases, and would need to be consolidated.
- Con Edison urges clarification of the State objective to share information via a publicly available queue. Con Edison currently provides application and job status via an online portal to aid in Contractor/customer knowledge of their job status. Access to specific job information is limited in part due to the personally identifiable information and sensitive market information of vendors working in the territory. Consideration could be made to summarize the active queues and make such summary data available upon real time inquiry. This level of transparency could be useful to confirm expected job processing time periods. Note also, that this functionality would supplement existing job tracking information that is already provided to the NYS DPS.

A cost/benefit balance exists. Most applications are less than 40kW, and are already processed quickly. If there is an error rate with a potential automated system, it is important that the costs of errors do not outweigh the time and resource savings of automation.

3.3 Iberdrola (NYSEG/RG&E) Self Assessment

Table 11. Utility Snapshot: Iberdrola (NYSEG/RG&E)

Customers	Apps per Month	Online Portal	Portal Software	App Processing Time	Dedicated FTEs (or equivalent)	Notes
1.25 million	120	No, apps submitted via DG email account	N/A	• <25 kW: 1-2 days • 25-50 kW: 5 days • 50-250 kW: 10 days • >250 kW: within 60 days pending Preliminary Technical Review and CESIR	• Expedited Applications: 1.5 FTEs • Technical Reviews: 8 FTEs	Among considered improvements: calculation of aggregate impact of applications in queue on the same feeder, automated customer notification, linkage of SAP information database with Access database to enable verification of customer information.

NYSEG/RGE (NYSEG) provides electric and gas service on the Eastern edge and Central and Western Upstate New York State. NYSEG serves approximately 370,000 customers in the Rochester area and approximately 880,000 customers in the remainder of the service territory, including its major operations center in Binghamton, NY. For the service area, NYSEG received approximately 120 DG interconnection applications per month, and approximately 1,400 total during 2014. There is currently a total of 3,900 systems and approximately 120 MW of DG in NYSEG. Solar electric is 94% of these systems and 43% of the capacity.

The number of connection requests has been growing steadily in recent years. Roughly 95% of those are residential. Through the end of April there were 893 applications in the queue for a total of approximately 93 MW. Nearly all of the applications in the queue are solar electric with 775 systems less than 25 kW. There were also 59 systems with outputs ranging from 250 kW to 2 MW. Developers have submitted approximately 95% of the current application queue. The staff has been increased by two in the last six months. No bottleneck exists now (as opposed to 6 months ago) because all applications go to the DG emailbox instead of an individual person (six people now review the DG emailbox compared to one or two in the past). Very recent growth of applications for larger solar electric systems is beginning to put a strain on engineering resources.

Customers submit DG applications via the NYSEG DG email account where they are reviewed in the Energy Services Department by the Transmission Services Interconnection Group. The total FTE staff currently working on SIRs interconnections in Energy Services is four.

This group carries out a clearinghouse function. Mostly developers, also customers, submit the applications with the electricity customer account number and address. Applications for inverter-based systems up to 25 kW do not require further engineering evaluation, and inverter-based systems from 25 to 50 kW are processed with a feasibility review and transformer sizing evaluation and usually approved within five days. There is no application fee for systems up to 50kW.

All applications above 50 kW require a $350 fee. Review of applications for these systems requires Distribution Planning, Protection Engineering, and potentially Substation Engineering. The number of systems above 50 kW has been increasing. Systems greater than 50 kW and less than 250 kW and all non-inverter based systems undergo a technical review. This review is completed within 10 business days. NYSEG has also seen an increase in the number of fast-track applications that end up getting cancelled.

Systems larger than 250 kW automatically go through the Preliminary Technical Review and CESIR study process. The number of applications requiring a CESIR has also been increasing recently and, depending on volume, the 60 business-day time window to do a CESIR study can be challenging. The typical cost of a CESIR study is $3,000 to $5,000.

NYSEG requires the installation of a reclosing device for all non-net-metered systems 250 kW and above. This device is capable of connection to the system's supervisory control and data acquisition (SCADA) control system, enables revenue metering and can help with monitoring and control of multiple DG on the same distribution circuit. The specific purposes of the recloser device are:

- System Protection – the recloser will be programmed to operate in a traditional protection mode to isolate the utility system for faults beyond the recloser. Fuses in each phase cannot be used for protection as blown fuse(s) would allow for the solar electric system to be interconnected in a single phase causing overvoltage conditions.
- Safety – the recloser will be SCADA-equipped to provide the local switching authority and the ability to isolate the generation from the utility system when needed either remotely or locally in the event of an emergency.

- Operational Efficiency – the recloser will be SCADA equipped to provide the local switching authority the ability to switch the generator offline for non-normal circuit contingencies when needed either remotely or locally in the event of routine switching and operation of the utility system.
- Telemetry – various data measurements will be collected and transmitted via the SCADA system to track the generator individual system's performance and its contribution to the overall performance of the distribution system.

NYSEG uses a number of software tools to internally process and study interconnection applications, and human interaction with these tools is key to proper use. When CESIR studies are required, data needs to be pulled from several different databases to perform the evaluation, including GIS, SAP (for customer peak load), and an Access database (moving to Sequel database) where customer and application information and equipment ratings are stored. In addition, different tools are used for feeder analysis and load flow (CYME) and protection (Aspen One Liner). The NYSEG distribution system is documented except for the Rochester and Binghamton downtown networks. Even so, there are several human interfaces required to conduct the studies.

CESIR studies are tracked in an Excel spreadsheet. NYSEG has customized their Access Database to handle generating the technical acceptance and review letters, the SIRS contract customer information and signature page, the meter notification email and electric service work order.

Improvements to practices that are being considered to support the interconnect processes in the future:

- Consider applications in queue and their aggregate impact on the same feeder.
- Improve customer visibility of application status and more quickly notify them of issues. This process is currently manual.
- Link the SAP information database with Access database to facilitate verification of customer information.
- Increase advanced metering infrastructure, which could help to provide more comprehensive load and voltage data.
- Conduct learning seminars for developers and provide an on-line FAQ, perhaps a check list, to assist in the SIR process.

Opportunities for improvement in the SIR that NYSEG recommends:

- Increase application fee for larger projects to discourage false starts. For example based on consider size and network versus radial circuit connections.
- Developers should be required to assign a single point of contact.
- Require a site plan for all projects larger than 25 kW.
- Adjust meter exchange deadline to a date at which the system installation has commenced to reduce incidences of customers turning away the meter crew or installing meters at facilities that don't follow through with system installation.
- Consider smart inverters and distribution management systems as the state looks toward REV.

Gaps that have been identified for achieving REV Phase 1 objectives and automation:

- NYSEG does not currently have an online application portal. However, most applications are received through the company website via an email application.
- Automation of the process for systems over 25 kW (screening and impact studies) will be challenging as every feeder and interconnection is unique.
- The data needed to perform studies is in different, unlinked systems. This requires manually gathering the data and information for different screenings and impact studies.
- Data is not readily available for downtown networks.
- Protection settings, Load Tap Changer (LTC), Cap switching, regulator and clearing times, are all in separate files. Protection engineering analyzes and provides requirements for relay settings and clearing times. Distribution Planning analyzes LTC, Cap switching and regulatory requirements.
- Reclosing time of 2 seconds may not be compatible with inverters that have increased ride-through capability.

The SIR time limits may be too short if the SIR limit is raised to 5 MW. This limit would be exacerbated by a substantial increase in application volume.

3.4 National Grid Self Assessment

Table 12. Utility Snapshot: National Grid

Customers	Apps per Month	Online Portal	Portal Software	App Processing Time	Dedicated FTEs (or equivalent)	Notes
1.6 million	350	No, apps submitted via DG email account	N/A	• <50 kW: within 3 days • >50 kW: variable pending feasibility/technical study	• Expedited Applications: 7 FTEs • Technical Reviews: 2.6 FTEs	A planning document (ESB 756 Appendix B, Ver. 3) has been developed to guide customers/developers through the interconnection process according to the NY SIR.

National Grid (NGrid) provides electric and gas service in New York, Massachusetts, and Rhode Island, and serves 1.6 million customers in Upstate New York. In New York, Ngrid currently processes approximately 350 DG interconnection applications per month, and a total of about 4,000 in 2014. Most interconnection requests are for solar electric systems that connect to the grid via an inverter. Roughly 95% of those requests are residential. Non-inverter and CHP connections are uncommon and usually for commercial customers. The number of connection requests has been growing steadily in recent years. In 2011, Ngrid established a core team that receives reviews and processes interconnection applications. This team is made up of staff from within Customer Solutions, Technical Sales and Support, and Retail Connections Engineering who follows an internal scoping document that defines responsibilities.

Customers submit DG applications via a DG email account that is received by the Customer Solutions and Technical Sales group. Customers, or developers, submit the applications with their electricity customer account number and address. Most applications do not require further evaluation (93% are less than 50 kW) and are processed and approved within three days. For the larger size systems (50 to 300 kW and 300 kW to 2 MW), the number of studies performed have been increasing significantly in recent months. Issues have been fuse sizing, reverse power flow, legacy 5 kV and delta services, and request for multiple services. Only about 50% of the feeders have aggregated load measurement and many areas are at 80-90% capacity. Currently, five engineers in the retail connections engineering group perform detailed CESIR studies. This number is up from three engineers in 2014, and is roughly one full-time equivalent staff per 800 applications per year.

Systems larger than 300 kW automatically go through a CESIR study, while systems 50 to 300 kW only proceed to study if the connection does not pass some initial manual screens that have been developed in house. One of the requirements for a study is a penetration limiting screen set at 67% of minimum load for inverter-connected DG (and 33% for non-inverter). This screen is based on islanding concerns and analysis from a report from Sandia National Laboratory.[8] It is not usually exceeded, but the number of applications for larger-sized solar electric system has been increasing recently. Depending on volume of these applications, the 60-business day time requirement to do a CESIR study can be challenging. Ngrid has also seen an increase in the number of fast-track applications that end up getting withdrawn or cancelled.

[8] Sandia National Laboratory. 2012. "Suggested Guidelines for Assessment of DG Unintentional Islanding Risk," SAND2012-1365, http://energy.sandia.gov/wp-content/gallery/uploads/SAND2012-1365-v2.pdf .

Ngrid uses a number of software tools to internally process and study interconnection applications, and human interaction with these tools is a key to proper use. When CESIR studies are required, data needs to be pulled from at least five different data bases to perform the work. In additional different tools are used for feeder analysis, load flow (CYME) and protection (Aspen). Ngrid believes that removing this human interaction to manage the tools and to review the steps is a big challenge as the user knowledge and intelligent coordination between different tools would be lost.

Ngrid has developed a planning document (ESB 756 Appendix B, Ver. 3) to inform and guide customers and developers through the interconnection process according to the NY SIR. A flow chart provides simple applications and an advanced set of requirements for larger solar electric systems (Solar Phase II Initiative, 11/14/2014) are available to the public. Ngrid has **also** developed an interconnection request processing guide for use of internal staff. Complying with North American Electric Reliability Corporation Critical Infrastructure Protection NERC CIP requirements, Ngrid has an Information Security Standard (IMS 102) that may be used for DG data in the future. A specification has also been developed to obtain quotes for a DG Tracking Platform Modernization Project. Proposals have been shared with the DPS this year and was only a request for information and not a request for quote.

Other modifications to current practices that are expected to support and/ or enhance the interconnection processes in the future are:

- To consider applications in queue, and their aggregate impact on the same feeder.
- To add more of the distribution system defining data to the EMS system (with the conversion from FeederAll to ABB) to simplify the CESIR study process.
- To improve the customer experience by streamlining their business processes and the visibility to the customer of application status.
- Increase advanced metering infrastructure could help to provide more comprehensive load and voltage data.
- Conduct learning seminars and information exchange/forums with developers.

Opportunities for improvement in the SIR that Ngrid recommends:

- Increase application fee and take a tiered approach based on technology, rate class, and network versus radial circuit to help reduce speculative applications.
- Adjust meter exchange requirement/ deadline to a date at which the installation is more finalized to reduce incidences of customers turning away the meter crew (note that the customer must be at home, meter is not pulled under load, and some customer panels do not have a main breaker, which prevents municipal approval).

- Consider smart inverters and distribution management systems as the State looks toward REV.
- Standards need to be referenced for inverter grounding (and should be determined by the individual utility at the point of common coupling PCC).
- More clarity around timeframes for distinctive process steps and recourse for utility when customer fails to complete an application.

Gaps that have been identified for achieving REV Phase 1 objectives:

- Ngrid does not currently have an online application submittal option.
- Automation of the process for systems over 50 kW (screening and impact studies) will be challenging for reasons previously described.
- The data needed for performing studies is spread across many repositories, may not exist in some areas and requires manual pulling and validation prior to use in an impact study.
- Data is not available for all feeders or for the Syracuse downtown network.
- Protection settings, Load Tap Changer , cap switching and clearing times, are all in separate files.
- Reclosing time of 2 seconds may not be compatible with future inverters with voltage and frequency ride through.
- Time limits are too short if the SIR limit is raised to 5 MW.

Cost recovery is an issue for DG in areas lacking electrical infrastructure, both for studies and upgrade, the mechanism for recovery is not clear.

3.5 Orange & Rockland Self-Assessment

Table 13. Utility Snapshot: Orange & Rockland

Customers	Apps per Month	Online Portal	Portal Software	App Processing Time	Dedicated FTEs (or equivalent)	Notes
220,000	100	Yes, relevant for any new construction, service upgrades, or new DG connections	Internally developed; applications accepted via NUCON and Project Center	• <50 kW: within 1 day (assuming no technical evaluation) • Plants requiring CESIR: within 60 days (limited sample)	• Expedited Applications: 3 FTEs • Technical Reviews: 2 FTEs	Evaluations underway: 1) enhance existing portal (for all construction requests) or interface existing portal with new commercial tool (for DG-only interconnection requests), 2) options for interfacing analysis capability on the backend of interconnection process.

Orange and Rockland (O&R), located downstate and to the west of White Plains, provides electric service in New Jersey, Pennsylvania, and New York. It serves approximately 22,000 customers in New York State. O&R currently processes about 100 DG interconnection requests per month. Most are for solar electric systems, and, roughly 95% of those are residential. Non-inverter and CHP connections are uncommon and usually for commercial customers. The number of interconnection requests has been growing steadily.

An online portal is available to accept applications for any new construction, for service upgrades, or for new DG connections. Customers can initiate the application with their existing account and address or apply for a new meter location. Most applications not requiring further evaluation (95%) are now processed within one day. Additional contract staff have been added in the last 6 months to address increasing numbers of applications and larger size DG connections. Both the kilowatt total of current requests, and the number of requests have been approximately doubling each year since 2012.

The existing O&R customer application portal was developed internally and is used for all new construction requests. Approximately 20% of these requests are for DG interconnections. This portal is working well and can likely handle foreseeable growth in number of DG install requests. However, to increase functionality and enable more automation for technical feasibility screening, another commercial software tool is under consideration. The decision at hand is whether to enhance the existing portal (for all construction requests) or to interface the existing portal with a new commercial tool (for only DG interconnection requests).

Either way, the automation of an initial feasibility check will be improved in the next few months and is expected to help ease the growing workload for both administrators and engineers. In addition to enhancing work flow processing on the front-end of the interconnection process, O&R is looking at the possibility of interfacing an analysis capability on the backend. This capability would apply only where a CESIR is required and use DEW, which is the same tool currently used in a manual mode to look at distribution load flow, protection or voltage regulation issues. The software is Distribution Engineering Workstation (DEW).

These improvements are expected to be initiated in the next few months with consideration of the ongoing REV process. Enhancements are not expected to change the existing look and feel for the customer but will increase the functionality. O&R believes that there is good potential to further automate screening to more quickly identify those interconnections that can fast-track and those that require further impact studies. If studies are required O&R intends to provide relatively accurate cost estimate early in the process.

Other practices that currently support the O&R interconnect process and/or customer visibility and interactions are:

- The company has an online portal to accept applications via NUCON and Project Center.
- Prior to the REV order being released, the company was in the process of reviewing new software to enhance the business processing in its existing online. Review is continuing to determine the best available tools for both the business processes and the technical assessment of interconnection applications.
- A simplified and more streamlined application management process will enhance the customer experience, as well as reduce the time needed to process applications.

Recommended Changes in future updates to NY SIR:

- Increase application fee for larger systems to cover costs and to discourage false starts.
- Adjust meter exchange deadline in SIR to a date at which the installation is more finalized to reduce incidences of customers turning away the meter crew.

Opportunities for future improvement that O&R is considering:

- In 2015-2016, O&R is integrating a library of devices into its website from the Go Solar California website (http://www.gosolarcalifornia.ca.gov/equipment/index.php) to provide customers/developers with better information about solar electric equipment.
- Automation to add interconnection information to GIS within about 24 hours.
- New ways to evaluate solar output performance and feedback this information to customers (with and without Advanced Metering Infrastructure [AMI]).
- Including DG, system and load data, in future automated DMS.
- Enhance interfaces to feeder analysis tools for faster identification of study requirements.
- Add mapping functionality to website that will allow potential customers to identify good locations for solar electric installations, rather than “fishing” at several locations to see which application gets accepted.

- Develop online FAQs and redevelop the website to make it more user friendly and accessible. For the latter, it has reviewed San Diego Gas & Electric, Hawaii Electric Company, Duke, Next Era, and Southern Company's websites and portals.
- Interacting with other companies and attending conferences to find out what is working well for other utilities.

Gaps to achieving REV Phase 1 objectives:

- The website does not currently have the capability for the applicant to view the status of all amounts paid and/or due to the utility (see SIR Section I.D.5).
- A high degree of manual work is currently required for technical reviews (screening, impact studies, etc.); expanded automation of technical reviews and screens, as well as integration into the existing work management system, is currently being explored to meet REV Phase 1 objectives.
- The technology to perform advanced screenings linked to the application portal has yet to be fully functional at this time in the industry; the timeline to meet this requirement needs to be adjusted to accommodate the market and industry to achieve this target.
- The cost to integrate with existing internal systems and to train employees and customers has not been discussed.
- Releasing data to a third party is a concern; O&R's model is proprietary, and there is value in its data and information systems; a nondisclosure agreement would be needed with any vendor, and data and models may need to stay behind the wall within our realm.

3.6 PSEG Long Island Self-Assessment

Table 14. Utility Snapshot: PSEG Long Island

Customers	Apps per Month	Online Portal	Portal Software	App Processing Time	Dedicated FTEs (or equivalent)	Notes
1.1 million	1,000	No, apps submitted via DG email account	N/A	• <50 kW: less than 10 days, with initial response within 2 days, depending on volume • >50 kW: variable pending feasibility / technical study, though typically expedited	• Expedited Applications: 3 FTEs • Technical Reviews: 1 FTEs	Among recently implemented process changes: changing the timing of net meter installation, contractor self-certify of inverter UL1741 capabilities, phone link set up to improve solar-related customer service.

PSEG Long Island (PSEG LI) operates the Long Island Power Authority's (LIPA) transmission and distribution system under a 12-year contract. PSEG LI provides electric service to approximately 1.1 million customers on Long Island. Working with LIPA, the PSEG LI Power Asset Management staff handles all DG interconnection requests on the Island. PSEG LI received more than 10,500 interconnection requests in the last 12 months and are currently handling about approximately 1,000 DG interconnection applications per month with a staff of 7. The approval time is less than 10 days with an initial response within two days, depending on volume. Staff is currently at about its maximum processing capability with some reserve to meet peak demand as exhibited last fall when solar applications experienced a 500% increase and utilizing reserve resources of extended days and some weekends the spike was reduced in approximately three weeks. Automation of processing would likely shorten the response and approval times, perhaps significantly.

Most interconnection requests are for solar electric systems that connect to the grid via an inverter, with 98% less than 50 kW. Non-inverter and CHP connections are uncommon and usually for commercial customers. The number of connection requests has been growing steadily. The Power Asset Management (PAM) staff handles all the initial technical reviews and most of the more detailed ones. That staff receives infrequent support from planning, protection, and meter engineering as well as the electric service group. The group is the single point of contact for applicants.

A technical screening criterion (see screening guide posted on the website) is sufficient for nearly all reviews and has been very important to keep up with the volume of applications. It was developed for PSEG LI by GE and applies to DG up to 200 kW (98% of PSEG LI applications). It is currently applied manually using a Microsoft Excel spreadsheet calculator. For most projects, there are only three screens needed; more complicated projects have five screens. Only about one project per month does not pass the screening. PSEG LI is in the process of extending this screening criteria approach for inverters based DG up to 10 MW. Automation of technical screening is worth considering and could save time and labor in application processing. Human checking would still be required for the application correctness (the number one reason that applications are delayed in processing) and to review the screening result.

Additionally, the PAM group implemented several significant application processing changes since 2012 that have enabled PSEG Long Island to keep up with the increasing volume of applications. Some of the process changes included changing the timing of net meter installation. Instead of waiting for the solar system to be installed and then issuing the net meter change order, the net meter is now installed after the solar electric system application is submitted and approved. Most times, the net meter is installed before

the system is installed and it is ready to be operated when the system is ready. Another significant technical process change was for all contractors to self-certify the UL1741 capabilities of the inverter. PSEG LI only currently performs spot checks to ensure contractor compliance. In addition, PSEG Long Island has made process changes to the billing system to recognize solar net meter customers and to be able to record net generation and have customer's bills reflect credits as soon as the system is able to produce energy. Finally, the PAM group as the "single point of contact" for interconnection issues has set up a telephone link to expedite answering and troubleshooting of customer inquiries and complaints regarding solar issues including application status, meter installations status and solar billing issues.

PSEG LI is currently using the 2012 version of the SIR with fast track applied up to 25 kW. Customers submit DG applications via a DG email account that is received by the PAM and manually entered into a spreadsheet. It is posted on the website and update every two weeks. The application status is shown, if not approved it will show "missing" in status column. Customers are also contacted by email at the; initial review/receipt of application (10 days depending on volume), technical approval stage (also 10 days for most) with closeout documents and at final approval. A manual order for meter replacement is sent upon technical approval. The PSEG LI GIS is updated monthly via a completed projects list sent to the mapping department.

Systems larger than 50 kW automatically go through a CESIR process; however, nearly all of these are inverter-connected and are expedited. So inverter DG 25 to 200 kW are very seldom studied and only if the connection does not pass the initial manual screens previously discussed. PSEG LI is in the process of extending their screening criteria and spreadsheet tool to inverter systems up to 10 MW. When the studies are completed, applicants are charged a fixed cost of $2,400.

The CESIR process for inverter system up to 200 and for rotating machines above 25kW are completed within 45-60 days. In all cases PSEG LI offers a pre-application inquiry meeting to all customers. Additional information is nearly always needed for CESIR studies. The number of these applications for larger PV systems has also been increasing recently and, depending on volume, the 60-day time window to do a CESIR study can be challenging. The screening criteria is also used for these larger projects and supplemented by in-house distribution design, planning, and protection groups. Typical information needed for the CESIR is minimum load, distance to substation, and fault studies. So far, third-party consultants have not been used for these studies.

PSEG LI uses a number of software tools to internally process and study interconnection applications, and human interaction with these tools is a key. When CESIR studies are required, data needs to be pulled from PSEG LI electronic mapping system, which has contained nearly all the required data since it was installed in 2012. Although PSEG LI has 19 small networks, over 99% of customers are served by 13.8 kV radial distribution. In additional different tools are used for feeder analysis, load flow (CYME) and protection (Aspen). PSEG LI believes that removing this human interaction to manage these tools, and to review the steps, is very challenging.

Improvements to practices that are expected to support the interconnect processes in the future are:

- Expanding the PSEG LI screening to up to 10 MW for inverter connected.
- Ongoing improvements in the data available in the PSEG LI electronic mapping.
- Availability of load data on all feeders.
- Working with outside consultant to assess smart inverter functionality for PSEG LI, which could increase hosting percentage but will not replace CESIR.
- A new job tracking system is being looked at by IT.

Challenges or gaps that have been identified for achieving REV Phase 1 objectives:

- Currently, LIPA/PSEG-LI has minimal online application submittal and online status capabilities. Applications are almost exclusively submitted via email and with some via U.S. Postal Service. The interconnection queue is publically posted on the website every two weeks. We see this as an advantage as unlike the other NY Utilities we do not have a large investment in a home grown system and are open to the implementation of a commercial software and analysis tool.
- Cost for the portal software could be significant depending upon the typical large volume. If possible we could recover the cost on a per fee application basis by implementing a minimal per-application fee for smaller applications and a minimal fee increase for larger applications.
- Automated analysis could be difficult to implement, and its results will have to be tailored to the input used. The applicant will have to fully understand the accuracy of such information and the results could be used for initial business decisions but additional study may need to be performed for the most accurate results depending upon the complexity of the application.
- If a short timeframe is required for implementing the portal, we have concerns about sacrificing quality for the sake of meeting that deadline.

Opportunities to improve existing processes:

- Automating the administration part of the process could provide significant streamlining and time savings.
- The front end of application management is what takes the most time right now, as emailed application information often must be manually typed into SGIP Queue spreadsheets to process applications.
- Automation of tasks such as the meter exchange order, approval emails, GIS entry orders, etc. could significantly reduce processing time and labor needed.
- Processing time could be reduced by having the ability to receive online payments.
- Some of our manual screen can be automated that could potentially be applied to nearly all of our applications to streamline the technical review process.

4 Readiness Assessment and Gap Analysis

The current interconnection practices employed by New York's major utilities, and summarized in Chapter 2, provide a baseline understanding of the interconnection landscape. Although all of the utilities follow a similar general method, each method applies unique approaches that are tied to utility-specific rationales. These key details and variations shine a light on an assortment of interconnection-related areas that require greater definition or other enhancement to effectively accommodate the expected volume growth of DG applications and enable a vibrant clean distributed energy resources market aligned with REV goals. This chapter considers the baseline status of interconnection processing for utilities in New York and identifies gaps to reaching the REV Phase I goals.

REV Phase 1 calls for a streamlining of the current interconnection approval processes in New York in order to reduce the administrative burden, increase transparency, and prepare for increased amounts of distributed generation deployment. In Phase 1, using the NY SIR as a framework, the Order provides that each utility must establish the following functionalities while working toward a more consistent statewide look and feel:

- Ability to apply online.
- Automatically managing the application approval process.
- Responding in a consistent and timely manner.
- Providing standardized contract forms and terms.
- Enabling transparency into the process.
- Supporting the status tracking of times to approval and who is responsible.
- Automated sharing of interconnection queue information with DPS staff and aggregate non-identifying information to a publically accessible site.
- Providing automated technical screening and impact studies.
- Improved timeliness for identification of study requirements

Considering the current status and landscape of the utilities' interconnection approval processes, and with REV Phase 1 functionality goals in mind, this chapter provides a readiness assessment of the New York utilities. It addresses the readiness of current interconnection practices by examining three indicator types: statistical, process, and functional. Following this readiness evaluation, the specific gaps for achieving REV Phase 1 on a statewide level are identified within two categories: application management processes and technical review processes.

4.1 Readiness Indicators

To provide a readiness assessment, EPRI has used the nine functionalities identified in REV Phase 1 for interconnection practices as the baseline. Individual utilities' current processes are compared by these nine functionalities to obtain a readiness perspective. In so doing, insights into the ability of each utility to automate both their interconnection application management and technical review processes were derived. The three readiness lenses utilized were:

- Statistical Level – provides insight into the capacity for processing applications and available resources.
- Process Level – provides insight into the steps, organization, design, and level of automation of existing utilities' interconnection processes.
- Functional Level – provides insight into the current status relative to achieving the REV Phase 1 interconnection goals for the DG market and utilities.

4.1.1 Statistical Level Readiness Indicators

The statistical readiness perspective provides insight into the number of applications and resourcing the utilities use for interconnection. The number of applications in the ast 12 months provides a baseline for discerning how many are processed, how quickly they are processed, how many need a CESIR, and the amount of resources required (both staff and systems). Each utility has a certain number of staff identified to support application processing and technical review. Some utilities employ staff within an organization dedicated to processing DG applications, whereas others have developed cross-functional teams to satisfy various steps of the interconnection application process. In addition to staffing numbers, the speed with which applications are processed (in particular applications that require no study) provides an indication of potential gains in efficiency that may be achievable. Lastly, understanding the ratio of CESIR studies to overall applications offers insight into the volume of applications requiring the full timeframe for completing all steps in the SIR.

Table 15 summarizes the readiness of each utility for selected statistical indicators. A range of full-time equivalents is available to support both the expedited and technical review process. Of note is that all of the utilities are able to process expedited applications within the NY SIR 10-day limit. In fact, in most cases, these applications are approved much more quickly. In addition, a relatively small percentage of applications have required a CESIR.[9] Currently, approximately 1% of applications require the added time and cost of a CESIR. (The number of applications for larger systems that typically require a CESIR are significantly lower than systems 50 kW and below). The majority of applications for systems that are 50 kW or greater are processed in the 10-day timeline with minimal technical review, depending on system size and other complexities.

Table 15 also shows that each utility has devoted substantial resources to processing interconnection applications. In some cases, the level of existing automation has allowed for significantly more streamlined processing.

[9] However, as this readiness assessment process ends, a number of factors appear to be leading to an increase in interconnection applications for larger projects that typically require a CESIR. These factors include the Net Metering Transition Plan, Community DG Order, scheduled declines in NY-Sun incentives, and scheduled reduction in investment tax credit.

Table 15. Statistical Readiness Indicators

Source: Self-assessment summaries provided by utilities

Readiness Indicators	CenHud	ConEd	Iberdrola	NGrid	O&R	PSEG LI
Available staff to process expedited applications[a]	2 FTE	10.75 FTE	1.5 FTE	7 FTE	3 FTE	3 FTE
Number of expedited applications processed in last 12 months	1,953	3,536	1,698	3,700	1,601	10,433
Processing time for expedited applications	3 days	1 day	5 days	2 days	1 day	8.4 days
Available staff to process technical reviews[a]	0.3 FTE	5 FTE	8 FTE	2.6 FTE	2 FTE	1 FTE
Number of applications received over the expedited threshold in last 12 months	18	253	160	99	48	164
Number of CESIRs performed in last 12 months	3	76	24	9	4	80
Percentage of applications > 50 kW requiring a CESIR in last 12 months	16.7%	30.0%	15%	11.1%	8.3%	48.8%
Number of software tools used for technical reviews	3	5	4	6	2	2

[a] Third party contractors are available to augment staff during times of high volume. Additionally, given that utility staff does not spend 100% of its time processing expedited applications and/or technical reviews, utilities use differing methods to estimate the equivalent level of full-time workload dedicated to each.

4.1.2 Process Level Readiness Indicators

The readiness indicators at the process level provide insight into the capability of each utility to carry out the core steps of the interconnection process itself. They lay out the steps, organization, design, and level of automation. To better understand the gaps that might exist at the process level, it is useful to consider the application management process and technical review screening separately from one another.

4.1.2.1 Application Management Process Readiness

The application management process for interconnection in New York is comprised of all the steps, tools, and procedures used to manage DG applications from submittal to approval, along with processing of expedited applications. The NY SIR provides requirements for Web-based application submittal, steps in the interconnection process (6 steps or 11 steps, depending on size and type), timeframes to complete each step, and communication with the customer at each step in the process.

Table 16 summarizes the key application management indicators considered for each utility. Of note is the manner in which utilities accept and review applications, and the methods in which they communicate with applicants. Additionally, there are identifiable differences in the way in which the utilities manage application data once it is submitted, and the extent to which it is integrated with their internal systems. Finally, interpretation of the NY SIR diverges across the examined utilities for items such as size thresholds, time windows, and communication requirements.

Table 16. Application Management Readiness Indicators

	CenHud	ConEd	Iberdrola	NGrid	O&R	PSEG LI
Applicant can see status of application review online	Yes, real time in portal with dates	Yes, real time in portal with dates	No	No	Yes, real time in portal with dates	Yes, spreadsheet posted weekly
Utility can easily see status of applications in the queue (source of application status in parentheses)	Yes (Access)	Yes (CPMS)	Yes (Access)	Yes (STORMS)	Yes (NUCON)	No (Excel)
Utility has an existing portal where applications can be submitted	Yes	Yes	No	No	Yes	No
Utility integrates DG process with existing processes for electric service requests	Yes, internal processing	Yes, external & internal process	No	Yes, internal processing	Yes, external & internal process	No
Utility process aligned with the current NY SIR size thresholds	Yes	No, expedited 25 kW & below	No, expedited 25 kW & below, CESIR 250 kW & above	Yes	Yes	No, follows previous NY SIR iteration
Automated steps in the application management process	Yes, some steps	Yes, some steps	Yes, some steps	No	Yes, some steps	No
Utility website provides reference materials for DG application process	Yes	Yes	Yes	Yes	Yes	Yes
Utility is taking steps to automate the application process	Yes	Yes	No	No	Yes	No

4.1.2.2 Technical Feasibility, Screening and Approval Process

The NY SIR outlines a technical review process for systems that are larger than 50 kW. This process involves preliminary technical reviews as well as full CESIRs. Table 17 presents several key readiness indicators to convey detectable gaps. Of note is the availability, accuracy, and accessibility (e.g., hard-copy or electronic, extent to which additional verification is required) of distribution system data that is needed for the studies. This data represents the foundation of any CESIR. Because it is fundamental to the completion and automation of such studies, it is therefore a key component to meeting future goals. Separately, each utility employs initial screening techniques that are not explicitly part of the NY SIR, but are used to streamline review of systems above the expedited size threshold and reduce the number of CESIR studies needed.

Table 17. Technical Process Readiness Indicators

	CenHud	ConEd	Iberdrola	NGrid	O&R	PSEG LI
Experts are on staff to quickly assess project feasibility in the grid	Yes	Yes	Yes	Yes	Yes	Yes
Utility has at least 90% of data needed for technical studies	No	No	No	No	Yes	Yes
Available data needs validation before use	Yes	Yes	Yes	Yes	No	No
Data is easily accessible in one or more database(s)	No, multiple databases, field verified	Yes, multiple databases	No	No, paper, field verified	Yes, multiple databases	Yes, multiple databases
Manual screening methods determine if a study is needed for systems > 50 kW	Yes	Yes	Yes	Yes	Yes	Yes
Part of screening or CESIR process is automated	No	No	No	No	No	No
Utility has taken steps to automate the technical review process	No	Yes, load flow screen	No	No	Yes, screening	No
Utility is considering automating technical review process	Yes, screening if data available	Yes, screening if data available	No	No	Yes, screening	No

Of note in the process level readiness evaluation is that some utilities are currently taking steps to automate the application process. In addition, a few utilities are considering automation and streamlining of the more technical screening processes that are now done manually. Collection, organization and access to current and reliable system data will be critical for this step.

4.1.3 Functional Level Readiness Indicators

The readiness indicators at the functional level take a more goal-oriented view. The utilities' readiness to achieve specific functional capabilities provides insight into their status relative to the broader New York REV goals for customers, utilities, and distributed generation markets. Notably, three of six utilities have made significant investment and progress toward many of these broader goals, and others are also seeking process efficiency gains. Although not fully aligned, utilities are employing many of the same methods for communication. Table 18 summarizes the overall statewide readiness for functionality called out in the REV Phase 1 Order.

Table 18. Functional Readiness Indicators

Functionality toward REV Phase 1	Statewide Readiness
Transparency	Customers can view their application status online at four of the six utility websites. Of those four, three contain dates and detailed explanations within each step that list what is needed from the customer. One utility's approach is to post a spreadsheet of the queue online on a weekly basis.
Consistent look & feel	The look and feel of the three existing online application portals are different, as are their status checking tools. In some cases, this is driven by the utilities' use of the same portal for large volumes of electric services requests besides DG interconnections. Websites with overviews of the interconnection process also contain process diagrams that are unique to each utility.
Consistent information sharing	All utilities communicate with applicants via phone/email (and through the portal, if they have one). The timing and level of detail is different due to differing interpretations of the SIR requirements.
Ability to apply online	Three utilities currently have portals where applications can be submitted. For the remaining three, applications are received via email.
Ability to manage, screen, and perform impact studies in an automated fashion	Manual review and interaction is currently necessary for all steps of the process. Three utilities are taking steps to automate application management via portals.
Standardized interconnection requirements	All utilities are using the NY SIR. Higher penetration levels and REV likely carry increased attention to interconnections and the SIR, with potential for more prescriptive processes. SIR revisions will need to consider the differences and variety inherent to the utilities and grid in NY. Individual utility experience and engineering judgment will continue to play an important role.
Standardized contract documents	An addendum is included by one utility with added terms specific to technical aspects that differs from the NY SIR.

4.2 Gaps to Achieving REV Phase 1 for Interconnection

Based on the readiness levels and indicators previously outlined, this section identifies gaps to achieving REV Phase 1 interconnection goals and requirements that are described for distributed resources.

4.2.1 Gaps in the Application Management Process

The majority of gaps in this process concern transparency and consistency. Although some of the utilities have made progress with online application portals, implementations vary.

Existing online application portals are not consistent. The three online application portals that exist today each have a different look and feel. In some cases, this look and feel is driven by the use of the same portal for large volumes of the utility's electric service requests other than DG. Creating a common look and feel, such as common naming conventions and status information, is needed, as well as consistent communication and visibility. This gap must be filled to meet REV Phase 1.

All applications are reviewed manually for completeness. Each utility reviews submitted applications for completeness manually, even if an online application portal is in use. Reasons cited include entry of incorrect information by applicants. When practical, creating an automated review process would help streamline the expedited process.

SIR approval path delineations are not consistent at each utility. Three of the six utilities follow the size thresholds outlined in the NY SIR to drive their application review process, while the others use a variation of the NY SIR's size categories. In addition, several additional factors affect the approval paths of applications, such as technology type, configuration, connection type, operational characteristics, and local infrastructure. These factors lead to a high variation of the approval paths used by utilities.

Three utilities do not have online application portals. Half of the utilities do not currently have an online application portal (or Web-based application process). Filling this gap is required to meet REV Phase 1.

Application management systems are not integrated. Existing application management systems are not integrated with other utility systems at two utilities (e.g., work management, GIS mapping systems, meter setting system, etc.).Complete automation is not possible without integrating these systems.

The timing and level of detail communicated at each step in the process varies by utility. When following the NY SIR-time windows, there is inconsistency surrounding when the clock for particular items starts and stops. In addition, the points at which communication with the customer occurs during the application process are not consistent. This gap can be addressed both in the NY SIR and to meet REV Phase 1.

Some utilities have contract attachments related to technical details of the site. One utility, for example, includes an additional contract addendum that provides more detail on specific technical requirements and terms. This component is inconsistent across the utilities.

4.2.1 Gaps in the Technical Review Process

Most of the gaps in this process relate to data and automation. Data refers to grid characteristics, electronic models, load information, and updates on physical changes to the grid. Although some of the utilities are beginning to think about automating screening processes, significant time and investment is still needed to achieve these ends.

A complete set of reliable distribution level data does not exist for most of the utilities in the State. Currently the majority of utilities do not have a complete set of data needed to perform automated technical review screens and impact studies. Filling this gap is required to meet REV Phase 1, and presents a significant challenge for most of the utilities.

In all cases, data does not reside in one database. Utilities must manually pull the data from various locations, in some cases from archived documents or field visits. Filling this gap is required to meet REV Phase 1, and presents a significant challenge for most of the utilities.

Most data must be validated before use. If data does exist, there is still exists a level of manual validation required before use, which sometimes includes field verification. Filling this gap is required to meet REV Phase 1, and presents a significant challenge for most of the utilities.

Utility distribution systems are unique. Each utility faces different technical issues, as the ability to interconnect very much depends on interconnection location and system type. This gap must be considered as part of any path forward in REV Phase 1.

Engineering judgment is critical to resolving technical issues. Engineering judgment is heavily relied upon to make decisions about interconnection and additional requirements to connect. This capability cannot be automated completely, and must be considered as part of any path forward in REV Phase 1.

Utilities use multiple tools to perform technical review. Each utility uses multiple tools (some developed in-house) to review and study interconnection applications on their system. Automation would require integration with each system. The use of these tools is limited by the availability, accessibility, and validity of the data that drive them.

There is no defined screening process. The NY SIR delineates an expedited process for applications that do not require technical review, as well as a CESIR process for applications that require a full impact study. It does not, however, define a process for applications that need technical review or screening that may be less effort than a full CESIR. Screening processes, e.g. in the Federal Energy Commission (FERC) Small Generator Interconnection Procedures (SGIP) or in State rules such as California's Electric Rule 21[10], have been shown to be useful in processing applications without formal studies. There is no screening step currently defined in the SIR. In defining this step, individual utility knowledge, and in some cases existing checklists, could evolve into more uniform procedures called for in the REV Order. Individual utility screening procedures may then allow for some level of automated technical screening, but also afford flexibility to the utilities to screen based on the unique characteristics of their system.

[10] See: http://www.cpuc.ca.gov/PUC/energy/rule21.htm

5 Implementation: Opportunities and Challenges

This chapter aims to build on the existing landscape and gaps described in previous chapters and provide actionable findings for achieving REV Phase 1 functionalities. Time relevance and practical limitations are considered.

The findings are organized in three categories:

- **Opportunities** found to be more urgent, within reach, and ready for implementation in the near term.
- **Challenges** found to be better suited to implementation over the mid to longer-term via planning, cost-benefit consideration, and deliberate steps.
- **Other** technology considerations and linkages to the broader aspects of REV, beyond standard interconnection requirements.

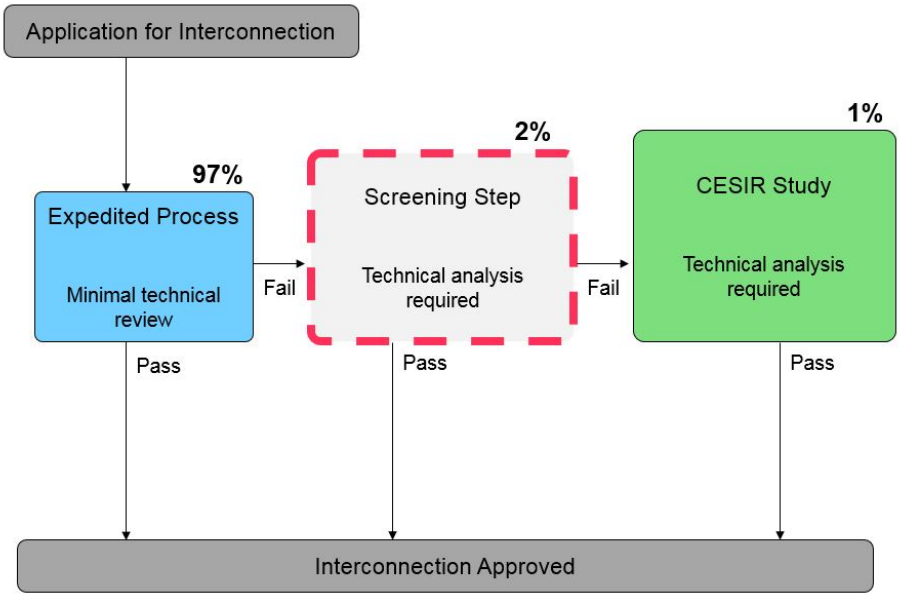
Broadly, the Other findings identify possible approaches to enhance interconnection processes as available integration technology advances and as grid integration needs change with higher DG penetration.

Examples of findings identified as Opportunities include developing a consistent functionality, look and feel with interconnection applications and contracts, education, outreach, both among utilities and between utilities and developers, and better definition of a supplemental screening review option between the current 6-step expedited process and the 11-step CESIR process put forth in the NY SIR. This screening process could allow for opportunities to automate review for a high percentage of current applications, as shown in Figure 6.

Findings in the Challenges category are REV-identified functionalities that will likely require more time and investment to implement. Examples include automating engineering judgment to assess connection feasibility, offering equal opportunity to connect and cost to connect across different grid conditions, and making expeditious decisions about the need for impact studies where data to make these decisions are imperfect or unavailable.

The Other findings look ahead and identify broader considerations such as to changing technology such as smart inverter usages, situations with increasing penetrations that alter interconnection challenges, and evolving engagement of end users in more actively managing their energy resources and usage.

Figure 6. Percentage of Total Applications that Follow Each Interconnection Process



Opportunities: Several opportunities exist to close gaps include improving visibility, enhancing customer experience, streamlining application management, adding a screening level to the technical review process, better defining application requirements including developing application checklists, and leveraging existing utility tools and expertise. Details include:

1. **Automating application management can be achieved, and in some cases is already in process.** Software is available that can be customized to interface with unique utility work management systems. Several utilities have developed online interconnection portals that effectively provide the customer with a method for application submittal and status review. These tools are still evolving with additional functionalities and automation to more precisely and consistently address the REV Phase 1 portal requirements. Utility staff who have not yet implemented portals can learn from staff that have. Also, these existing portals may be flexible to take on a more consistent state-wide look and feel. Based on a look back at applications for connection over the past 12 months, about 97% could be processed to the point of approval via online portals with only completeness and feasibility checks.
2. **Establishing a consistent look and feel for each interconnection portal can leverage existing utility investments.** As a first step, consistent statewide terminology and visibility can be obtained by developing architecture for the application portal interface. This structure would provide consistent visibility to the customer even if the internal systems for each utility differ. It is essential to develop this structure now, before each utility invests in separate automation initiatives. It will require detailed definition and outlining of portal design elements, customer communications, and transparency issues.

3. **Developing a well-defined screening process can reduce the number of CESIR studies.** Applications are trending to larger systems and grid penetration is increasing. This suggests that more defined screening methods (including initial, supplemental, and aggregate) will have increasing value in the future. In fact, utility technical experts have already developed useful screening criteria and can likely identify some new ways to streamline the technical review processes. California's Rule 21 is an example. However, more variability of the electric grid across New York State would need to be considered. For example, the New York City area is more densely populated than Western New York. Developing New York State criteria for conducting feasibility checks and screening, while allowing individual utilities and areas to be treated appropriately, may reduce the number of necessary impact studies.

   A statewide framework would be helpful for developing consistent technical review steps and methods, and individual grid screening details may hasten automation of some technical review processes. An estimated additional 2% of applications may be streamlined with this factor (on top of the 97% in the expedited process) given the current mix of applications. Streamlining is expected to bring high value in much of the state, particularly in central and western New York State where larger systems are more common and parts of the grid are less robust. Also, across the State, there is an expectation of larger systems and higher penetration levels that may benefit from an additional screening step. These applications are more likely to need technical screening, but may not require a full CESIR.
4. **Leveraging local utility expertise and knowledge is valuable component in all of the utility interconnection processing.** Most interconnection requests are addressed in a few days. The SIR (6-step process) enables expedited processing and the availability of local expertise moving the majority of applications quickly to approval. In large measure, the pace of approval happens because each of the utilities has an intimate understanding of its distribution grid, as well as in-depth corporate knowledge. This local expertise and sophisticated knowledge can be leveraged as part of the REV Phase 1 solution for streamlined interconnection.
5. **Clarifying the NY SIR will help streamline the interconnection process.** There are areas of the SIR that, with further clarification, would improve the interconnection process. Among potential revisions, examples include establishing an application checklist consistent across all utilities that would make explicit the expectations of the customer and streamline the data request process. Another example is process efficiency opportunities to utilities and applicants by revising and clarifying information required in interconnection applications as well as the specific information provided in the preliminary utility response to the applicant. Additional examples include more detail on required time frames and information needs to reduce confusion around chess clock determinations and potential adjustments to the 10-day meter set rule to help reduce undue resource burdens and increased instances of premature meter setting reported by utilities.
6. **Implementing periodic working sessions, in which interconnection experts share best practices with one another, is expected to raise the quality and efficiency of New York's interconnection processes.** With extensive knowledge and learning experiences in hand, utilities, regulators and others are well positioned to contribute and share with one another. For example, more consistent application of technical requirements in the SIR and related interconnection standards could be addressed with the goal of improving the statewide process. Utilities' sharing of work practices could enhance focus on topical areas.

7. **Automated data entry and customization of DG databases can improve efficiency of the application management process.** Two utilities' online portals automatically feed data from the customer's interconnection application into the DG database, and another utility was in the process of developing a similar system at the time of the REV Order. By implementing such practices, utilities can reduce the need for manual data entry, thus streamlining the application management process. Customization of DG databases also has potential to save time in the processing of applications. For example, several utilities have customized their DG databases to automatically generate meter exchange requests or important letters to the customer (approval, final authorization, etc.) at the appropriate time, and one utility's DG database automatically feeds customer information into its DEW models for analysis. Going forward, additional customization could incorporate links from the DG database to site plans or supporting documents, creating a central data repository for quick access to important customer documents and information. Continued development of DG database integration and customization represents a significant source of efficiency improvement in the application management process.

Challenges: Several gaps are related to data availability, data validation, automating human engineering knowledge, automating reasoning for problem solving in unique grid circumstances and systems, and the relative cost-benefit associated with accelerating the process. Details include:

1. **Customers and developers see inconsistency in cost and completion time of CESIR studies.** Costs for CESIRs are currently inconsistent among the utilities, as are the timeframes required to complete them. Inconsistency is largely due to uniqueness of the distribution systems. Additionally, the complexity of the data collection processes and access to reliable distribution data at some utilities extends the time needed to complete such studies. Separate from internal system data, data needed on the DG project itself can delay a CESIR until answered. Defining more consistent communication points provides better transparency to the customer, but does not make CESIR costs and timeframes more uniform among the utilities. The improved availability of data is an important precondition in both regards.
2. **Automating the CESIR process represents significant effort.** Several specific gaps are challenging the full CESIR automation:

    - Detailed data needed to perform technical reviews and accurate feasibility assessments is not complete and in many cases scattered in different systems and databases. Additionally, the load data to assess feeder and substation penetration levels is not readily available and not in a consistent format. When data and systems are imperfect, more extensive human engineering judgment is required. Several utilities are currently working to collect and improve their data sets, but expect the effort to take several years to accomplish.
    - Lack of well-defined integrated methodologies and tools. To fully account for complexity of the distribution system, existing utility tools are well positioned from the grid perspective, but DG integration tools are still being developed. As this process evolves, utilities will more readily be able to perform these analyses within their existing tools using data in a consistent manner.

- Interfacing with all the different utility business processes is challenging. Each utility uses multiple systems and databases to perform a CESIR with different interface requirements. These legacy systems have different makes, manufacturers, and vintages that lack a common input and output. Over time, these systems will evolve and become more integrated, utility by utility, but this is not happening uniformly in the short term. Several utilities mentioned initiatives already underway to merge existing databases within the utility to streamline its overall business processes. Still, it remains uncertain if full interfacing of business process systems will be practical in the long run.

3. **Customers and developers face variation in the ease of interconnection in different parts of the electric grid across New York State.** Although consistent interconnection requirements would improve application processes, they must also take into account unique distribution systems. The technical requirements for grid connection of DG systems across the State vary depending on relative size, capacity, and location. For example, in parts of the State, voltage is the primary concern, which has a specific set of technical solutions, whereas in others parts islanding is the primary concern, which results in a different set of solutions. These study requirements and solutions result in different timelines to approval and infrastructure upgrade needs and costs.
4. **Communication of the uniqueness of utility distribution systems and the technical requirements and impact of DG can help with the application process.** Being able to effectively communicate the requirements and uniqueness of the distribution system results can help improve the interconnection process, but requires the system data to be available. With system data, utilities can begin to communicate specific issues and locations on the system that might have less of an impact as well as those that might have additional technical requirements. The hosting capacity will vary across the grid and along a single feeder. Communicating the differences, more or less favorable areas, will help guide DER to locations where it can more readily and cost-effectively be integrated into the distribution grid.
5. **The volume of future applications is subject to a number of variables, making it difficult to plan resources.** The current volume in applications varies at each utility throughout the course of the year. The drivers are related to NYSERDA incentives, policy changes, economics, and local developers. The ability to anticipate volume at any given point in time has become increasingly challenging over the past year. Each utility expressed inherent flexibility in resources that can support the interconnection process (both internal and external), but have no access to data to plan for it over the next few years.

Other: Several other considerations and linkages can make a difference in the New York interconnection process. These considerations are related to evolution of technologies, end-use customer engagements, and other state and national efforts related to interconnections, standards, outreach, and education. Details include:

1. **Smart inverters provide value as DG penetration increases.** Using smart inverters is recognized as having future value. A lesson learned from rapid DG deployment in Germany and elsewhere is to include the smart inverters on approved lists with flexibility for certain advanced functions to be enabled at a later date, as well requirements that include grid support capability before DG penetration reaches a level where it is needed. The incremental cost is small and starting sooner is a proactive step to making the grid more DG-ready. Later, the functionality will be available when utilities are equipped to take advantage of it. Starting sooner is most easily initiated by state interconnection requirements. Given that the scale of DG penetration is increasing rapidly, near-term attention to these issues is needed. Because the incremental cost is small and equipped inverters are readily available, they may be appropriate or required for all sizes, from residential to large-scale systems.

   Standards such as IEEE 1547 are already evolving to allow for grid support functions. Future utility DMS systems are expected to be able to coordinate with distributed generation voltage support and also have the analytical tools and data needed to determine settings and operating algorithms. A number of utilities are aware of this opportunity and are taking steps to prepare to take advantage of widespread distributed grid support from DG. Utility DMS that are in most utilities' plans will need to specify a DG coordination functionality.
2. **Other aspects of REV will play a role in how interconnection evolves.** Interconnection is just one piece of the REV process. Over time, the technology, grid, and markets will evolve, and that will impact interconnection volume and process. As utilities identify areas of their system where more DG can be accommodated, where it provides greater value, or where more challenges may occur, alternatives may present themselves. In particular, as the DSP role takes shape, utilities will have more tools, methods, and data available to improve their efficiency and effectiveness as well as to expand markets and options to customers and developers.
3. **Existing activities in New York State can be leveraged for education and information sharing**. In New York State, several activities can currently help further the interconnection process. For example, the NYSERDA/CUNY/ConEd initiative to develop the NY State Solar Map has potential as a model for use as a statewide inventory of existing DG or possibly as a future map showing the best grid areas for DG. As initiatives such as this one evolve, they can be leveraged toward the overall REV Phase 1 vision for transparency into interconnection.
4. **Leading practices can be shared statewide for enhanced customer service and engagements.** Initiatives for customer outreach are being considered by most utilities, and several have identified opportunities worth sharing statewide. This concept of enhanced customer service and engagement could be a positive side effect, spurring investment in portal enhancements, expanding customer choices, and enabling prosumers.

Appendix A: Glossary

Business Day: Monday through Friday, excluding utility holidays. Source: NY SIR (2014)

CESIR Process: The 11-step application process described in Section I.C. of the NY SIR (2014). This process applies to systems that do not satisfy criteria for the Expedited Process. The 11 steps consist of:

1. Initial Communication from the Potential Applicant
2. Inquiry is Reviewed by the Utility to Determine the Nature of the Project
3. Potential Applicant Files an Application
4. Utility Conducts a Preliminary Review and Develops a Cost Estimate for the Coordinated Electric System Interconnection Review (CESIR)
5. Applicant Commits to the Completion of the CESIR
6. Utility Completes the CESIR
7. Applicant Commits to Utility Construction of Utility's System Modifications
8. Project Construction
9. Applicant's Facility is Tested in Accordance with the Standardized Interconnection Requirements
10. Interconnection
11. Final Acceptance and Utility Cost Reconciliation

Source: NY SIR (2014)

Coordinated Electric System Interconnection Review (CESIR): Any studies performed by utilities to ensure that the safety and reliability of the electric grid with respect to the interconnection of distributed generation as discussed in the NY SIR. Source: NY SIR (2014)

Distributed Energy Resource (DER): From EPRI, "Smaller power sources that can be aggregated to provide power necessary to meet regular demand." From REV, "DER is used to describe a wide variety of distributed energy resources, including end-use energy efficiency, demand response, distributed storage, and distributed generation. DER will principally be located on customer premises, but may also be located on distribution system facilities. Sources: EPRI (http://www.epri.com/Our-Work/Pages/Distributed-Electricity-Resources.aspx), REV (2015).

Distributed Generation (DG): A method of generating electricity from multiple small energy sources very near to where the electricity is actually used. Source: Dictionary.com.

Expedited Process: The 6-step application process described in Section I.B. of the NY SIR (2014). This term is typically interchangeable with the term Fast Track Process, applying to systems 50 kW and less, and to UL 1741 certified inverter-based systems between 50 kW and 300 kW. The 6 steps consist of:

1. Initial Communication from the Potential Applicant
2. Inquiry is Reviewed by the Utility to Determine the Nature of the Project
3. Potential Applicant Files an Application
4. System Installation
5. Applicant's Facility is Tested in Accordance with the Standardized Interconnection Requirements
6. Final Acceptance

Source: NY SIR (2014)

Feeder Hosting Capacity: The total amount of PV that is likely to cause an adverse impact to the feeder; i.e., the maximum amount of PV that can be accommodated. Source: EPRI "Stochastic Analysis to Determine Feeder Hosting Capacity for Distributed Solar PV" (2012)

Generator-Owner: An applicant to operate on-site power generation equipment in parallel with the utility grid per the requirements of the NY SIR. Source: NY SIR (2014)

Impact Study: A collection of electrical engineering studies addressing the effects of a DR interconnection with an electric power system. Commonly includes Power Flow, Short Circuit, Voltage Regulation, Flicker and Power Quality, and less common may be Dynamic/Transient Stability Electromagnetic Transient. Source: IEEE 1547.7 (2013)

Integrated Planning for DG: Maximizing the benefits and minimizing the impacts of DG in an integrated grid. Sources: IEEE Power and Energy Magazine (Mar/Apr 2015, article by EPRI), EPRI "Distribution Feeder Hosting Capacity: What Matters When Planning for DER?" (April 2015, #3002004777)

Integration of DG: Integration considers the operation of the entire electric power system, how this system is affected by distributed resources, and how to maximize the strategic value of these resources in the system. It is intended to have a broader meaning than simply interconnection of DSG at a single point in the power system. Source: EPRI Engineering Guide (Dec. 2012, Report 1024354)

Interconnection: The result of the process of adding a DG unit to an Area EPS. Source: IEEE 1547 (2003)

Islanding: A condition in which a portion of the utility system that contains both load and distributed generation is isolated from the remainder of the utility system (Adopted from IEEE Std 929). Source: NY SIR (2014)

Online Portal: A web portal is most often one specially designed Web page that brings information together from diverse sources in a uniform way. Source: Google

Penetration Level: The rated power output of the aggregate PV systems on a distribution circuit segment divided by the peak load of that circuit segment. Source: IEEE PVSC (2011)

Point of Common Coupling: The point at which the interconnection between the electric utility and the customer interface occurs. Typically, this is the customer side of the utility revenue meter. Source: NY SIR (2014)

Preliminary Review: A review of the generator-owner's proposed system capacity, location on the utility system, system characteristics, and general system regulation to determine if the interconnection is viable. Source: NY SIR (2014)

Remote Net Metering: Per the Public Service Law (PSL) §66-j & §66-l, Remote Net Metering allows certain types of customers and/or distributed generation technology (see tables in NY SIR Section II) the option to apply excess generation credits from the customer's generator to certain other meters on property that is owned or leased by the same customer and located within the service territory of the same utility to which the customer-generator's net energy meters are interconnected and within the same load zone. Source: NY SIR (2014)

Screening: A means of reviewing systems using relevant criteria during the interconnection application review process. Screens are used in several state and federal interconnection procedures such as FERC SGIP 2013 (2 supplemental screens) and CA Rule 21 2015 (18 screens in three levels), and often share the following characteristics:

1. Vary from simple (expedited) to complex (study), use various interconnection procedures and rules, and often include a supplement screening.
2. Usually involve relative size ratios, calculations, formulas, and penetration metrics.
3. Typically provide fast review without requiring impact studies.

Sources: FERC SGIP (2013), CA Rule 21 (2015), EPRI

Smart Inverter: An electronic power converter that, in addition to converting direct current alternating current (inverting), includes capabilities to provide grid support offering one or more of the following features:

- Voltage support at the point of common coupling with the grid, and by modulating either the real or reactive power output to the grid.
- Ride-through of grid voltage or frequency deviations outside the normal range, usually brief events where the inverters remain connected and may adjust output.
- Operator remote control providing the opportunity to update or dynamically adjust trip settings, ride-thru behaviors, as well as real or reactive power.

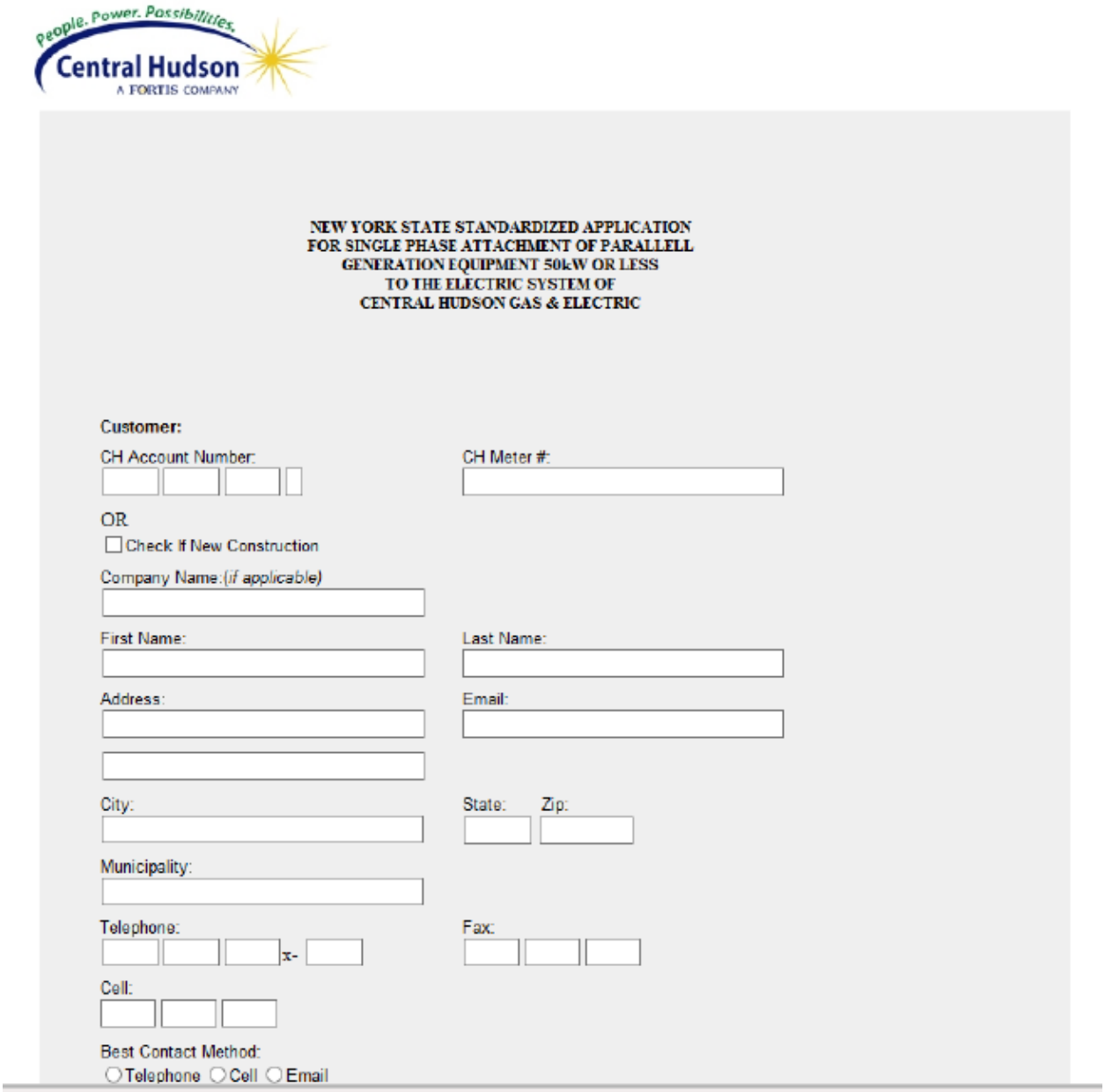
Source: EPRI

Verification Test: A test performed upon initial installation and repeated periodically to determine that there is continued acceptable performance. Source: NY SIR (2014)

Appendix B: Existing IOAP User Interfaces

Central Hudson IOAP

Central Hudson Application Page



NEW YORK STATE STANDARDIZED APPLICATION
FOR SINGLE PHASE ATTACHMENT OF PARALLELL
GENERATION EQUIPMENT 50kW OR LESS
TO THE ELECTRIC SYSTEM OF
CENTRAL HUDSON GAS & ELECTRIC

Customer:

CH Account Number:

CH Meter #:

OR

☐ Check If New Construction

Company Name:*(if applicable)*

First Name:

Last Name:

Address:

Email:

City:

State: Zip:

Municipality:

Telephone: x-

Fax:

Cell:

Best Contact Method:

○ Telephone ○ Cell ○ Email

Central Hudson Status Page

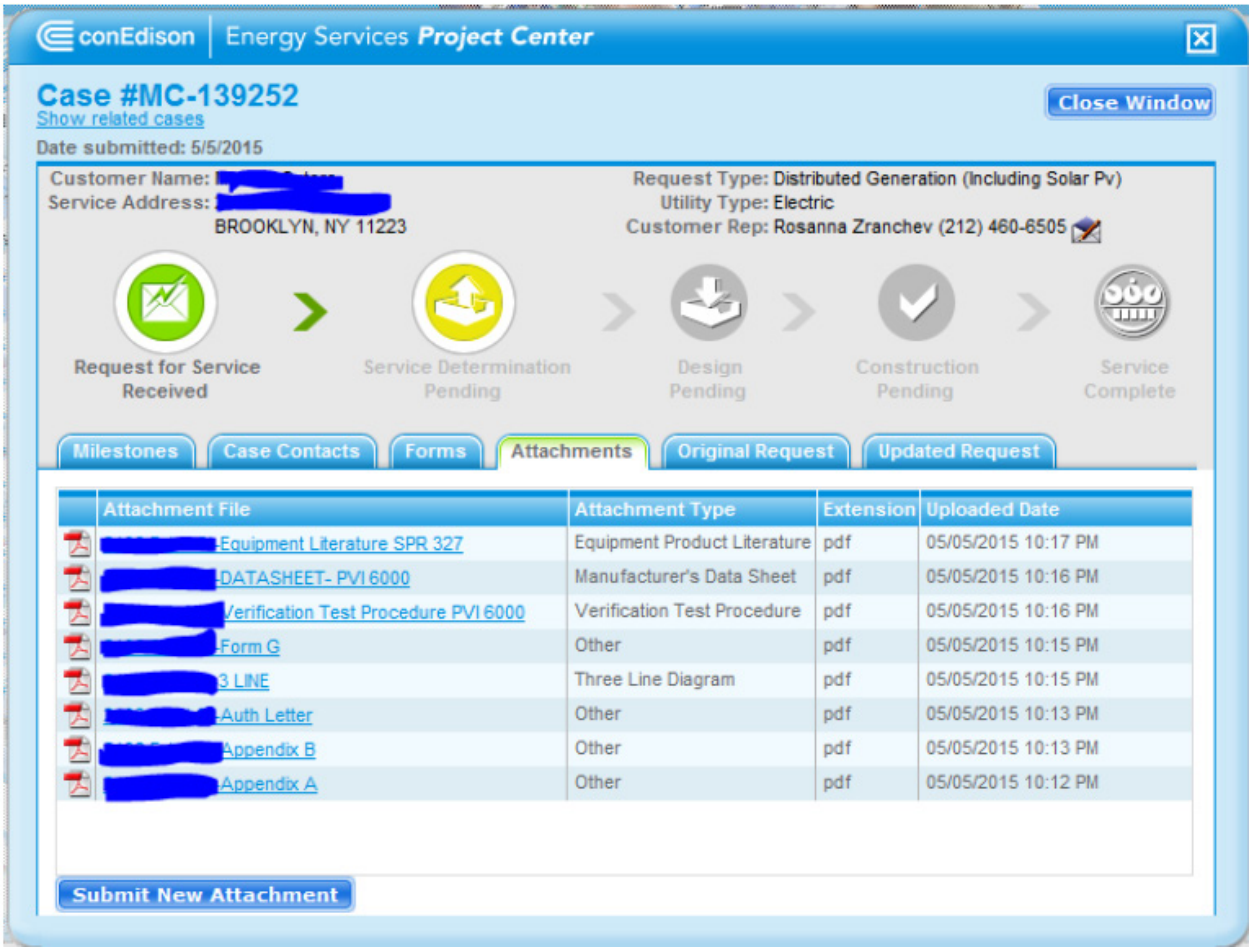
Project Number: 003615
Applicant: [redacted]
Address:
Phone Number:
Source: PV
Size(kW): 5.52
Contractor: HUDSON SOLAR
Project Status: INTERCONNECTED

Application Filing		
	Date Complete	Comments:
App.Reviewed For Completeness	2014/09/30	
Application Complete?	2014/09/30	
Letter of Authorization (if applicable)	2014/09/30	
Application form completed and signed	2014/09/30	
Standardized contract signed	2014/09/30	
Three-line diagram complete	2014/09/30	
Site plan diagram complete	2014/09/30	
Copy of manufacturer's equipment data sheet complete	2014/09/30	
Copy of manufacturer's verification test procedures complete	2014/09/30	
Copy of equipment UL certification complete	2014/09/30	
Expected Central Hudson review date		
Preliminary Approval Granted	2014/10/10	

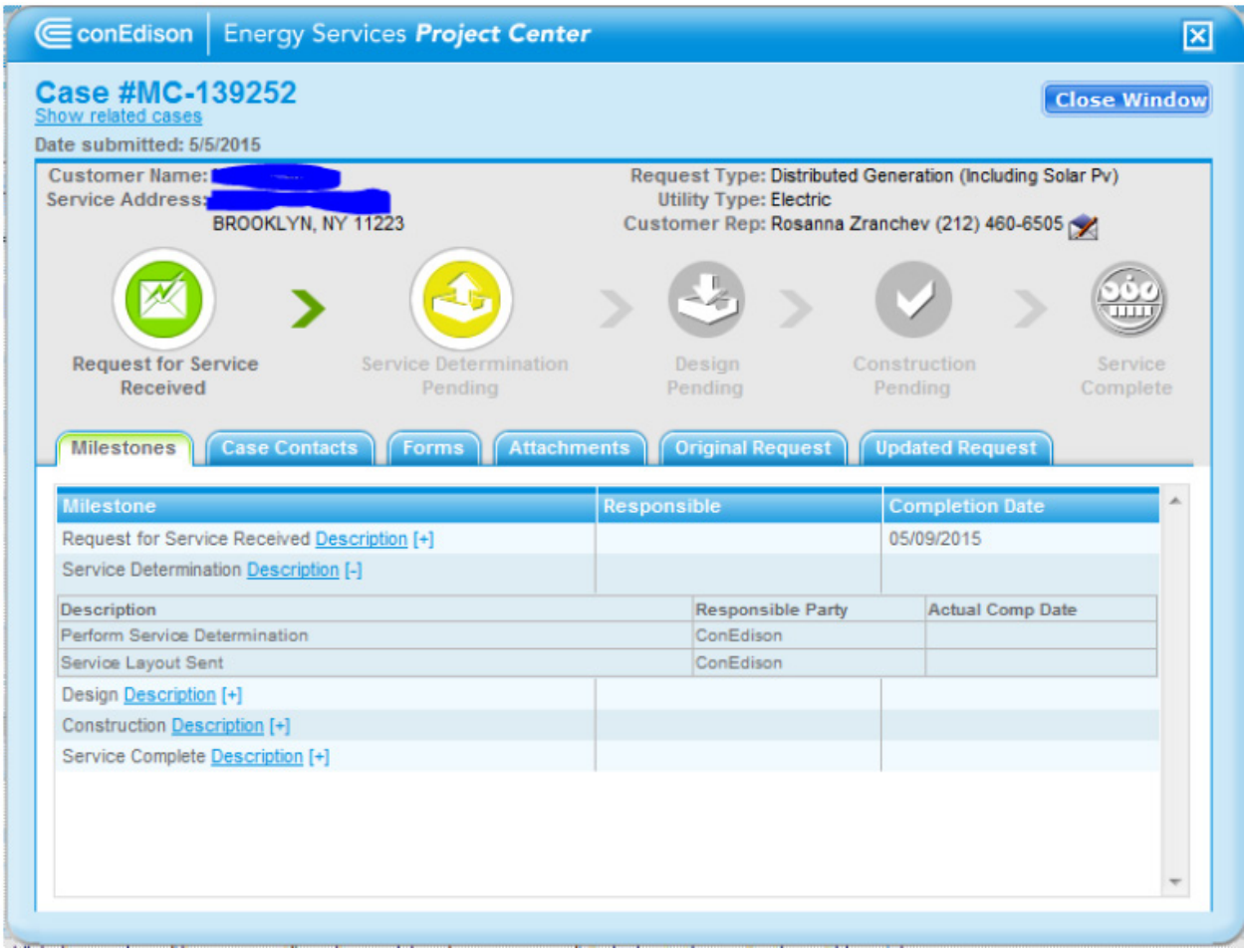
Construction/Detailed Review (if required)			
	Amount	Date Complete	Comments:
Preliminary Review Complete			
Cost Estimate For CESIR	.00		

Consolidated Edison IOAP

Consolidated Edison Application Page

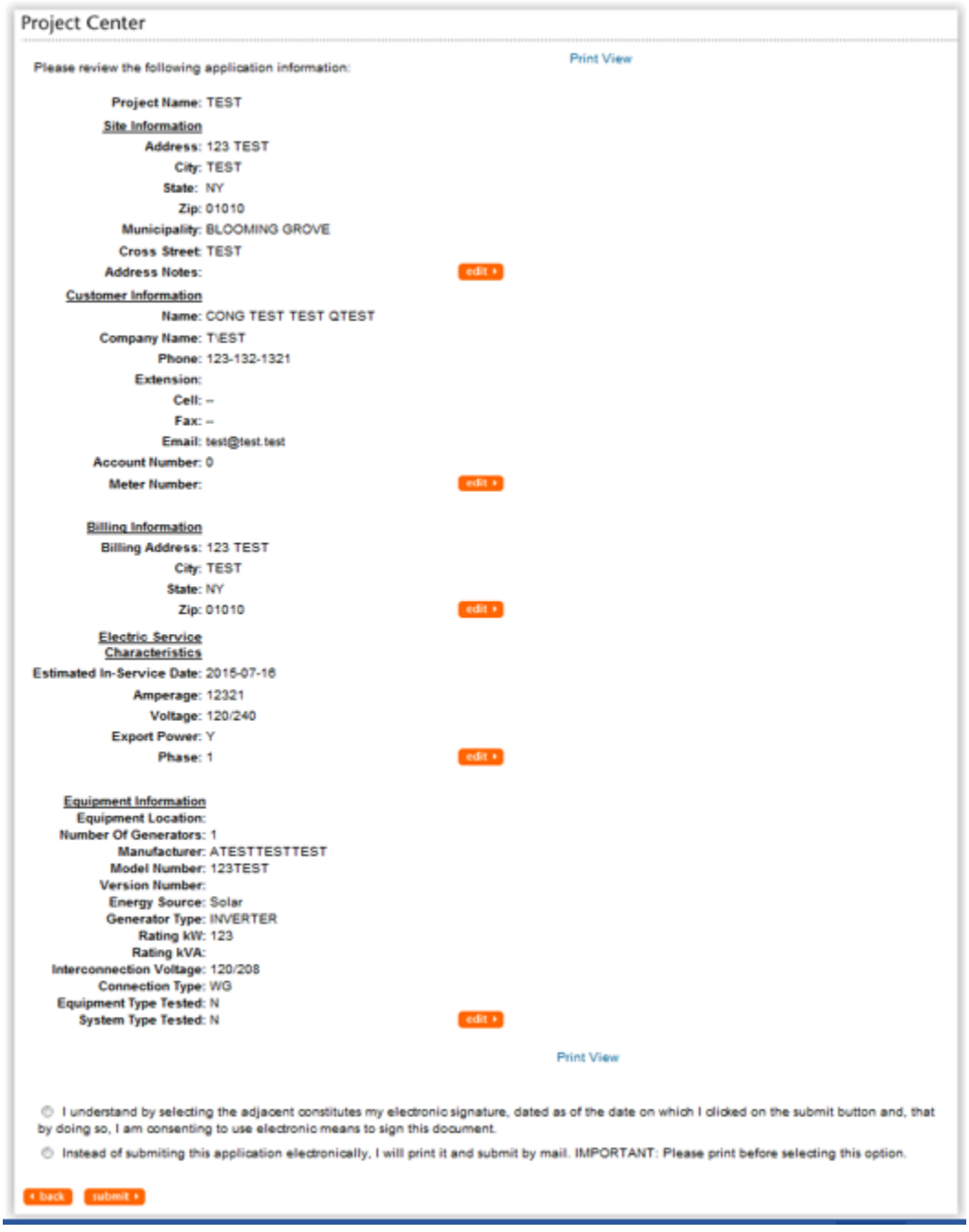


Consolidated Edison Status Page



Orange & Rockland IOAP

Orange & Rockland Application Page



Project Center

Print View

Please review the following application information:

Project Name: TEST

Site Information
Address: 123 TEST
City: TEST
State: NY
Zip: 01010
Municipality: BLOOMING GROVE
Cross Street: TEST
Address Notes: edit

Customer Information
Name: CONG TEST TEST QTEST
Company Name: T\EST
Phone: 123-132-1321
Extension:
Cell: --
Fax: --
Email: test@test.test
Account Number: 0
Meter Number: edit

Billing Information
Billing Address: 123 TEST
City: TEST
State: NY
Zip: 01010 edit

Electric Service Characteristics
Estimated In-Service Date: 2015-07-16
Amperage: 12321
Voltage: 120/240
Export Power: Y
Phase: 1 edit

Equipment Information
Equipment Location:
Number Of Generators: 1
Manufacturer: ATESTTESTTEST
Model Number: 123TEST
Version Number:
Energy Source: Solar
Generator Type: INVERTER
Rating kW: 123
Rating kVA:
Interconnection Voltage: 120/208
Connection Type: WG
Equipment Type Tested: N
System Type Tested: N edit

Print View

I understand by selecting the adjacent constitutes my electronic signature, dated as of the date on which I clicked on the submit button and, that by doing so, I am consenting to use electronic means to sign this document.

Instead of submiting this application electronically, I will print it and submit by mail. IMPORTANT: Please print before selecting this option.

back submit

Orange & Rockland Status Page

Total Capacity All Sources (kW): 0

Project Steps	Amount	Completed Date / Not Applicable	Estimated Completion Date	Pending from Customer
[-] Project Initiation				
Application Received		2/6/2015		
Contract Received		6/4/2015		
Application Fee Received		6/4/2015		
Three Line Electric Schematic		6/4/2015		
Generator/Inverter Information		6/4/2015		
Installation Test Plan				
Application Review Complete		6/4/2015		
[-] Engineering Review				
Application Not Approved - Letter Sent				
Design Approved for Construction		6/4/2015		
[-] O&R Construction				
Payment Received				X
O&R Construction Complete				
[-] System Installation				
Net Meter Order				
Net Meter Installation Complete				
[-] Inspection Process				
Receipt of Electrical Inspection				X
RECEIPT OF CONTRACTOR CERTIFICATION				X
Appointment with Customer				X
Verification Test Passed				
Verification Test Failed				
Verification Re-test Passed				
Verification Re-test Failed				
[-] Project Complete				
Final Interconnection Acceptance Letter Sent				

Contract : View

Check status of another project go exit

Appendix C: In Depth Interviews (IDIs)

NEW YORK INTERCONNECTION ONLINE APPLICATION PORTAL GAP ANALYSIS

IN-DEPTH INTERVIEW TOPIC GUIDE (Rev 3)

Respondent Name(s):	Heather Adams & Stephanie Genesee
Respondent Title(s):	Director, Electric Distribution and Standards Assistant Engineer
Company Name:	Central Hudson Gas & Electric
Contact Information (phone / email):	845-486-5552, hadams@cenhud.com 845-486-5473, sgenesee@cenhud.com
Date / Time of Interview:	June 2, 2015, 9am-3pm
EPRI Interviewer(s):	Tom Key, Lindsey Rogers, David Freestate

I. Background & Perspective – Questions to Answer Beforehand

1.1 What size (kW) classifications are used to segment interconnection applications?

- ≤50kW – Technical review (besides transformer check) not required or performed.
- >50kW-300kW – Technical review performed but CESIR is typically not required.
- >300kW-1,000kW – Technical review performed and CESIR likely required depending on system conditions.
- ≥1,000kW – CESIR required.

1.2 Are there any tools or processes you are developing to help make interconnection faster/cheaper/better? If so, can these tools be shared?

As part of the Company's internal Bridge-to-Excellence (B2E) process improvement program, Central Hudson had developed an on-going B2E Team in order to improve the Distributed Generation Interconnection process. As a result of this team, Central Hudson was in the process of implementing various interconnection improvements; however, placed them on hold pending the outcome of this gap analysis. The following are a list of the improvements:

- A graphical redesign of the externally facing web portal will help ease of use by providing a more user friendly customer self-service channel.
- We have plans to implement a new internal web application interface which will greatly reduce application review time.

- Recreating our DG Customer Access Database into a web application will help automate our process and increase efficiencies immensely. The new web application that we have been working on will automate DG related procedures for not only the Engineering Department but the Meter Shop, Customer Accounting & Customer Service Departments as well. The new system will have the same current customer information and automated checks as our current Access Database, in addition to the following improvements:
    - Automatic customer information input.
        - Currently when an application is submitted through our web portal, the information automatically uploads to our mainframe but not our DG Customer Access Database. Customer information and DG project information is then copied and pasted into the database.
    - Side-by-side comparison of customer information between the utility records and the interconnection application.
    - Automated scheduling of projects due each day would replace our current Excel spreadsheet.
    - Integration of PSC Certified Equipment (Pull down list of inverters)
    - Ease of entering inverter information for contractors.
        - Rather than filling in each field of inverter information in the application (SIR Appendix B), the web application will have dropdowns and even calculate the total system size.
    - Automatic transformer loading calculation.
        - Based on our records, the system will take into account all DG (installed & pending) on the customer's transformer and calculate its loading. This will help us determine if an upgrade is necessary to accommodate their proposed DG.
    - Link to the customer/contractor web portal.
        - Will provide customer/contractor with up-to-date status and eliminate duplicate work for the technician processing the application.
    - Add ability for customer/contractor to update web application, submit additional documents, and submit final interconnection request online.
        - Currently they can apply via the web and upload documents, but do not have the ability to revise or add documents. After the initial submission, any changes must be submitted through email, including the final interconnection submission.
    - Consolidation of multiple databases and spreadsheets will help reduce duplication.
        - Transformer upgrades and technical review information is currently stored in a separate spreadsheet and would be pulled into the web application.
    - Checkbox for field visits that our Operations Department could see, rather than emailing back and forth.
    - Automate billing order invoice requests to our Customer Accounting Department.

- Automate net meter install dispatch orders.
  - Currently the request is manually made from our Meter Department to our Customer Service Department once the orders are created and email is sent back. The system will automatically create the appropriate order based on the web application information.
- Automatically set up the account as "Net Metered" upon final interconnection approval.
  - Currently an email is sent from Engineering to Customer Accounting and it is manually set up.
- Automatically generated approval letters and status update emails will also be implemented.
- Automatically mail an interconnection contract to a new customer taking over service at net metered account.

1.3 What are the most significant issues in processing interconnection applications?

- Discrepancies between three-line diagram submitted for preliminary approval and final interconnection documents
  - Review documents for discrepancies/errors; verify the size and components listed match the three-line diagram
  - Submit as-built three-line if installation differs from approved design (inverters, panels, interconnection point, etc.)
- A system is built prior to submitting an interconnection application.
  - System design may not be approved.
  - Unnecessary wait times for upgrades (net meter, transformer, etc.) as they should be done in conjunction with the system construction.
- Typing customer signatures.
  - Digital signatures are accepted through Verisign on a case-by-case basis, but they must be actual signatures, and not typed in a cursive font (as sometimes happens).
- Submit application under wrong Utility Account # and Utility Meter #.
  - Verify the Utility Meter # <u>in the field</u> that you will be interconnecting the system behind.
  - If the customer has multiple meters at their location, be certain you are submitting the application using the correct account and meter number.
- Time spent processing applications/upgrading meters when the customer is not committed
  - Overall, approximately 6% of projects received are either abandoned or considered abandoned due to contractors/agents submitting applications to Central Hudson when the customer is not committed to the project and does not have any intention in moving forward.

1.4 What tools do you use to ensure the privacy and security of your customers' information?

- The customer/contractor can create a username and password to view the status of their project.
- When submitting through our web portal, a unique project number is automatically generated and sent to the e-mail addresses provided for the application, and is required during the initial login to access the customer's project status/information.

1.5 Please complete the below table to give us an idea of volume of applications: (Please note that the responses below are for all interconnections, regardless of technology and net-metering status) The below stats are based on apps received 5/28/14-5/27/15.

Question	< 50 kW	50-300 kW	> 300 kW
How many MW of PV and non-PV DG are currently interconnected?	26.752 MW	2.536 MW	4.582 MW
How many applications did you process in the last 12 mos?	1,953	13	5
What % of all applications in the last 12 mos were incomplete when received?	15.0%	100.0%	100.0%
What % of applications in the last 12 mos have been approved?	98.7%	76.9%	0.0%
What % of applications in the last 12 mos have been installed?	70.4%	38.5%	0.0%
Do you conduct a preliminary technical review for each of the project size categories (Y/N)	Y (limited)	Y	Y
In next 2 years, what are your projections for the level of interconnection applications received?	See below- note* and chart.		

*May 2015 received 13 applications >1MW. Suspected driver - RNM grandfathering clause effective June 1, 2015.

Year	Total Annual Preliminary Applications Received	% Change
2009	248	-
2010	219	-12%
2011	202	-8%
2012	457	126%
2013	570	25%
2014	1,658	191%
2015*	622	N/A
***2015 includes data for Jan-Apr only**		
5 Year Avg. (2010-2014)	621	64%

Year	Total Annual Final Applications Received	% Change
2009	226	
2010	229	1%
2011	187	-18%
2012	377	102%
2013	456	21%
2014	1,214	166%
2015*	578	N/A
***2015 includes only Jan-Apr Data**		
5 Year Avg. (2010-2014)	493	54%

1.6 For approved project applications (both installed and not pursued) in the last 12 months, what percent have required utility infrastructure upgrades of between $0-$9,999, $10,000 to $49,999, >$50,000 to $100,000, >$100,000? Has this changed from prior years? If so, why?

Question	$0-$9,999	$10,000 to $49,999	>$50,000 to $100,000
What percent have required utility infrastructure upgrades?	5.733%	0.051%	0.051%

*Based on 1,971 apps received $0-$9,999 with 113 upgrades; $10,000 to $49,999 with 1 upgrade required; $50,000 to $100,000 with 1 upgrade required.

- The amount of transformer upgrades has increased due to multiple systems being installed on the same transformer, which has not been a problem in the past.
- We have also seen a significant increase in applications >300kW, which have a higher potential to require mitigation solutions that may be costly.

1.7 Please complete the below table to give us an idea of the tools and systems (business + technical) used in the interconnection process:

Process	Tool/System	How do you use it?	Used for something other than DG also?	In House/ Commercial
Business Management Systems	Mainframe	* View customer/ meter info * View/update DG web app * View/update app status/info	Yes, houses all utility customers' account info	Commercial software, in-house development and design.
	Access Database	*Store DG system info * Generate approval letters * Run queries for reporting * Review transformer	No	Commercial software, in-house design.

		DG loading		
	Excel	*Log preliminary & final interconnection submissions * Track DG system upgrades & associated billing orders * Track technical review details	No	Commercial software, in-house design.
	OMS	Confirm customers feeder, transformer, & transformer size	Yes, outage management tracking.	Commercial software
	FOS/WMW	Net-meter change assignments to field personnel	Field Management Systems	Commercial Software
Systems for Technical Review	Milsoft's WindMil	Modeling DER on feeder: power flow & fault currents for off-peak and peak conditions.	Yes, distribution feeder studies and feeder development.	Commercial software
	EDD's DEW	Modeling DER on feeder power flow, fault currents, & DER assessment tool for min load and peak	Yes, underground network analysis.	Commercial software

		conditions.		
	Excel	Record analysis and modeling results from WindMil/DEW using Excel.	No	Commercial software, in-house design.

How many utility staff are currently available to perform *administration and processing* of interconnection applications?) What is the estimated total man years for this effort?

- 2 CH Employees
- 1 Contractor as needed

Approximately 2 FTEs (4,080 man hours per year)

1.8 How many utility staff are currently available to perform *engineering and studies* of interconnection applications? What is the estimated total man years for this effort?

- 1 CH employee in Electric Distribution Planning for systems > 50kW
- 1 CH employee in Electric System Protection for non-inverter based system applications

Approximately 1/3 FTE. Larger studies utilize third party consultants for CESIRs on a case-by-case basis.

II. Interconnection Process – Getting into the Details

Receiving Application

2.1 How does your first contact with the DER customer typically occur? Which department is responsible for replying to initial customer inquiries, and what is their standard procedure?

- Generally the first contact is when the contractor/agent submits the application through CH's web portal on behalf of the DER customer.
- The Electric Distribution Planning (EDP) Department is responsible for initial customer inquiries, which are responded to within 1-3 business days in the form they were received (either phone call or e-mail).
- If a customer calls our Customer Service Department, a CSR may be able to answer their question; if not, the inquiry is forwarded to the Distribution Planning department.

2.2 What are the possible ways applications can be submitted for each PV system/size classification (e.g. online, by mail, in person, etc.)? Can customers attach supporting documents and utilize electronic signature?

- Regardless of the PV system/size classification, applications may be submitted online, by e-mail, by US mail, or in person. SIR dictates online web portal must allow submittals for systems ≤25kW; however we allow all size applications to apply online through the web portal.
- Approximately 95% of all applications are submitted using the web portal. Most applications received by US mail or e-mail are for system sizes >50kW.
- Customers can attach supporting documents and utilize electronic signatures (Verisign) through our web portal.
- Payments must be made by credit card/debit card via phone or web (separate from our application portal), or paper check through US mail. Typically paper checks are received.

2.3 Who reviews the application for completeness? Does the same person/people review the application for approval?

- A technician or contractor reviews the application for completeness.
- Yes, the individual reviewing the application for completeness also provides approval or indicates customer & contractor/agent of deficiencies.

2.4 Who contacts the customer to inform them whether the application is completed adequately and/or whether it has been approved? Is this process automated in some way?

- A technician or contractor contacts the customer manually via e-mail.
- Central Hudson was in the process of automating this correspondence through internal IT programming updates, but has put that improvement on hold pending the outcome of this gap analysis.

2.5 What is your typical response time to customers after receiving complete and incomplete applications? What factors most affect this response time?

- Response time is within 5 business days for incomplete applications.
- For systems ≤ 50 kW, response is within 10 business days for complete applications.
- For systems > 50 kW, response is within 15 business days for complete applications, indicating whether a CESIR is required or not the project is approved for construction.
- For systems > 50 kW that require a CESIR, response is within 60 business days after CESIR commences.
- Primary factors that affect response time are: verifying transformer and circuit information in the field, and volume of applications received and waiting in queue.

2.6 Do you designate a single point of contact for the applicant? If so, what is the rationale for designating your utility point person and at what time is this designation made?

- A technician or contractor is assigned as the single point of contact based upon the Operating District in which the customer resides and the size and generation type.
- For initial phone calls, there is a single technician listed as the point of contact.
- For e-mails, we designate one e-mail address – distributedgeneration@cenhud.com which the two Engineering techs and the contractor can access. This helps provide excellent customer satisfaction, since it is continuously monitored and enables employees and contractors to cover absences.

2.7 What level of detail is provided and at what point is this communicated? (e.g. application completeness check, preliminary response, status update)

We communicate the following statuses for each application in a letter to the customer via e-mail or US mail (if e-mail not on file). In addition, this information is available via the web portal. All associated costs (for systems >25kW) are estimated and then reconciled after work is completed. The following detail is communicated:

Systems ≤ 50kW

- Incomplete application describing deficiencies
  *Communicated within 5 business days of application received.
- Preliminary approval indicating that the customer may proceed with construction. Costs included if transformer upgrade is required ($350 fixed fee for systems ≤ 25kW)

Communicated within 10 business days of a complete application.

- Final approval letter which indicates verification testing was successful and customer may turn system on.
  * Communicated within 5 business days after receiving passing documentation from the customer
  OR
  *Communicated within 10 business days if the verification testing is witnessed by a CH employee/contractor.

Systems > 50kW

- Incomplete application describing deficiencies
  - *Communicated within 5 business days of application received.
- Preliminary approval indicating that the customer may proceed with construction OR indicating need for CESIR and its cost to perform.
  - *Communicated within 15 business days of a complete application.
- If applicable - results of CESIR and any upgrades required for interconnection and the estimated costs.
  - *Communicated within 60 business days after customer commits to CESIR (payment & additional documents received as indicated in NYSSIR).

- Final approval letter which indicates verification testing was successful and customer may turn system on.

  *Communicated within 10 business days after verification testing is witnessed by a CH employee.

2.8 After an application is received, what tools are used to store and access its information?

- If received via web portal, the application information is automatically stored in our Customer Information System (CIS) and the documents are uploaded to a folder on our server. Additional information is then manually input into our Access Database.
- Applications received via e-mail or US Mail are entered into the web portal via a Central Hudson employee or contractor. Central Hudson was in the process of automating this correspondence through internal IT programming updates, but has put these improvements on hold until further direction from DPS Staff. See question 1.2.

2.9 Who has access to the application once it is received (or in your database)?

- Employees and contractors within the Electric Distribution Planning department have access to CIS system and Access Database. The Meter Shop also has access to the Access Database (in order to track and implement meter changes).
- All Central Hudson employees have read-access to customer folders (which contain application documents, letters of approval, etc…) via our Content Central Server.
- The customer and their agent/contractor also have access to the web portal via a username and password to view the status of their project. When submitting through our web portal, a unique project number is automatically generated and sent to the e-mail addresses provided for the application, and is required during the initial login to access the customer's project status/information. DPS Staff was also provided a username and password when the portal was first constructed.

2.10 Can the customer/contractor access their application information online? If so, what project details and status information are available to them and when? If not, how else are they able to access information?

- Yes; as specified in the NYSSIR, some of the information provided includes: date application received, dates each documents received (and notes indicates which are missing or incorrect), expected review date, preliminary approval granted date, if meter change is required (if so, whether the meter change was completed), customer net-metered or not, dates Central Hudson notified system complete/ready for verification testing, if Central Hudson witnessed the test or only received paperwork, if verification testing completed and passed/failed and notes indicating why, date interconnected. If applicable, customer can also see CESIR commencement dates/info.

2.11 How do you communicate to customers (verbal, written, email) and at what the steps of the application process?

- See answer to 2.7 above.

2.12 What was your median response time for initial inquiries in 2014 and in 2015?

- This is not tracked directly, but we respond to all inquiries within 3 business days.

2.13 Using your current work management system, can you estimate the maximum number of applications you could process each month while still meeting SIR time requirements?

- We currently process approximately 160 preliminary applications/month and 130 final applications/month (average based on past 12 months). We are able to meet the SIR Timelines at this rate; however we would require an increase in resources should this rate increase. The average application processing time is much greater for systems over 50kW.

- Receiving approximately 180-200 or more of preliminary applications/month (depending on size), and 150-200 or more of final applications/month would require additional resources in order to continue to meet the SIR time requirements.

Expedited Process (< 50 kW)

2.14 The SIR lists a fast-tracked 6-step application path for smaller systems, is this the same path your applications follow?

- Yes.

2.15 Are there any steps in your interconnection review process that are automated, and if so, what is the level of automation for each?

- We receive an e-mail notification when a customer submits an application using the web portal, and the customer/contractor receives e-mail notifying them their project was submitted, as well as the associated project #.

2.16 What tracking tools do you currently use for applications throughout the interconnection process? Do your customers have access to these tools? Can the tracking tools be integrated into the utility's website (if they are not already)?

- We track our applications using an Access Database and Excel. As mentioned previously, application status dates are entered into our CIS mainframe, which the customer or agent/contractor can view when logging into our web portal.
- Automatic tracking updates could be implemented – see response to question 1.2.

2.17 How does the applicant track application status? Do any of your utility tracking tools inform customers of the status of individual review steps (e.g. the progress and expected completion date of a CESIR being conducted)?

- Application steps can be tracked via the online portal.
- Automatically generated approval letters and status update emails were to be implemented as part of our internal programming updates which are currently on hold (see question 1.2).

Application Approval and Processing

2.18 What is your procedure for adding distributed energy resources into the Geographic Information System (GIS)? At what point in the process does this happen? How often does this happen (daily, weekly, monthly)?

- We currently have DERs visually plotted in an ESRI map, which is pulled in daily from our DG database.
- ESRI is currently under development to be our primary GIS and sole source of data.

2.19 Which steps in the approval process are most commonly not passed the first time? What are the most common reasons for not passing and what measures are typically taken in these situations?

- In regards to what makes an application incomplete for systems ≤50kW, generally they are missing or have submitted an inadequate agent letter of authorization or verification test, three-line diagram and application do not match, and/or the interconnection application is not under the name of the utility customer.
- For applications > 50kW, there are often multiple discrepancies between the submitted documents and even within the same document, in addition to missing the $350 application fee; nearly all applications in this size category are typically either incomplete or inaccurate.

2.20 What is your procedure for installing new meters? When does that happen?

- Our Meter Shop currently has access to our DG Database and can view all approved applications.
- Our current standard is to install digital net-meters for all net-metered customers.
- If the customer applies for interconnection and does not have an existing net-meter that is capable of spinning backwards, we install the digital net-meter within 10 business days of granting preliminary approval. This is done by manually creating a dispatch order through the call center, which gets assigned to a commercial rep. or meter tester to change out the meter in the field.

Systems Greater than 50 kW

2.21 The SIR lists an 11-step path for applications involving a Coordinated Electric System Interconnection Review – CESIR (please reference the attached flow charts); is this the same paths your applications follow?

- Yes.

2.22 Do you use any automated or manual screens for certain PV size classifications?

- Unless generation is completely absorbed by load (24/7/365), typically > 300kW systems will require a CESIR, due to potential backfeed onto CH's Substation and Transmission System.
- Sometimes smaller systems may also require a CESIR depending on system conditions (>50kW on single phase).
- During the technical review, we model the PV system using software to check for power quality, protection issues, and phasing. Refer to question 2.33.
- Screening criteria incorporates many variables and thus requires engineering judgment. Using an automated screening tool could result in a more conservative approach and cause a higher percent of projects to require a detailed review (CESIRs)

2.23 What are the different means by which you can accept interconnection payments from customers (e.g. application fees, CESIR fees, etc.)? In what form are payments typically submitted?

- Forms in which we can accept payment are credit/debit card via phone or web (using a separate website from the web portal) and paper check through the mail.
- Typically paper checks are received.

CESIR Process

2.24 Please explain criteria that trigger a CESIR requirement?

- Unless generation is completely absorbed by load (24/7/365), typically > 300kW systems will require a CESIR.
- Sometimes smaller systems may also require a CESIR depending on system conditions.
- During the technical review, we model the PV system using software to check for power quality, protection issues, and phasing.

2.25 What is your typical completion time for a CESIR?

- CESIR's are completed within 60 Business Days.

2.26 What are the most common obstacles to completing a CESIR within the NY SIR time requirements?

- Creating an accurate model of the interconnected feeder – this requires field verification and manual updates.
- Multiple scenarios – this includes adjacent feeders nearby and determining which feeder is more optimal for interconnection OR if customer is installing multiple 2MW systems, this would need to be modeled in steps.
- Mitigation issues – determining which are most cost effective and feasible.

2.27 Do you typically have all the information you need when you start a CESIR? If not, what missing information is most likely to cause delays?

- Externally, the CESIR commences once we have payment and necessary documentation from customer needed to complete it.
- Internally, compiling system information (including field verifying the interconnected feeder and making updates) to provide to contractor takes time.

2.28 Who communicates with the customer before, during, and after the CESIR process? What is the typical content of these communications?

- For CESIR commencement and completion, we send the customer a letter via e-mail indicating such.
- During the CESIR process, typically the contractor may call or e-mail and ask for updates, which they then relay to the customer.

2.29 Are third-party consultants utilized for CESIR studies? What percent of studies?

- Yes. Of the 5 total CESIR's completed to date, three used third party consultants.

2.30 What tools and resources do you use during the CESIR process? Modeling and load flow analysis tools; Commercially-produced or in-house?

- During the technical review (as described in 2.33), DEW software is used for modeling and load flow analysis to help determine if a CESIR is needed.
- If a CESIR is required for inverter-based systems, we provide a Milsoft WindMil model and detailed system data and Protection settings to the third party consultant.
- For non-inverter based systems, our internal Electric System Protection Department utilizes Aspen software.
- Locational information from the application database can be directly uploaded into DEW by pressing a customized button.

2.31 Are there electronic maps for the entire distribution system? If no, what percentage is mapped electronically? Can/do the maps feed simulation tools for performing load flow analysis?

- Yes, we have an electronic map of our entire distribution system.
- For 3-phase circuitry, only 30% of models have been corrected in detail. The rest need to be field verified before using for analysis.
- The maps can be extracted and imported into WindMil for analysis. In addition, secondary data is not modeled, which can be a driver of upgrades, particularly in systems with nameplate ratings < 50 kW.

2.32 Are there any manual reviews that don't involve a full CESIR? If so, why? How many of each do you typically compete in a month?

- Yes; for systems >50kW, within the 15 business day technical review, it is determined if a CESIR is required. The level of these received varies. In the last couple months, approximately 3-5 of these are performed and do not require a CESIR.

2.33 For each type of manual review, what information is needed and how long does it usually take to complete?

- Information needed: system specs provided in application, feeder conductor sizes and components (regulators or caps nearby), location of existing PV, customer loading (to estimate back feed expected), transformer size customer, secondary size and its approximate distance from the transformer to the meter.
- The system is also modeled using the software and the following impacts/factors bulleted below; the system is analyzed with and without the proposed PV system interconnected during both off-peak and peak conditions. If any of these analyses illustrate "red flags" or concerns, a CESIR is required. These reviews typically take between 10-15 business days.

    - Voltage impacts
    - Loading (customer load and circuit load vs. generator size)
    - Protective coordination
    - Distribution line components nearby (capacitors or regulators)
    - Existing PV on circuit
    - Fault current contribution
    - Flicker calculation

Anticipated voltage rise at PV customer's meter is calculated based on

- PV system size
- Secondary voltage loss (based on system size, wire size, and distance)
- Transformer size and impedance

Summary Table

Interconnection Process		Which department performs step?	What Tools/Systems are used?	What data is needed?
All Applications	**Inquiry Received & Responded**	Electric Distribution Planning/Customer Service	Phone/Email/Website	Varies
	Application Received	Electric Distribution Planning	Email/Mail/Excel/ Web portal/ Mainframe	See NYSSIR
	Application Fee Received (for systems > 50kW)	Electric Distribution Planning/ Cash Processing/ Customer Service	Mail/Website/Phone	Invoice Number
	Application Receipt Notification sent to customer	Electric Distribution Planning	Email	Online submission
	Application reviewed for completeness	Electric Distribution Planning	Mainframe/Database/ Excel	See NYSSIR
	Application Status Notification sent to customer (complete or incomplete)	Electric Distribution Planning	Mainframe/Database/ Email/Mail	Customer Acct#/ Email Address
	Application Tracking (communication with customer throughout)	Electric Distribution Planning/Customer Service	Web Portal/ Email/Mail	Customer's User Id & Password
	Application sent for screening/review	Electric Distribution Planning	Database/Excel	Account #
Case 1: Expedited	**Screening or Technical Review**	Electric Distribution	OMS, Mainframe, Excel	Site address, system size, customer load,

Process		Planning		existing DG, transformer size
	Application Approved	Electric Distribution Planning	Mainframe/Database/ Email/Mail/Excel	See NYSSIR
	Request for Meter Set	Electric Distribution Planning	Mainframe/Database/ Email	Account #/ Meter Type/ Approval Date
	Add DG system to utility mapping	Electric Outage Services and Electric GIS	OMS/Email	Account # & System Size
	Verification Test	Electric Distribution Planning	Database	Customer Address & Three-Line Diagram
	Final Acceptance	Electric Distribution Planning	Mainframe/Database/ Email/Mail/Excel	Customer Acct#/ Email Address
Case 2: Full CESIR Process	**Preliminary technical review**	Electric Distribution Planning	OMS, Mainframe, DEW, Excel	Primary and secondary circuit characteristics, site address, system size, customer load, existing DG
	Estimate of CESIR if needed to customer	Electric Distribution Planning	Excel	Contractor cost, system size vs. load to determine expected backfeed, adjacent feeders, number of systems
	Payment received	Cash Processing/ Customer Service	Mainframe	Check/Online Payment/Phone Payment
	Data request to customer	Electric Distribution Planning	Email/Phone	Varies
	CESIR study	Inverter Based –	Inverter Based –	Primary and secondary circuit

		Contractor Non-Inverter Based – Electric System Protection	WindMil Non-Inverter Based – Aspen	characteristics, site address, system size, customer load, feeder component settings, protection schematics, relay settings, existing DG
	Application Approved	Electric Distribution Planning	Mainframe/Database/ Email/Mail/Excel	Customer Acct#/ Email Address
	Request for Meter Set	Electric Distribution Planning	Mainframe/Database/ Email	Account #/ Meter Type/ Approval Date
	Add DG system to utility mapping	Electric Outage Services	OMS/Email	Account # & System Size
	Verification Test	Electric Distribution Planning and/or Electric System Protection and/or Electric T&D Operations	Database	Customer Address & Three-Line Diagram
	Final Acceptance	Electric Distribution Planning	Mainframe/Database/ Email/Mail/Excel	Customer Acct#/ Email Address

III. Perspective & Expectations re: Online Portal

3.1 Please describe the specific challenges you foresee in meeting the NY REV's online portal requirements.

- Our biggest challenge is lack of data.
  - We are currently working to create accurate primary circuit models; however, this is only complete for about 30% of our feeders.
  - We also do not have any secondary data modeled. Not having this data was sufficient years ago, as the grid only experienced one-way power flow. However, with new distributed resources being interconnected to

the system, this introduces two-way power flow. Secondary data is now critical to obtain in order to mitigate voltage rise and fluctuations.

3.2 Please describe the specific opportunities you foresee in meeting the NY REV's online portal requirements.

- Having an automated interconnection process does provide certain benefits, such as decreased review time and data validation/clean up. However, the amount of time and money involved in completely automating the process is very expensive. The level of automation ultimately required by DPS Staff should be balanced so that costs are not unfairly placed on rate payers.

3.3 What steps have you investigated or taken to develop an online portal?

- We had an on-site demo meeting with Qado Energy and a webinar with Clean Power Research regarding their application portals.

- We also planned to redesign our external facing web portal to provide a more user friendly customer self-service channel, as well as implement a new internal web application interface which would allow for more automation and greatly reduce application review time; however, the data required for the level of automation proposed will take several years to obtain.

3.4 What specific steps do you plan to investigate or take through the end of this year to develop an online portal?

- The specific steps will be guided by the outcome of this gaps analysis, but the Company plans to implement the aforementioned programming changes to provide further automation at a minimum.

IV. Misc Questions (if time allows)

4.1 In your opinion, is there anything in the NY SIR that is unclear, difficult or impractical to comply with? Are there parts of the SIR that may not be well aligned with your physical or IT infrastructure? Are there constructive solutions that you have developed or would suggest?

- Meter change requirement of 10 business days after preliminary approval results in unnecessary meter changes and thus loss of company time and money due to installers submitting applications when customers are not fully committed to the installation (we get turned away when trying to install meter, or we find out projects later on were cancelled). A solution to this could be a requirement that the contractor must also submit a signed agreement with the customer indicating a committed lease or purchase agreement.
- The SIR does not enable Central Hudson to require electrical inspection certificates, and customers are allowed to turn the system on without official approval from the utility. This is a safety concern, as we have witnessed systems that do not have passing test results.

- Nothing in the SIR addresses account read-overs and a requirement that allows Central Hudson to request from the new customer an SIR contract.
- Currently IT does not have the infrastructure in place to allow customers to pay for application/upgrade fees within the interconnection web portal. Due to the monthly billing implementation (regulatory requirement), the IT department also has resource constraints.

4.2 In response to NYSERDA, strategic locations have been identified for PV and microgrids. What is the utility's preferred frequency and timing for updating strategic locations? Other suggestions?

- Annually. Microgrids however, should not be incorporated as part of a standardized process.

4.3 Do you currently have access to interconnected/operational DER performance data? If so, how does such visibility support utility planning or operations? If not, is there value in gaining such visibility (e.g. operational visibility and data resolution) regarding DER performance? At what scale of DER or type of DER is this most relevant?

- We have access to performance data for 2 interconnected systems (451kW and 500kW). This is for internal research purposes only.
- There is value in understanding the system impacts of DERs, and real-time integration into a DMS or DERMS system would be required if integrated into system planning and operations and to enable REV markets. For example, understanding how cloud cover would suddenly impact voltage and how the grid could compensate would be important. The scale at which this is relevant would vary based on feeders, but installing inverters that could be upgraded to communicate via SCADA and provide smart functionality via a firmware update could begin today so that REV markets could be quickly enabled in the future.
- We believe that requiring contractors to share output/performance data from DER systems (possibly based on a particular size) will be crucial information to have going forward.

4.4 Do you believe the adoption of smart inverters would provide benefits, e.g. reduce the need for CESIR studies?

- Yes, smart inverters have the potential to provide benefit. However, our CESIR studies are usually only required for DERs that are expected to have a large impact on our system and thus the use of a smart inverter would not reduce the need for the study.
- Smart inverters could help mitigate certain system upgrades, but we would still require a CESIR study to analyze the DER impacts as well as what smart inverter settings would be needed to allow the system to interconnect.

NEW YORK INTERCONNECTION ONLINE APPLICATION PORTAL GAP ANALYSIS

IN-DEPTH INTERVIEW TOPIC GUIDE (Rev 3)

Respondent Name(s):	Jim Skillman
Respondent Title(s):	Customer Project Manager
Company Name:	ConEdison
Contact Information (phone / email):	212-460-3421 SKILLMANJ@coned.com
Date / Time of Interview:	May 20, 2015
EPRI Interviewer(s):	Lindsey Rogers, Tom Key, David Freestate

I. Background & Perspective – Questions to Answer Beforehand

1.1 What size (kW) classifications are used to segment interconnection applications?

- Less than 25kW PV (PSN1): Application is submitted online and is processed by a Energy Services Representative; applicant can be assisted by anyone within an Energy Services group, but typically designated personnel handle these jobs.
- 25kW- 300 kW: Application is submitted online and is processed by a regional energy services customer project manager; Distribution Engineering performs feasibility study that includes looking at load data, network protectors and service inadequacies or fuse/relay requirements; one person from the energy services group is assigned to manage the project and interact with customer.
- 300 kW – 2 MW: Application is submitted online and is processed by a customer project manager of the central Energy Services DG/High-Tension Group; Distribution Engineering performs feasibility study that includes looking at load data, network protectors and service inadequacies or fuse/rely requirements; one person from the Energy Services DG/High Tension Group is assigned to manage the project and interact with customers.

1.2 Are there any tools or processes you are developing to help make interconnection faster/cheaper/better? If so, can these tools be shared?

- Developing a phone app to interface with Project Center. In addition, REV Track 1 deliverables as well as our own process improvements are pushing streamlining of small residential PV cases to keep up with increased applications. We would be happy to share concepts, but as Project Center is an in-house program specific to Con Ed we can't share a solution directly.

1.3 What are the most significant issues in processing interconnection applications?

- For our <25kw PV applications, the biggest challenge is the sheer volume of applications causes a massive administrative burden to track, review, and maintain all the required SIR documentation. The process is being streamlined by our efforts prior to Track One, and the Track One interconnection requirements will further smooth that issue once fully implemented.

- For our >25KW PV and all net meter-able systems, our mesh network grid and high population of spot networks increase the complexity for installers causing multiple rounds of review and corrections. Getting from completed application package to technically acceptable system is often the biggest challenge for the installers.

- For very large systems, the requirements for proper protection of existing installed infrastructure can result in projects dropping out due to high interconnection costs. Con Ed has been working to find new methods of protection at lower cost that still meet IEEE requirements for protection to eliminate this issue, and has had success with large PV projects with our PV Pilot Program.

1.4 What tools do you use to ensure the privacy and security of your customers' information?

Personally Identifiable Information (PII) release prevention measures are built into our processes and Energy Services personnel are trained to maintain PII safe. In addition, we do not have a live link between the online application portal and our back-end billing which contains the most vital PII.

1.5 Please complete the below table to give us an idea of volume of applications:

Question	< 25 kW	25-300 kW	> 300 kW
How many MW of PV and non-PV DG are currently interconnected?	PV: 4,476 , 31.7MW CHP: 26, 0.2 MW	PV: 393, 25.2MW CHP: 151, 17.8 MW	PV: 18, 10.2 MW CHP: 94, 140.4 MW
How many applications did you process in the last 12 mos?	PV: 3520 CHP: 16	PV: 156 CHP: 62	PV: 26 CHP: 9
What % of all applications in the last 12 mos were incomplete when received?	20%	20%	20%
What % of applications in the last 12 mos have been approved?	85%	85%	85%

What % of applications in the last 12 mos have been installed?	PV: 82% CHP: 43%	PV: 70% CHP: 43%	PV: 65% CHP: 53%
Do you conduct a preliminary technical review for each of the project size categories (Y/N)	N	Y	Y
In next 2 years, what are your projections for the level of interconnection applications received?	PV: 3400 – 5100 CHP: 10 -30	PV: 400 – 600 CHP: 50-100	PV: 200 – 300 CHP: 30-50

Of applications in the queue, 2,200 are for PV systems, and 2,239 are for systems less than 25kW; most PV is 40kW and lower.

Of the nearly 4,000 interconnection applications each year, about 10% require a feasibility study; of those, about 10%-25% require a full CESIR.

1.6 For approved project applications (both installed and not pursued) in the last 12 months, what percent have required utility infrastructure upgrades of between $0-$9,999, $10,000 to $49,999, >$50,000 to $100,000, >$100,000? Has this changed from prior years? If so, why?

Only 1 PV was <$50k and 2 were > $100k, most CHP was between $50k and $150k, with one reporting >$200k.

- PV<25kw – 0%
- 25<PV<300kw – 8%
- 300<PV<2000kw – 39%
- Non-PV<25kw – 0%
- 25<Non-PV<300kw – 10%
- 300<Non-PV<2000kw – 21%

This has increased over time as we have increased our ability to provide customer solutions to network issues at customer's cost, while net metering and other policies have given value to these type systems.

Con Ed does not currently charge for many CESIR's, in some cases because they are running pilot programs to experiment with new study methods. For CHP projects we have and still do charge for CESIR's where appropriate

- PV<25kw – 0%
- 25<PV<300kw – 54% @ $5k-$10k
- 300<PV<2000kw – 60% @ $5k-$10k
- Non-PV<25kw – 0%
- 25<Non-PV<300kw – 24% @ $15k-$30k
- 300<Non-PV<2000kw – 41% @ @ $15k-$30k

The solar systems have caused more CESIR type studies of network protector interactions, the lower number of CESIR type studies for CHP is due to non-exporting technologies and much more inverter based systems than synchronous which would

require the CESIR. All CESIR costs reflect primarily DE/SD engineer's review time and not transfer trip or other upgrade costs.

1.7 Please complete the below table to give us an idea of the tools and systems (business + technical) used in the interconnection process:

Process	Tool/System	How do you use it?	Used for something other than DG also?	In House/ Commercial
Business Management Systems	Pega	Customer Project Management	All electric & gas service requests	Commercial
	Logica	Work Management System	All internal work requests	Commercial
	Project Center	Online Customer/Contractor Portal	All electric & gas service requests	In-house
Systems for Technical Review	PVL	Load flow analysis	System resource and contingency planning	In-house
	Vision Maps	Mapping tool	Location of all cables, pipes, etc and their connections	Commercial
	Load Aggregator	Calculates peak load and kwh usage by month (facility level data)	Electric service rulings and system resource planning	Commercial
	RMS/SCADA	Shows network/radial feeder load profiles	System operation and resource planning	Commercial
	CIS	Peak load and kwh usage by month system (for account level data)	Billing accounts	Commercial

1.8 How many utility staff are currently available to perform *administration and processing* of interconnection applications? What are the estimated total man years for this effort?

- Technically, all Energy Services Majors personnel can process any of these jobs if required. However, the numbers below indicate the personnel dedicated to the tasks currently.

- <25KW PV – 7 FTE's dedicated to these as their primary work = 7 man-years.

- 25-300kw PV & non-PV DG <300kw – out of a pool of about 60 qualified CPM's, 10-15 FTE's have cases assigned to them at any given time which take up about 5% of their work load. Approximately 0.75 man-years.

- >300kw all DG – 6 FTE's – 3 handle cases and 3 are administrative support, which account for about 50% of their time = 3 man-years.

1.9 How many utility staff are currently available to perform *engineering and studies* of interconnection applications? What is the estimated total man years for this effort?

- There are 10 FTE Engineering specialists who spend about 50% of their time on interconnection applications and support = 5 man-years.

II. Interconnection Process – Getting into the Details

Receiving Application

2.1 How does your first contact with the DER customer typically occur? Which department is responsible for replying to initial customer inquiries, and what is their standard procedure?

- For systems less than 25kW, first contact is typically the receipt of the customer's online application. . We are also starting to receive phone calls from customers who have questions about the quotes and savings estimates they are getting from third party solar companies.
- For systems greater than 25kW, first contact is either project submittal via Project Center or an email/phone call initiated by the customer

- Less than 25kW (PSN1): 2 people in Energy Services Specialist are designated to respond to PSN1 DG inquiries in all boroughs except Staten Island. Staten Island has 1 Customer Project Manager, 2 Specialists, and 2 union personnel.
- 25kW-300kW (PSN2): Regional Energy Services Groups are designated to respond to PSN2 DG inquiries in all boroughs.. These cases are assigned to Customer Project Managers, and there are approximately 8-10 CPM's per region.
- 300kW-2MW (PSN3): Central Energy Services Group office responds to customer inquiries, based on the customer's location. 3 Customer Project Managers plus 3 other managers who provide technical assistance, case oversight and customer engagement.

2.2 What are the possible ways applications can be submitted for each PV system/size classification (e.g. online, by mail, in person, etc.)? Can customers attach supporting documents and utilize electronic signature?

All applications are submitted online via Project Center. Project Center allows customers to apply online, attach documents, and sign electronically. In addition, we support 3rd party electronic signatures (some out of state solar companies already had this as part of their customer process).

2.3 Who reviews the application for completeness? Does the same person/people review the application for approval?

Energy Service's standard procedure is to review the application for completeness using a checklist (there are separate checklists for PSN1, PSN2, PSN3), notify the customer of any missing information or documents if the application is incomplete, and add the completed application to the queue for Distribution Engineering to review (PSN2&PSN3 only) (9 people in this group doing feasibility and CESIR studies). Both customer and contractor/developer must sign off on all forms before the application is placed in the queue.

2.4 Who contacts the customer to inform them whether the application is completed adequately and/or whether it has been approved? Is this process automated in some way?

Customer Project Managers

2.5 What is your typical response time to customers after receiving complete and incomplete applications? What factors most affect this response time?

Responses to initial inquiries are made within the SIR requirement of 3 days.

2.6 Do you designate a single point of contact for the applicant? If so, what is the rationale for designating your utility point person and at what time is this designation made?

- Energy Services Specialists: PV < 25kW
- Regional Energy Services Group: PV >25kW, <300kW, all non-PV DG <300kW
- Central Energy Services Group: All DG >300kW

2.7 What level of detail is provided and at what point is this communicated? (e.g. application completeness check, preliminary response, status update)

Application's status is available on the website, and customer is emailed at the following steps: application receipt, application completeness check, conclusion of approval review, conclusion of feasibility study, completion of CESIR, receipt of customer documents, and final authorization. All email communications with contractors are copied to the customer's email.

2.8 After an application is received, what tools are used to store and access its information?

Applications are stored in CPMS (Customer Project Management System); the same system is used for DG applications (4,000/year) and for non-DG service requests (36,000/year).

2.9 Who has access to the application once it is received (or in your database)?

All groups with access to CPMS can view the application, but do so as needed.

2.10 Can the customer/contractor access their application information online? If so, what project details and status information are available to them and when? If not, how else are they able to access information?

Yes; the customer/contractor can access their application status and information online through Project Center. The status checks include: service request received, determination, feasibility study, construction, metering, testing, project completion.

2.11 How do you communicate to customers (verbal, written, email) and at what the steps of the application process?

Customer is emailed at the following steps: inquiry, application receipt, application completeness check, conclusion of approval review, conclusion of feasibility study, completion of CESIR, receipt of customer documents, and final authorization.

2.12 What was your median response time for initial inquiries in 2014 and in 2015?

Initial inquiries (Steps 1 and 2 of the SIR) are handled informally and have not been tracked historically. Goal is to meet the SIR Requirement of 3 days.

2.13 Using your current work management system, can you estimate the maximum number of applications you could process each month while still meeting SIR time requirements?

The current work management system handles all cases – DG and non-DG electric, as well as gas cases – and handles about 40,000 cases a year. I am not aware of a limit to the system's capabilities. Current staffing levels have some capacity to handle more interconnection applications, but we may look to increase the number of personnel assigned full time to DG work as the ratio of these cases to standard non-DG cases continues to rise.

Expedited Process (< 50 kW)

2.14 The SIR lists a fast-tracked 6-step application path for smaller systems, is this the same path your applications follow?

Yes, SIR is followed for both paths.

2.15 Are there any steps in your interconnection review process that are automated, and if so, what is the level of automation for each?

Systems 0kW-25kW are screened and processed by the Energy Services Specialist that the application is assigned to. The main check is for complete applications. Once the application is approved, the Energy Services Specialist uses CPMS to initiate the meter installation order through the work management system. For systems 25kW and up, the customer project manager receives and reviews the application for completeness and passes it on to Distribution Engineering. Distribution Engineering performs an initial feasibility study that is primarily based on looking at load relative to the DG to determine potential for network/system issues. The feasibility study is performed with PVL, and if that study is not passed, the DE Engineer performs a CESIR. Some of the things checked in the feasibility study are interconnection details (the characteristics of the service going into building), SIR technical requirements and UL listing, service adequacy (whether local service can handle the PV output), load flow study if the system is big enough, and the main service plate and load information. After an application is approved, Energy Services personnel will use CPMS to initiate the meter installation order through the work management system.

If the feasibility study indicates upgrades must be made for the system to be interconnected, Distribution Engineering provides the customer with a list of options and cost estimates for each. The customer then informs Customer Project Management which choice they would like to make. Once the customer commits to a choice, they are billed for any utility upgrades that are required. If a feasibility study finds that a CESIR is required, costs of the study are estimated for the customer; after the customer accepts, the study is performed.

2.16 What tracking tools do you currently use for applications throughout the interconnection process? Do your customers have access to these tools? Can the tracking tools be integrated into the utility's website (if they are not already)?

CPMS tracks application management, and Logica tracks work management; CPMS is integrated with the website, providing Project Center with real-time information.

2.17 How does the applicant track application status? Do any of your utility tracking tools inform customers of the status of individual review steps (e.g. the progress and expected completion date of a CESIR being conducted)?

Yes; the customer/contractor can access their application status and information online through Project Center. The status checks include: service request received, determination, feasibility study, construction, metering, testing, project completion.

Application Approval and Processing

2.18 What is your procedure for adding distributed energy resources into the Geographic Information System (GIS)? At what point in the process does this happen? How often does this happen (daily, weekly, monthly)?

There is not a formal GIS system, but ConEd adds approved systems to the Visions Maps Mains & Services Plates for field identification. Formal tracking is provided by the DG Group PSC Reporting database. We are working to bring the silos of

information together to form a complete picture, but disparate legacy systems and a lack of common standards makes the process difficult.

2.19 Which steps in the approval process are most commonly not passed the first time? What are the most common reasons for not passing and what measures are typically taken in these situations?

- Ensure customer is aware of the work being done; in some cases, contractor enters false email address for the customer, or begins work without the customer's knowledge or final approval (this seems to be more common when the 3rd party leasing model is involved)
- Add standard page to contract that describes the type, size, etc. of the system, similar to a site plan. Con Ed currently uses an amendment for this purpose, as the contract is very general.

2.20 What is your procedure for installing new meters? When does that happen?

SIR's 10-day requirement is followed; recently, more customers have been turning meter crews away because they don't want the system installed

Systems Greater than 50 kW

2.21 The SIR lists an 11-step path for applications involving a Coordinated Electric System Interconnection Review – CESIR (please reference the attached flow charts); is this the same paths your applications follow?

A feasibility study is performed for systems greater than 25kW; if it passes the feasibility study, the application follows the expedited path. NYS SIR Steps 1 and 2 are rarely followed for any case, we add items on the back end for billing, etc

2.22 Do you use any automated or manual screens for certain PV size classifications?

Systems 25 kW and above are screened by a Distribution Engineer by doing a feasibility study. If it does not pass the feasibility study a CESIR may be required, but only upon customer request. Most issues are resolved based on feasibility study results.. All screens are done by engineers utilizing different tools.

2.23 What are the different means by which you can accept interconnection payments from customers (e.g. application fees, CESIR fees, etc.)? In what form are payments typically submitted?

To avoid refunding procedures, payment is made after services are performed; payments are typically submitted via mailed check or online payment (through a separate website from Project Center). Billing information is kept separate from Project Center; one concern about integrating the two is the potential for the customer's billing information to get hacked in Project Center.

CESIR Process

2.24 Please explain criteria that trigger a CESIR requirement?

Systems that are greater than 25 kW that do not pass a feasibility study.

2.25 What is your typical completion time for a CESIR?

In April 2015, typical application completion time was around 5 days; Con Ed's goal is within 18 days. Start-to-finish on residential PV usually ran around 2-3 months, commercial PV around 9 months to a year. Small to medium (<1MW) CHP jobs often take well over a year, and very large CHP (>1MW) typically last a number of years.

2.26 What are the most common obstacles to completing a CESIR within the NY SIR time requirements?

Developers often don't provide information/documents in a timely manner or don't submit accurate information (e.g., account numbers).

2.27 Do you typically have all the information you need when you start a CESIR? If not, what missing information is most likely to cause delays?

All basic information is typically provided in the CPMS; the need for additional documentation from the developers, such as additional drawings, diagrams, or other information, is usually uncovered during the CESIR process

2.28 Who communicates with the customer before, during, and after the CESIR process? What is the typical content of these communications?

Distribution Engineering works directly with the customer during the CESIR and feasibility studies, although the CPM (Customer Project Management) project manager is still the official point of contact for the customer, and remains in contact with them.

2.29 Are third-party consultants utilized for CESIR studies? What percent of studies?

No

2.30 What tools and resources do you use during the CESIR process? Modeling and load flow analysis tools; Commercially-produced or in-house?

Primary modeling tool is PVL which is an in-house load flow tool

2.31 Are there electronic maps for the entire distribution system? If no, what percentage is mapped electronically? Can/do the maps feed simulation tools for performing load flow analysis?

PVL (Polyvoltage Load Flow) is a tool developed in house that is used for load flow analysis and incorporates a mapping application. The Vision Maps program has a full set of maps for services, conduit runs, high voltage feeders, and other layouts that then feed into PVL.

2.32 Are there any manual reviews that don't involve a full CESIR? If so, why? How many of each do you typically compete in a month?

- Of the nearly 4,000 interconnection applications each year, about 10% require a feasibility study; of those, about 10%-25% require a full CESIR.
- Con Ed does not currently charge for many CESIR's, in some cases because they are running pilot programs to experiment with new study methods. For CHP projects we have and still do charge for CESIR's where appropriate

2.33 For each type of manual review, what information is needed and how long does it usually take to complete?

Summary Table

Interconnection Process		Which department performs step?	What Tools/Systems are used?	What data is needed?
All Applications	**Inquiry Received & Responded**	Energy Services (by Customer Project Managers)	CIS, Vision Maps, Load Aggregator, e-mail/phone	Customer account #, DG size & type, letter of authorization.
	Application Received	Energy Services	Project Center and Pega	Customer account #, DG size & type, letter of authorization, SIR forms.
	Application Fee Received (for systems > 50kW)	na	na	na
	Application Receipt Notification sent to customer	Energy Services	Project Center	Project Center auto-generated
	Application reviewed for completeness	Energy Services	Project Center and Pega	All required info & SIR forms
	Application Status Notification sent to customer (complete or incomplete)	Energy Services	Project Center and Pega/email	All required info & SIR forms
	Application Tracking (communication with customer throughout)	Energy Services	Project Center and Pega/email	e-mail contacts in Pega
	Application sent for screening/review	Energy Services	Pega - case management	All required info & SIR forms

Case 1: Expedited Process	**Screening or Technical Review**	na	na	na
	Application Approved	Energy Services	Project Center and Pega	All required info & SIR forms
	Request for Meter Set	Energy Services	Pega and Logica-work management system	Customer account #, existing meter type, parking restrictions
	Add DG system to utility mapping	Energy Services and Regional Engineering	Vision Maps & e-mail	Customer account #, DG size & type, service address
	Verification Test	na	na	na
	Final Acceptance	Energy Services	Pega	Contractor self-certification form and electrical inspection from AHJ/DoB
Case 2: Full CESIR Process	**Preliminary technical review**	Distribution Engineering	PVL	Customer account #, DG size & type, service address
	Estimate of CESIR if needed to customer	Distribution Engineering & Energy Services	Project Center and Pega	All required info & SIR forms and DE approval
	Payment received	Energy Services	Pega and Logica-work management system	Customer account #, existing meter type, parking restrictions
	Data request to customer	Energy Services	Vision Maps	Customer account #, DG size & type, service address
	CESIR study	Distribution Engineering & Energy Services	na	na
	Application Approved	Distribution Engineering &	Pega	DE approval & field notes and electrical

		Energy Services		inspection from AHJ/DoB
	Request for Meter Set	Distribution Engineering	CIS, Vision Maps, Load Aggregator, PVL, RMS/SCADA	Customer account #, DG size & type, service address
	Add DG system to utility mapping	Distribution Engineering	na	na
	Verification Test	Energy Services	na	na
	Final Acceptance	Energy Services	Pega/email	Notes from DE on required items

III. Perspective & Expectations re: Online Portal

3.1 Please describe the specific challenges you foresee in meeting the NY REV's online portal requirements.

- Removing the human element would be problematic; there are many considerations unique to the system and the local grid that cannot be picked up by a software program.
- All the tools required for feasibility and CESIR studies would have to communicate well with one another, which would require a significant investment of time and resources; Con Ed's tools in particular differ from other utilities due to their network structure
- Much of the data that would be required for fully automated impact studies does not exist.
- Data resides in different databases, and would need to be consolidated
- A cost/benefit balance exists. Most applications are for less than 40kW, and are already processed quickly
- If there is an error rate with a potential automated system, it's important that the costs of errors do not outweigh the time and resource savings of automation.

3.2 Please describe the specific opportunities you foresee in meeting the NY REV's online portal requirements.

- Automation of load flow analysis may be possible for systems below 200kW or 250kW; however, there will always be a subset that need manual review.
- Improving the customer's visibility of the application process

- Establishing a standard set of evaluation criteria for all the Joint Utilities so that developers in all areas of the state can expect a similar outcome to similar reviews.

3.3 What steps have you investigated or taken to develop an online portal?

Implemented Project Center, which allows online applications for all DG systems. Working on developing Project Center to allow for automatically screening/processing of systems below 25kW.

Con Edison is working to improve a number of systems in line with business and customer service goals. These timelines are in progress and may influence/be influenced by new integration projects to establish the IOAP. Utility IT personnel are limited, so accomplishing IOAP goals may require 3rd party involvement and its associated costs.

3.4 What specific steps do you plan to investigate or take through the end of this year to develop an online portal?

- Developing a phone app to interface with Project Center.
- Setting up a demonstration with Qado Energy and Clean Power Research to review their software.
- Working on automation tools and front-end improvements to make the customer experience with Project Center easier and more informative.

IV. Misc Questions (if time allows)

4.1 In your opinion, is there anything in the NY SIR that is unclear, difficult, or impractical to comply with? Are there parts of the SIR that may not be well aligned with your physical or IT infrastructure? Are there constructive solutions that you have developed or would suggest?

The requirement to add meters within 10 days of approving expedited applications is problematic because customers often cancel the project, and all of the prior metering work must be undone.

4.2 In response to NYSERDA, utilities have identified strategic locations for PV and microgrids. What is the utility's preferred frequency and timing for updating strategic locations? Other suggestions?

This is done once a year after ConEdison's annual load relief study is completed.

4.3 Do you currently have access to interconnected/operational DER performance data? If so, how does such visibility support utility planning or operations? If not, is there value in gaining such visibility (e.g. operational visibility and data resolution) regarding DER performance? At what scale of DER or type of DER is this most relevant?

Con Edison only has visibility into the performance of six out of 4,700 PV systems; these six are in the Smart Grid pilot project that allows export across a network protector. Con Edison thinks there is value in gaining more visibility into the operational behavior of these systems. The Joint Utilities requested telemetry for DG above 200kW in recent comments to Staff on SIR revisions as a start.

4.4 Do you believe the adoption of smart inverters would provide benefits, e.g. reduce the need for CESIR studies?

Smart inverters are not considered in relation to the CESIR process.

NEW YORK Interconnection Online Application PORTAL GAP ANALYSIS

IN-DEPTH INTERVIEW TOPIC GUIDE (Rev 3)

Respondent Name(s):	Raymond Kinney
Respondent Title(s):	Director - Transmission. Energy Services
Company Name:	NYSEG/RGE
Contact Information (phone / email):	rpkinney@nyseg.com, 607-762-4321
Date / Time of Interview:	May 26, 2015
EPRI Interviewer(s):	Tom Key, Nadav Enbar, David Freestate

I. Background & Perspective – Questions to Answer or Clarify

1.1 What size (kW) classifications are used to segment interconnection applications?

- 25 kW and less
  - Review of the application is completed within the Interconnections group; roughly 70% of distribution miles are in the 5kV voltage class.
- Greater than 25kW and less than or equal to 50kW
  - Application is routed to Distribution Planning for their review.
- Greater than 50kW and less than or equal to 250kW
  - Application is routed in parallel to both Distribution Planning and Protection Engineering for review.
- Greater than 250kW, less than or equal to 2MW, or non-inverter based that are 50kW and above.
  - Application routed to Distribution Planning for a Preliminary Technical Review; if it passes, then a Final Technical Review (CESIR) is performed.

1.2 Are there any tools or processes you are developing to make interconnection faster/cheaper/better? If so, can these tools be shared?

- We did not identify any tools being developed; if there are, please list here.
- Following are process improvements under development.
  - Developing a separate interface in Access for each of the 4 interconnection application paths to simplify and streamline the process.
  - Currently using Visual Basic for automation functions (ex. automated meter exchange order, final authorization letter); developing an SQL database and upgrading to VB.net.

1.3 What are the most significant issues in processing interconnection applications?

- Sudden high volume caused by incentive deadlines can cause processing bottlenecks.
- 90% of applications over 250kW have errors or omissions; correcting these errors and collecting the correct documents from developers is time consuming.
- Volume of applications has increased exponentially in recent years
    - In the past 5 years, application volume typically grew by 25%-40% from year to year.
    - Between 2013 and 2014, applications doubled; roughly as many applications were received in the fourth quarter of 2014 as in all of 2013.

1.4 What tools do you use to ensure the privacy and security of your customers' information?

- User names and passwords are created for customers to check their application status online.
- Customer authorization must be signed before sharing information with developers.
- Customer information is only available to staff with access to utility databases.

1.5 Please complete the below table to give us an idea of volume of applications:

Question	< 50 kW	50-300 kW	> 300 kW
How many MW of PV and non-PV DG are currently interconnected?	PV = 30.076MW Non PV = 959kW	PV = 7.384MW Non PV = 7.754MW	PV = 13.215MW Non PV = 59.683
How many applications did you process in the last 12 months?	1698	61	99
What percent of applications in the last 12 months were incomplete when received?	15	25	90
What percent of applications in the last 12 months were approved?	100	100	98
What percent of applications in the last 12 months were installed?	80	25	10

Do you conduct a preliminary technical review for each of the project size categories? (Y/N)	N	Y	Y
In next 2 years, what are your projections for the level of interconnection applications received?	At least double	At least double	Tenfold increase

1.6 For approved project applications (both installed and not pursued) in the last 12 months, what percent have required utility infrastructure upgrades of between $0-$9,999, (95%) $10,000 up to $49,999, $50,000 up to $99,999, and $100,000 and over (5%)? Has this changed from prior years? If so, why?

We have received an increased amount of projects 250kW and greater

1.7 How many utility staff are currently available to perform administration and processing of interconnection applications? What is the estimated total man years for this effort?

2 FTE equaling 1.5 man years total

1.8 How many utility staff are currently available to perform engineering and studies of interconnection applications? What is the estimated total man years for this effort?

8 FTE but they are not available for this work on a full time basis

1.9 Please complete the below table to give us an idea of the tools and systems (business + technical) used in the interconnection process:

Process	Tool/System	How do you use it?	Used for something other than DG also?	In House/ Commercial
Business Management Systems	MS Word, Excel	Tech review & final acceptance letters. Tracking project status	General Company computer software	Commercial
	MS Outlook	Receive applications, sending review, status and communications with developers	General Company computer software	Commercial

	MS Access	Project database	General Company computer software	Commercial
	Visual Basic	Application and process automation	General Company computer software	Commercial
			General Company computer software	
Systems for Technical Review	CYME	Provides electronic model of distribution system	General Distribution Planning analysis.	Commercial
	GIS Mapping Database	Provides electronic map od distribution system.	General Distribution Planning analysis, Operations, Outage Management, etc.	Commercial
	SAP	Provides data for equipment ratings, loading, customer usage.	General program for Company assets, accounting, customer service, work management etc.	Commercial
	ASPEN	Relay study and coordination	General program for all Company protection analyses	Commercial

II. Interconnection Process – Getting into the Details

Receiving Application

2.1 How does your first contact with the DER customer typically occur? Which department is responsible for replying to initial customer inquiries, and what is their standard procedure?

- First contact is usually through receiving the application in the DG mailbox.
- Transmission Services receives the application through the DG mailbox; if incomplete, they send email to customer and notify them, and if complete, they begin processing the application.

2.2 How many utility staff are currently available to perform administration and processing of interconnection applications? What is the estimated total man years need for this effort in 2015?

- FTE equaling 1.5 man years total

2.3 What are the possible ways applications can be submitted for each PV system/size classification (e.g. online, by mail, in person, etc.)? Can customers attach supporting documents and utilize electronic signature?

- All applications are filled out via an online form that is emailed to the DG mailbox.
- Customers can attach documents when they email the DG mailbox.

2.4 Who reviews the application for completeness? Does the same person/people review the application for approval?

- Transmission Services reviews applications for completeness. (process description is from the internal printout provided by Transmission Services)
  - Check name against spreadsheet to determine if the project is new or an addition to an existing system
  - Assign file number if new
  - Create electronic folder & place all attachments into it
  - Make hard copy folder and place in "holding area"; print initial email, 1st page of Appendix A, and all of Appendix B, and put these in the hard copy folder
- For systems 25kW and less, Transmission Services reviews applications for approval.
- For systems above 25kW, Distribution Planning reviews the application for approval.

2.5 Who contacts the customer to inform them whether the application is completed adequately and/or whether it has been approved? Is this process automated in some way?

- Transmission Services contacts the customer if the application is incomplete.
- If an application is complete, it is processed and the customer is notified when anything is needed from them or when the application is approved.

2.6 What is your typical response time to customers after receiving complete and incomplete applications? What factors most affect this response time?

- Typical response time is within a day or two.
- Factors most affecting this response time are volume of applications and level of correctness and completeness of the applications.

2.7 Do you designate a single point of contact for the applicant? If so, what is the rationale for designating your utility point person and at what time is this designation made?

- Transmission Services uses the DG mailbox as the single point of contact; no single individual is the point of contact, but a team of 6 people within Transmission Services has access to the DG mailbox, and any of them can assist the customer
- If an application is being reviewed by Distribution Planning, the customer is requested to copy Distribution Planning whenever they email Transmission Services so they can also provide any needed assistance.

2.8 What level of detail is provided and at what point is this communicated? (e.g. application completeness check, preliminary response, status update)

- The single point of contact is provided when the customer submits the application.
- The single point of contact provides the customer with the current application status, including steps that have been completed and expected completion times of pending steps; the single point of contact also itemizes any documents or information that is still needed from the customer.

2.9 After an application is received, what tools are used to store and access its information?

- Interconnection applications are stored in a Microsoft Access database.

2.10 Who has access to the application once it is received (or in your database)?

- The application can be accessed internally by Transmission Services, Distribution Planning, and other internal groups that need the information.

2.11 Can the customer/contractor access their application information online? If so, what project details and status information are available to them and when? If not, how else are they able to access information?

- Customers can access their application status online, but typically call or email instead.
- When customers access their application status online, the steps of the SIR process are shown; completed steps are in green, pending steps are in yellow, and steps that haven't yet begun are in red.

2.12 How do you communicate to customers (verbal, written, email) and at what the steps of the application process?

- The customer is notified by email in the following events: there is an incomplete application, something is needed from the customer, or the application review has been completed.
- Upon acceptance/rejection of the application, the following happens: customer receives email notification explaining the reason for rejection, or in the case of acceptance a final acceptance letter is issued notifying the customer to proceed with the installation.

2.13 What was your median response time for initial inquiries in 2014 and 2015?

- days

2.14 Using your current work management system, can you estimate the maximum number of applications you could process each month while still meeting SIR time requirements?

- It is difficult to estimate, but the current system might be able to handle 4x the current volume of applications.

Expedited Process (< 25 kW)

2.15 The SIR lists a fast-tracked 6-step application path for smaller systems, is this the same path your applications follow?

- Yes, SIR steps are followed for the expedited process.

2.16 Are there any steps in your interconnection review process that are automated, and if so, what is the level of automation for each?

- Meter exchange work orders, contracts, a list of any additional items/actions required from the customer, and final authorization letters are automatically generated by the Access database and Visual Basic.

2.17 What tracking tools do you currently use for applications throughout the interconnection process? Do your customers have access to these tools? Can the tracking tools be integrated into the utility's website (if they are not already)?

- Application status can be tracked by utility staff through the Access database.
- Customers can access an online status page that interfaces with Access to show which SIR steps have been completed, but they typically prefer to contact utility staff for further details.

2.18 How does the applicant track application status? Do any of your utility tracking tools allow you to inform customers of the status of individual review steps (e.g. the progress and expected completion date of a CESIR being conducted)?

- Nearly all customers prefer to find status of individual review steps by calling or emailing their point of contact; through the online status page, it's possible for customers to view status in relation to the overall interconnection process, although customers rarely do so.

Application Approval and Processing

2.19 What is your procedure for adding distributed energy resources into the Geographic Information System (GIS)? At what point in the process does this happen? How often does this happen (daily, weekly, monthly)?

- Existing distribution assets are in the GIS; their functional location is used, rather than physical address.
- A procedure has not been formalized for adding DG resources into GIS; DG addition to GIS was just implemented in early 2015, and is still being developed.

2.20 Which steps in the approval process are most commonly not passed the first time? What are the most common reasons for not passing and what measures are typically taken in these situations?

- Preliminary technical review is the step where applications most commonly do not pass the first time; in these cases, data in Cyme is typically adjusted to determine whether upgrades/modifications may be added to pass the application without a full CESIR.

2.21 What is your procedure for installing new meters? When does that happen?

- When the application is approved, the Access database automatically sends a meter exchange order.
- A recent problem is that homeowners do not realize the application has progressed as far as it has, and do not want the meter installed.

Systems Greater than 25 kW

2.22 The SIR lists an 11-step path for applications involving a Coordinated Electric System Interconnection Review – CESIR (please reference the attached flow charts); is this the same paths your applications follow?

- Yes, the steps from SIR guidelines are followed when a CESIR is required.
- A $350 application fee is collected for systems greater than 50kW, with the exception of net metered customers.

2.23 Do you use any automated or manual screens for certain PV size classifications?

- Manual screens are used for inverter-based systems greater than 25kW and less than or equal to 250kW; these screens look at transformer size, service equipment

size (utility owned), impact of other customers tapped into transformers, what other connected generation is on the circuit (with percent to connected load), where capacitors are on the system, and system load.

2.24 What are the different means by which you can accept interconnection payments from customers (e.g. application fees, CESIR fees, etc.)? In what form are payments typically submitted?

- Payments may either be mailed or wired to the utility; most customers prefer to mail checks.
- Currently, there is no capability to receive online payments.

CESIR Process

2.25 Please explain criteria that trigger a CESIR requirement?

- A CESIR is conducted for systems greater than 250kW, non-inverter based systems, or for systems that do not pass the preliminary technical review.

2.26 What is your typical completion time for a CESIR?

- Completion time is within the SIR requirements, but is unpredictable; for complete applications it is sometimes several days, and for applications requiring a lot of additional documents or information from developers, it may take 50 to 55 days.

2.27 What are the most common obstacles to completing a CESIR within the NY SIR time requirements?

- Customer education is one of the primary obstacles.
  - For systems above 250kW, developers submit incomplete/incorrect applications roughly 90% of the time.
  - A great deal of time can be lost trying to obtain the correct documents.
  - No list of preferred developers is currently used.

2.28 Do you typically have all the information you need when you start a CESIR? If not, what missing information is most likely to cause delays?

- Completeness of applications varies on a case-by-case basis; missing drawings, site plans, and incorrect account information are the most common problems.

2.29 Who communicates with the customer before, during, and after the CESIR process? What is the typical content of these communications?

- During the CESIR process, staff from Distribution Planning typically communicate by email with clients to inform them if anything is needed; they copy each other and the DG mailbox on these communications, and keep a case

history in the Access database to ensure that others can assist the customer if needed.

2.30 Are third-party consultants utilized for CESIR studies? What percent of CESIR studies have utilized third-party consultants in the past 12 months?

- Third-party consultants are used for CESIR studies when the volume of workload exceeds the utility's processing capacity. 25% of CESIR studies are performed by Third-party consultants

2.31 What tools and resources do you use during the CESIR process? Modeling and load flow analysis tools; Commercially-produced or in-house?

- Cyme is used for load flow modeling and analysis during the CESIR process.

2.32 Are there electronic maps for the entire distribution system? If no, what percentage is mapped electronically? Can/do the maps feed simulation tools for performing load flow analysis?

- There are good maps for distribution, but not for three of the city networks.
- What database are the maps in? GIS
- Better maps and GPS coordination from the applicant is needed, as the wrong locations have been studied in the past; site plans and GPS coordinates would be helpful.

2.33 Are there any manual reviews that don't involve a full CESIR? If so, why? How many of each do you typically complete in a month?

- When possible, manual preliminary technical reviews use Cyme modeling to find a configuration that will allow the system to be approved without a full CESIR

2.34 For each type of manual review, what information is needed and how long does it usually take to complete?

- For a preliminary technical review, a complete/correct application is needed, as well as drawings and any other requested documents; it is typically completed within 15 days.

Summary Table: please complete where applicable

Interconnection Process		Which department performs step?	What Tools/Systems are used?	What data is needed?
All Applications	**Inquiry Received & Responded**	Transmission Services	Email	
	Application Received	Transmission Services	Email	
	Application Fee Received (for systems > 50kW)	Transmission Services	Regular mail (check)	
	Application Receipt Notification sent to customer	N/A (customer notification is only made for incomplete applications	N/A	
	Application reviewed for completeness	Transmission Services	manual	
	Application Status Notification sent to customer (complete or incomplete)	Transmission Services	Email or phone	
	Application Tracking (communication with customer throughout)	Transmission Services	Email or phone	
	Application sent for screening/review	Transmission Services	Outlook calendar	
Case 1: Expedited Process	**Screening or Technical Review**	Transmission Services	Email	
	Application Approved	Transmission Services	MS Word	
	Request for Meter Set	Transmission Services	Email, MS Word	
	Add DG system to utility mapping	Transmission Services	Access database, GIS mapping	

	Verification Test	Transmission Services	Email, MS Word	
	Final Acceptance	Transmission Services	Email, MS Word	
Case 2: Full CESIR Process	**Preliminary technical review**	Distribution Engineering	CYME, SAP, GIS	
	Estimate of CESIR if needed to customer	Transmission Services	Email	
	Payment received	Transmission Services	Regular mail (check)	
	Data request to customer	Transmission Services	Email	
	CESIR study	System Engineering	Aspen	
	Application Approved	Transmission Services	Email, MS Word	
	Request for Meter Set	Transmission Services	Email, MS Word	
	Add DG system to utility mapping	Transmission Services	Access database, GIS mapping	
	Verification Test	Transmission Services	Email, MS Word	
	Final Acceptance	Transmission Services	Email, MS Word	

III. Perspective & Expectations re: Online Portal

3.1 Please describe the specific challenges you foresee in meeting the NY REV's online portal requirements.

- Integrating the portal with existing data systems.
- Protecting customer privacy/security if a statewide or 3rd party portal is used.
- Data quality is a concern for increasing automation

    - Some level of human intervention is needed to make sure the customers enter correct data in their applications
    - Given how dynamic the grid is, a high level of automation would require that system information be updated frequently and accurately.

3.2 Please describe the specific opportunities you foresee in meeting the NY REV's online portal requirements.

- Increased automation could reduce processing time and increase processing capacity.
    - If SAP were linked to the interconnection database, it wouldn't be necessary to manually enter customer information (address, account number, etc.).
- Mapping of DG capacity could give customers a better idea of the best places to submit applications.

3.3 What steps have you investigated or taken to develop an online portal?

- Developed DG mailbox and online status check capability.

3.4 What specific steps do you plan to investigate or take through the end of this year to develop an online portal?

- Meeting with vendors that offer online application & processing services.
- Talking to other utilities to learn from their experiences & best practices.
- Plan to simplify the website, as customers sometimes find it confusing.

IV. General Questions (please check these responses and expand were possible)

4.1 In your opinion, is there anything in the NY SIR that is unclear, difficult, or impractical to comply with? Are there parts of the SIR that may not be well aligned with your physical or IT infrastructure? Are there constructive solutions that you have developed or would suggest?

- The SIR requires that the meter be exchanged within 10 days of approving the application, which is very early in the process; about 5%-10% of the time, the customer turns away the meter exchange crew.
- SIR and Public Service Law are vague about whether net metered customers should be charged for CESIR studies; NYSEG has not been doing so because they thought they were not allowed to, but other utilities have been.

4.2 In response to NYSERDA, utilities have identified strategic locations for PV and microgrids. What is the utility's preferred frequency and timing for updating strategic locations? Other suggestions? Annually

4.3 Do you currently have access to interconnected/operational DER performance data? If so, how does such visibility support utility planning or operations? If not, is there value in

gaining such visibility (e.g. operational visibility and data resolution) regarding DER performance? At what scale of DER or type of DER is this most relevant?

- Currently, there is no access to DER performance data.

4.4 Do you believe the adoption of smart inverters would provide benefits, e.g. reduce the need for CESIR studies?

- We do not have a good enough understanding on the capabilities of smart inverters. However we believe CESIR studies will be required regardless.

NEW YORK INTERCONNECTION ONLINE APPLICATION PORTAL GAP ANALYSIS

IN-DEPTH INTERVIEW TOPIC GUIDE (Rev 3)

Respondent Name(s):	Michael Pilawa
Respondent Title(s):	NY Lead Technical Support Consultant
Company Name:	National Grid
Contact Information (phone / email):	(315) 798-5367
Date / Time of Interview:	May 19, 2015 9am-2pm ET
EPRI Interviewer(s):	Tom Key, Lindsey Rogers, David Freestate

I. Background & Perspective – Questions to Answer Beforehand

1.1 What size (kW) classifications are used to segment interconnection applications?

Applications are segmented into three size classes per the NY SIR: (1) up to 50kW, (2) above 50kW and less than or equal to 300kW, and (3) above 300kW and less than or equal to 2MW.

1.2 Are there any tools or processes you are developing to help make interconnection faster/cheaper/better? If so, can these tools be shared?

NGRID issued an RFI a few years ago, but is now rethinking its approach based on REV. The RFI was utilized to see what systems were out there and start pursuing an online system.

1.3 What are the most significant issues in processing interconnection applications?

- There could be improvements to the requested data needs on the application—for example, up-front requirements for a site plan and latitude/longitude coordinates could improve utility review.
- Greater visibility into what stage of the interconnection process the customer is in could improve the customer experience.
- Incorporate approaches for ensuring the maturity of applications; applications that do not go forward have increased from 40% to 60% over the past year.

1.4 What tools do you use to ensure the privacy and security of your customers' information?

The highest level of classification that is involved in a particular data transfer will determine if any special measures need to be taken. National Grid established 4 data classifications from the lowest to the highest level of sensitivity: See attached PDF.

- Publicly Available
- Internal Use Only
- Confidential
- Strictly Confidential

Publicly Available and Internal Use Only do not require encryption protection when being transferred.

Confidential and Strictly Confidential require encryption protection when being transferred. Some of this information may also require encryption at rest and/or further access restrictions.

1.5 Please complete the below table to give us an idea of volume of applications:

Question	< 50 kW	50-300 kW	> 300 kW
How many MW of PV and non-PV DG are currently interconnected?	PV: 6,925, 59.1 MW Non-PV: 226, 1.6 MW	PV: 254, 24.1 MW Non-PV: 29, 3.9 MW	PV: 16, 14.2 MW Non-PV: 16, 11.3 MW
How many applications did you process in the last 12 mos?	3,700	300	
What % of all applications in the last 12 mos were incomplete when received?	25-30%		
What % of applications in the last 12 mos have been approved?	94%	84%	78%
What % of applications approved have been installed?	84%	65% (110-200 kW worst)	16%
Do you conduct a preliminary technical review for each of the project size categories (Y/N)	N	Y	Y
In next 2 years, what are your projections for the level of interconnection applications received?	2015: 3,540 2016: 161 2017: 90	2015: 4,255 2016: 187 2017: 110	2015: 4,971 2016: 213 2017: 130

When an applicant removes their project from the queue is usually when we perform a **preliminary interconnection study (impact study).** This study provides a high level

view of what will be expected going into the next phase of the process, potentially identifying significant interconnection costs that could make the project unviable. The percentage of cancellations is generally around 15% to 20%.

1.6 For approved project applications (both installed and not pursued) in the last 12 months, what percent have required utility infrastructure upgrades of between $0-$9,999, $10,000 to $49,999, >$50,000 to $100,000, >$100,000? Has this changed from prior years? If so, why?

For upgrades less than $10k: (1) 50kW-500kW 25%, (2) 500kW-1000kW 40%, (3) 1MW-2MW 25%, (4) 2 MW and above 10%.

25% $10k - $50k, 40% $50k - $100k, 35% $100k-up

This has changed quite a bit over the past couple of years, mainly due to size of the proposed systems and the location of the project as it relates to the feeder loading. There are more projects being proposed in areas where infrastructure has not been updated/upgraded for many years; for example, they may lack three-phase power, etc. We are seeing in some cases a saturation of large scale DG on the same feeder, which is causing infrastructure issues.

1.7 Please complete the below table to give us an idea of the tools and systems (business + technical) used in the interconnection process:

Process	Tool/System	How do you use it?	Used for something other than DG also?	In House/ Commercial
Business Management Systems	CSS	Obtain customer load equipment, loads, and load profiles	Yes	Commercial
	STORMS	Schedule and track tasks. Design and issue facility changes in support of DG interconnection	Yes	Commercial
	ESB 750 series	Reference for establishing interconnection criteria and reviewing customer designs	Yes,applies to all electric served customers	Both

	Company Tariffs	Used as regulatory basis for DG design applications and review	Yes,applies to all electric served customers	Commercial
	CIAC procedure	Estimation of cost for facility upgrades needed to support DG interconnection	Yes, applies to all electric served customers	In-House
	Contractor Engineering Services	Used as a tool to assist in management of workflows	We have master service agreements where contractors support various engineering and project management work for all capital projects.	External Resources
Systems for Technical Review	ABB EMS	System configuration & system load/voltage/current data	Yes	Commercial
	Aspen	Perform system & transmission network fault current analysis and protective device coordination	Yes	Commercial
	CYME	Perform load flow, fault current and voltage fluctuation/flicker analysis	Yes	Commercial
	Excel	Perform voltage and islanding screens	Yes	Commercial
	FeedPro	Substation and feeder load data	Yes	Commercial

	GIS	Obtain system topology, connectivity & equipment & load data for distribution systems	Yes	Commercial
	Various data repositories	Data stored in electronic input files and electronic hard copy and excel format are used for inputs to other tools by manual data entry	Yes	In-House

1.8 How many utility staff are currently available to perform *administration and processing* of interconnection applications? What is the estimated total man years for this effort?

- Between TSES and Customer Solutions, there is about 7 FTEs that perform the administration and processing of interconnection applications.

1.9 How many utility staff are currently available to perform *engineering and studies* of interconnection applications? What is the estimated total man years for this effort?

- There are 5 full-time employee (FTE) engineers currently performing preliminary and CESIR studies. In 2014, we processed 66 preliminary reviews and 35 CESIRs all within the SIR timelines. Not all preliminary reviews resulted in CESIRs. This effort results in approximately 2.6 FTE years.

II. Interconnection Process – Getting into the Details

Receiving Application

2.1 How does your first contact with the DER customer typically occur? Which department is responsible for replying to initial customer inquiries, and what is their standard procedure?

First contact with the customer typically occurs through an email or phone inquiry. The Customer Solutions group reviews the application for completeness, and approves applications that follow the expedited process. If an application doesn't follow the expedited process, the Technical Sales and Engineering Support (TSES) group performs initial screens. The Retail Connections group contains up to 5 employees who are focused on conducting CESIR studies.

Editor's note: Reference NGRID org chart provided for key departments created for this process.

Contractors are used as needed for CESIR studies when volumes are high. We also utilize contractors in Customer Solutions to initially review applications and process applications for 50 kW and below.

Prior to submitting applications, NGRID provides feeder voltages and an ESB 756B reference table. This table 4.6-1 is located in our Electric Service Bulletin 756B, and provides typical planning limits for distributed generation connection to a radial distribution feeder. These generator capacities are on a per-generator basis on full nameplate ratings and at unity power factor. Please be advised that the company will evaluate each application before deciding on the maximum MVA allowed on the National Grid system at a given point.

NGRID's Technical Sales and Engineering Support (TSES) responds to initial customer inquiries. The standard procedure is to receive applications via email. If up to 50kW and inverter based, the interconnection application is fast tracked for approval and the customer is notified via email. The system is then added to the work management system and the metering team, GIS team, and billing department is notified. If the system is greater than 50kW and less than or equal to 300kW, the TSES group does a few rule of thumb screens to determine if a study is needed. These include 67% of minimum load (inverter-based) and 33% minimum load (rotating machines), delta system (4160), fuse sizing too low, and underrated transformer. These initial screens utilize GIS and FeedPro. Any systems that have an exception (e.g., larger than 300 kW, network systems, non-inverter, energy storage, systems that fail initial screens) are sent to NGRID's Retail Connections group for CESIR.

2.2 What are the possible ways applications can be submitted for each PV system/size classification (e.g. online, by mail, in person, etc.)? Can customers attach supporting documents and utilize electronic signature?

Applications are submitted via email to DistributedGenerationServices-NY@nationalgrid.com mailbox that has been set up to receive applications and general inquiries relating to distributed generation and net metering.

2.3 Who reviews the application for completeness? Does the same person/people review the application for approval?

Customer Solutions reviews applications for completeness. For systems up to 50kW that don't require additional technical review, Customer Solutions also approves the applications. All other applications are approved by Technical Sales and Engineering Support. The most common missing items are diagrams, missing account numbers, incorrect addresses, etc.

2.4 Who contacts the customer to inform them whether the application is completed adequately and/or whether it has been approved? Is this process automated in some way?

Customer Solutions (CS) or Technical Sales and Engineering Support (TSES) may contact the customer, depending on which group is working on the application. The process is not automated, and is done via phone or email.

2.5 What is your typical response time to customers after receiving complete and incomplete applications? What factors most affect this response time?

Typical response time is within 1-2 days; volume of applications at a given time is what most affects response time.

2.6 Do you designate a single point of contact for the applicant? If so, what is the rationale for designating your utility point person and at what time is this designation made?

Yes, but interconnection applications are initially handled and managed by Customer Solutions and Technical Sales and Engineering Support groups. Once an application is in CESIR, one person is assigned to a project from TSES that acts as a project manager and interfaces with the customer; meanwhile, Retail Connections performs the technical review and interfaces with the customer's engineer on technical issues and information.

2.7 After an application is received, what tools are used to store and access its information?

Applications are stored within NGRID's work management system (WMS) and the key groups that are involved in the interconnection process have the ability to access it. The WMS is the same system NGRID uses to handle all of its electric service requests (STORMS).

2.8 Who has access to the application once it is received (or in your database)?

All of the utility's groups have access to the application, but only view it as needed

2.9 Can the customer/contractor access their application information online? If so, what project details and status information are available to them and when? If not, how else are they able to access information?

No, customers must reach out to NGRID via email (DG inbox) or call the utility directly.

2.10 How do you communicate to customers (verbal, written, email) and at what the steps of the application process? What level of detail is provided and at what point is this communicated? (e.g. application completeness check, preliminary response, status update)

Communication with customers is done via email or by phone. NGRID communicates with the customer via email when it receives and reviews an application for completeness. NGRID also notifies customer via email when a system has been approved for fast track or flagged for CESIR study. There is communication email on the Pre-Review and CESIR estimated prior to commitment. For CESIR studies, there is phone and email communication on data needs, questions, etc., to complete the study.

Results of the CESIR study are emailed to customers. All time windows for communication follow NY SIR.

2.11 What was your median response time for initial inquiries in 2014 and in 2015?

Initial feedback is provided within 24-48 hours.

2.12 Using your current work management system, can you estimate the maximum number of applications you could process each month while still meeting SIR time requirements?

We process on average of about 440 applications per month.

Expedited Process (< 50 kW)

2.13 The SIR lists a fast-tracked 6-step application path for smaller systems, is this the same path your applications follow?

Yes, we follow the NY SIR for all interconnection projects.

2.14 Are there any steps in your interconnection review process that are automated, and if so, what is the level of automation for each?

No.

2.15 What tracking tools do you currently use for applications throughout the interconnection process? Do your customers have access to these tools? Can the tracking tools be integrated into the utility's website (if they are not already)?

NGRID uses its STORMS work management system to track applications. Customers to do not have access to this tool. This is strictly an internal system.

2.16 How does the applicant track application status? Do any of your utility tracking tools inform customers of the status of individual review steps (e.g. the progress and expected completion date of a CESIR being conducted)?

No, customers cannot directly track application status without calling or emailing.

Application Approval and Processing

2.17 What is your procedure for adding distributed energy resources into the Geographic Information System (GIS)? At what point in the process does this happen? How often does this happen (daily, weekly, monthly)?

DER applications get added into the GIS after they are approved and in the time window of any other electric service additions. With the NY SIR fast track, sometimes systems are added to the GIS that do not get installed, and there is a correction to the system that happens monthly. This usually gets completed within 3 to 4 weeks.

2.18 Which steps in the approval process are most commonly not passed the first time? What are the most common reasons for not passing and what measures are typically taken in these situations?

The initial application review is commonly not passed because of underrated transformers, fuses rated too low, risk of saturation, and possibility of reverse power flow.

2.19 What is your procedure for installing new meters? When does that happen?

New meter installation follows the NY SIR's 10-day requirements. Installation usually occurs within one week of approving the application. NGRID has recently seen an uptick in approved applications that end up not getting installed when the meter crew goes out to the customer premises. Incidence has risen this year from 40% to 60%. We believe this recent increase is due to a push to get contracts executed with customers so that the contractors can secure NYSERDA funding.

Systems Greater than 50 kW

2.20 The SIR lists an 11-step path for applications involving a Coordinated Electric System Interconnection Review – CESIR (please reference the attached flow charts); is this the same paths your applications follow?

Yes, we follow the NY SIR interconnection steps.

2.21 Do you use any automated or manual screens for certain PV size classifications?

For systems greater than 50kW and less than or equal to 300kW, NGRID has developed several rules of thumb to fast track some of the larger systems. These are conservative screens, and if they do not pass one of these, they go through a full CESIR. All screens are performed manually.

If a system is inverter based, located on a feeder that does not have a heavy saturation of DG, and has an appropriately sized transformer, then we can pass it through to the expedited process. If an application does not have any system issue, then we should process that application in the expedited process.

2.22 What are the different means by which you can accept interconnection payments from customers (e.g. application fees, CESIR fees, etc.)? In what form are payments typically submitted?

Customers pay for their applications up-front; if applicable, they also pay for their CESIR study up-front, as well as for upgrades. Over/under prepayment is reconciled at the end of the process. NGRID invoices customers through snail mail, not online.

Currently, we do not have a system in place where customers/developers can check the account balance for an interconnection project. In addition, all interconnections costs have to be paid in whole and up-front before we can start the construction piece of the project. As for the communication piece, this is usually accomplished by direct

communication with the customer/developer either through email, phone, or face to face meetings.

CESIR Process

2.23 Please explain criteria that trigger a CESIR requirement?

Systems larger than 300kW are automatically pushed to a CESIR. For systems greater than 50kW and less than or equal to 300kW, a CESIR is triggered if the initial screens described above are not passed.

2.24 What is your typical completion time for a CESIR?

Completion time complies with the NY SIR; NGRID typically completes at least 6 CESIR's a month.

2.25 What are the most common obstacles to completing a CESIR within the NY SIR time requirements?

The high volume of applications, triggered by incentives, is a key challenge. Time delays getting information (site plans, detailed design) from the developer/customer is also an issue.

2.26 Do you typically have all the information you need when you start a CESIR? If not, what missing information is most likely to cause delays?

No, NGRID typically does not have all the information it needs to kick off a CESIR. A site plan and detailed system design (and location) are the most common data needs that cause delays in starting a CESIR.

2.27 Who communicates with the customer before, during, and after the CESIR process? What is the typical content of these communications?

Assigned staff in NGRID's Retail Connections Engineering group works with customers during the CESIR. Communication is handled via phone and email.

2.28 Are third-party consultants utilized for CESIR studies? What percent of studies?

Yes, 3rd parties are used when volume is high; it depends on the workload of internal staff.

2.29 What tools and resources do you use during the CESIR process? Modeling and load flow analysis tools; Commercially-produced or in-house?

See table.

2.30 Are there electronic maps for the entire distribution system? If no, what percentage is mapped electronically? Can/do the maps feed simulation tools for performing load flow analysis?

GIS data is available on 75% of assets (GIS does identify underground networks accurately and not all sub-transmission/transmission systems, and substation assets). Hourly load is monitored on 50% of feeders and 50% of customers. When hourly data is not available, FeederPro is used for modeling.

2.31 Are there any manual reviews that don't involve a full CESIR? If so, why? How many of each do you typically compete in a month?

For systems greater than 50kW and less than or equal to 300kW, NGRID has developed several rules of thumb to fast track some of the larger systems. These are conservative screens, and if they do not pass one of these, they go through a full CESIR. All screens are performed manually.

If a system is inverter based, located on a feeder that does not have a heavy saturation of DG, and has an appropriately sized transformer, then we can pass it through to the expedited process. If an application does not have any system issue, then we should process that application in the expedited process.

2.32 For each type of manual review, what information is needed and how long does it usually take to complete?

Summary Table

Interconnection Process		Which department performs step?	What Tools/Systems are used?	What data is needed?
All Applications	**Inquiry Received & Responded**	Technical Sales and Engineering Support (TSES)	DG mailbox	Customer info
	Application Received	Customer Solutions (CS)	DG mailbox	Customer info
	Application Fee Received (for systems > 50kW)	CS		
	Application Receipt Notification sent to customer	CS	STORMS, Email/phone	Customer info
	Application reviewed for completeness	CS	STORMS	Application info
	Application Status Notification sent to customer (complete or	CS	STORMS, email/phone	Application info

	incomplete)			
	Application Tracking (communication with customer throughout)	CS	STORMS	Application info
	Application sent for screening/review	CS	STORMS	Application info
Case 1: Expedited Process	**Screening or Technical Review**	CS	SmallWorld, FeedPro, MATLAB	GIS info, Application info
	Application Approved	CS	STORMS	Application info
	Request for Meter Set	CS		
	Add DG system to utility mapping	CS	SmallWorld	GIS info
	Verification Test	CS	STORMS	Test results
	Final Acceptance	CS	STORMS	Application info, complete verification info
Case 2: Full CESIR Process	**Preliminary technical review**	TSES	STORMS, SmallWorld	Application info, GIS info
	Estimate of CESIR if needed to customer	Retail Connections Engineering (RCE)	STORMS	Application info, prelim. tech. review results
	Payment received	Complex Project Management (CPM)		
	Data request to customer	TSES	STORMS, Phone/email	CESIR estimate, customer info
	CESIR study	RCE	STORMS, Cyme, Aspen, SmallWorld, Excel, ABB EMS,	Application info, GIS info, load data, customer documents
	Application Approved	TSES		CESIR results

	Request for Meter Set	TSES		
	Add DG system to utility mapping	TSES	SmallWorld	GIS info
	Verification Test	RCE	STORMS	Test results
	Final Acceptance	RCE	STORMS	Application info, complete verification test

III. Perspective & Expectations re: Online Portal

3.1 Please describe the specific challenges you foresee in meeting the NY REV's online portal requirements.

- Removing human interaction and review (that's a huge knowledge base).
- Standards for how inverters are going to act do not exist.
- The number of systems/tools used to perform CESIR studies is large and unique across utilities.
- The amount, integrity, quality, and security of data is a concern.
- The uncertainty about things changing in the future (reconfiguration, changes to infrastructure).
- Lack of advanced metering infrastructure (AMI).
- Accessibility of data (it tends to be located in different places and different formats).
- Considering applications in queue and their aggregate impact on the same feeder.

3.2 Please describe the specific opportunities you foresee in meeting the NY REV's online portal requirements.

- Education of solar industry on data needs, utility practices, and why certain steps are necessary.
- Streamlining process and visibility of application (enhancing customer experience) would be doable.
- Considerations for smart inverters and distribution management systems (DMS's) as the state looks towards REV.

3.3 What steps have you investigated or taken to develop an online portal?

- In 2014, we sent out a RFQ for a on-line system.

3.4 What specific steps do you plan to investigate or take through the end of this year to develop an online portal?

- Take the info from the RFQ and expand into that to see what can be developed.

IV. Misc Questions (if time allows)

4.1 In your opinion, is there anything in the NY SIR that is unclear, difficult, or impractical to comply with? Are there parts of the SIR that may not be well aligned with your physical or IT infrastructure? Are there constructive solutions that you have developed or would suggest?

Application improvements are needed, such as readjustments to the application fee. Currently, the application fee of $350 is considered an extremely low fee, and does not represent the cost for us to perform the application review and the preliminary interconnection study. This allows a lot of developers to submit multiple applications for the same customer, but for different locations to find a site that has the least cost for interconnection. If the fee were increased, this would prevent a lot of developers from submitting projects that aren't real.

As part of the proposal to reopen the NYS SIR, we have identified that fees should be somewhere between $750 and $5,000 as a starting point. There should be a tiered approach based on technology, rate class, and network versus radial circuits.

The 60-day time limit for CESIR studies is sometimes hard to comply with when data needs fall short and volumes are high.

The NY SIR's 10-day metering rules have caused some issues when the meter has been installed on a customer premises and the customer has either been unaware of the application, or has backed out of the application. In these cases, NGRID has had to backtrack and uninstall the meter.

4.2 In response to NYSERDA, utilities have identified strategic locations for PV and microgrids. What is the utility's preferred frequency and timing for updating strategic locations? Other suggestions?

We generally perform this when we are asked by NYSERDA to identify these locations as part of their PON's

4.3 Do you currently have access to interconnected/operational DER performance data? If so, how does such visibility support utility planning or operations? If not, is there value in gaining such visibility (e.g. operational visibility and data resolution) regarding DER performance? At what scale of DER or type of DER is this most relevant?

Currently, we do not have access to performance data. We believe there is a huge value in gaining such visibility, especially as we get more involved with DER's and Micro-grids

4.4 Do you believe the adoption of smart inverters would provide benefits, e.g. reduce the need for CESIR studies?

Currently, NGRID does not consider smart inverters in the CESIR process. The focus of the utility's CESIR studies emphasizes anti-islanding rather than concerns for voltage regulation.

NEW YORK INTERCONNECTION ONLINE APPLICATION PORTAL GAP ANALYSIS

IN-DEPTH INTERVIEW TOPIC GUIDE (Rev 3)

Respondent Name(s):	Joe White
Respondent Title(s):	Section Manager – Technology Engineering
Company Name:	Orange & Rockland Utilities
Contact Information (phone / email):	845-577-3688, whitejoe@oru.com
Date / Time of Interview:	May 27, 2015
EPRI Interviewer(s):	Tom Key, Nadav Enbar, David Freestate

I. Background & Perspective – Questions to Answer Beforehand

1.1 What size (kW) classifications are used to segment interconnection applications?

- Up to 50kW
- Greater than 50kW up to 2MW
- 2MW and greater
- About 95% of applications are for residential systems (< 25kW).

1.2 Are there any tools or processes you are developing to help make interconnection faster/cheaper/better? If so, can these tools be shared?

- Have paused moving forward any software upgrades and/or purchases for application processing until the REV SIR discussions are further developed.
- Currently exploring a specialized solar distributed generation company's software as a front-end portal to streamline the interconnection application process.
- Reviewed a local start-up company recommended by Staff as an option, but found the technology to not be as advanced as the competitor.

1.3 What are the most significant issues in processing interconnection applications?

- Initial incorrect, missing data
- Phantom applications from the customer and/or developer
- Phantom applications occur when a developer submits applications for the same project at several different addresses ("fishes") to see which location is best, and then pursues the application at the optimal location and allows the others to become inactive.

- Introducing capacity maps (a la PSEG) could reduce phantom applications
- Increasing the application fee from $350 to, say, $1,000 would also deter phantom projects

1.4 What tools do you use to ensure the privacy and security of your customers' information?

- Customers are given a project number in Project Center when applications are made in the portal; it was not clear if customer is given a user name or password to check status. The project number is required to check project status.

1.5 Please check the below table to give us an idea of volume of applications:

Question	< 50 kW	50-300 kW	> 300 kW
How many MW of PV and non-PV DG are currently interconnected?	18.7MW	7.9MW	6.2MW
How many applications did you process in the last 12 mos.?	1601	10	38
What % of all applications in the last 12 mos. were incomplete when received?	4.7%	50%	68.4%
What % of applications in the last 12 mos. have been approved?	100%	70%	28.9%
What % of applications in the last 12 mos. have been installed?	64.8%	10%	0%
Across the 3 PV size categories, what % of applications in the last 12 mos. have required an infrastructure upgrade?	<1%	0%	100% (only one project completed)
Do you conduct a preliminary technical review for each of the project size categories (Y/N)	Almost always No	Case by Case	Yes
In next 2 years, what are your projections for the level of interconnection applications received?	>3500	>100	>70

1.6 For approved project applications (both installed and not pursued) in the last 12 months, what percent have required utility infrastructure upgrades of between $0-$9,999, $10,000 to $49,999, >$50,000 to $100,000, >$100,000? Has this changed from prior years? If so, why?

- Due to the lack of volume of projects having completed a CESIR (2, as of end-May 2015), the range of true costs cannot be determined at this time.

1.7 Please complete the below table to give us an idea of the tools and systems (business + technical) used in the interconnection process:

Process	Tool/System	How do you use it?	Used for something other than DG also?	In House/ Commercial
Business Management Systems	CIMS	Net meter order, verifying customer information	Yes	In House
	Project Center	Online interface	Yes (new constructions)	In-House
	NUCON	Work management	Yes (new constructions)	In-House
Systems for Technical Review	NRG	Site Location, Circuit/Feeder identification	Yes	In House
	DEW	PV Impact Analysis	Yes	Commercial

1.8 How many utility staff are currently available to perform *administration and processing* of interconnection applications? What is the estimated total man years for this effort?

- Technology Engineering is the utility department that manages applications, but sometimes customer service gets involved (mainly for billing questions) due to the nature of the call center environment.

- O&R supports 3 full-time dedicated contractors to administer the application process.
- 3rd party consultants can be hired on an as needed basis
  1

1.9 How many utility staff are currently available to perform *engineering and studies* of interconnection applications? What is the estimated total man years for this effort?

- 2 engineers are responsible for performing technical review within the technology Engineering Department. Other departments are contacted as necessary for engineering review.

II. Interconnection Process – Getting into the Details

Receiving Application

2.1 How does your first contact with the DER customer typically occur? Which department is responsible for replying to initial customer inquiries, and what is their standard procedure?

- Smaller residential solar distributed generation interconnections typically notify the company via the online application submittal.
- Most first contacts for larger interconnections occur via email and/or phone call to inquire about the location of the interconnection.

2.2 What are the possible ways applications can be submitted for each PV system/size classification (e.g. online, by mail, in person, etc.)? Can customers attach supporting documents and utilize electronic signature?

- Online applications via Project Center are the preferred and most common form of submission, but the company also accepts applications by e-mail, fax, or USPS.
- Supporting documents can be attached to the application.
- A disclaimer in the application notifies the customer that their submission of the application constitutes an online signature.

2.3 Who reviews the application for completeness? Does the same person/people review the application for approval?

- Technology Engineering reviews the application for both completeness and approval.

2.4 Who contacts the customer to inform them whether the application is completed adequately and/or whether it has been approved? Is this process automated in some way?

- Technology Engineering contacts the customer to inform them of any issues with the application; when approved, they contact the customer via email using templates in the NUCON software.

2.5 What is your typical response time to customers after receiving complete and incomplete applications? What factors most affect this response time?

- Typical response time is within one day, and is usually same-day (that's the aim).
- Factors most affecting response time are volume and completeness/correctness of applications.
- In the 4th quarter of 2014, there was a backlog because of insufficient staff in addition to an increase in applications due to tax incentives expiring at the end of the year; staff was added, and it took a few months to clear the backlog and return to normal processing times.

2.6 Do you designate a single point of contact for the applicant? If so, what is the rationale for designating your utility point person and at what time is this designation made?

- Technology Engineering monitors an internal mailbox for initial contact from the customer; once contact has been made by an employee, the customer is given the employee's name and number for follow-up as appropriate.

2.7 How do you communicate to customers (verbal, written, email) and at what the steps of the application process? What level of detail is provided and at what point is this communicated? (e.g. application completeness check, preliminary response, status update)

- O&R uses verbal, written and email communications to customers throughout the application process.
- The various communications and detailed responses are utilized in various stages of inquiry, response to applications submitted, and at completion; this includes ongoing communications at every point in the process.
- Depending upon the accuracy of the application submitted, the level of communication is increased to resolve issues with an application versus minimal interaction if the application is submitted correctly with no known issues.

2.8 After an application is received, what tools are used to store and access its information?

- Once an online application has been received via Project Center, the application is automatically uploaded into NUCON for review and processing by the department.
- NUCON is also used for tracking the application from submission to completion within the software.

2.9 Who has access to the application once it is received (or in your database)?

- Anyone within the department has access to the application information, but three contractors primarily work on this effort as a daily task.

2.10 Can the customer/contractor access their application information online? If so, what project details and status information are available to them and when? If not, how else are they able to access information?

- Yes, the customer/contractor can attain status updates online via Project Center.
- Project Center is updated with information from NUCON, which is the software utilized by the three contractors to process DG applications.
- All status updates are visual to the customer/contractor on a real-time basis when updates are made in NUCON.
- O&R has developed a flow chart to explain how the process works to improve the customer experience
- O&R doesn't track how often the online status tool is used, but customers do not call or email very often to inquire about status.

2.11 What was your median response time for initial inquiries in 2014 and in 2015?

2.12 Using your current work management system, can you estimate the maximum number of applications you could process each month while still meeting SIR time requirements?

- The existing work management system has large capacity and could process an indefinite number of applications each month while still meeting SIR requirements; staffing would be a bigger constraint on processing capacity than the work management system.

Expedited Process (< 50 kW)

2.13 The SIR lists a fast-tracked 6-step application path for smaller systems, is this the same path your applications follow?

- SIR and CESIR paths and deadlines are followed within O&R.

2.14 Are there any steps in your interconnection review process that are automated, and if so, what is the level of automation for each?

- Customer application submittal is automated, otherwise, not at this time; currently exploring a specialized solar/distributed generation commercial software as a front-end portal to streamline the interconnection process.
- Paused moving forward until the REV SIR discussions are further developed.

2.15 What tracking tools do you currently use for applications throughout the interconnection process? Do your customers have access to these tools? Can the tracking tools be integrated into the utility's website (if they are not already)?

- Project Center is the portal in which applications can be submitted and tracked by the customer, and the customer can view updates from Project Center on a real-time basis from the NUCON software used by the Technology Engineering Department; tracking tools are integrated into the utility's website.

2.16 Do any of your utility tracking tools inform customers of the status of individual review steps (e.g. the progress and expected completion date of a CESIR being conducted)?

- The interconnection process is discussed post and pre-CESIR payment being received; customers are given an internal contact who updates them on the status as necessary.
- The online tracking tool lists the completion dates of prior steps, and the expected completion dates of pending steps.

Application Approval and Processing

2.17 What is your procedure for adding distributed energy resources into the Geographic Information System (GIS)? At what point in the process does this happen? How often does this happen (daily, weekly, monthly)?

- Service locations that have DERs are notated within the mapping system once those DERs are approved for operation; the notification and GIS updates occur several times a day.
- GIS is being updated to include the DER information; the smart tagging of DER's will commence in Q4 2015; DER locations are tracked in a spreadsheet maintained by the Technology Engineering Department.

2.18 Which steps in the approval process are most commonly not passed the first time? What are the most common reasons for not passing and what measures are typically taken in these situations?

- Issues vary by application, but typical errors include inaccurate customer information, incorrect installer information, incorrect PV data for panels and inverter, incorrect wiring diagrams, and incorrect on-line diagrams being incorrect.
- Customers are notified when the above inconsistencies are found, and corrective actions are taken to complete the application.

2.19 What is your procedure for installing new meters? When does that happen?

- For projects 50kW and below, new meters are requested upon conditional approval to build.
- For projects greater than 50kW, meters are ordered once final paperwork has been received.

Systems Greater than 50 kW

2.20 The SIR lists an 11-step path for applications involving a Coordinated Electric System Interconnection Review – CESIR (please reference the attached flow charts); is this the same paths your applications follow?

- SIR and CESIR paths and deadlines are followed within O&R.
- Sometimes applications are put on the 6-step path if, following cursory review, it is determined that they will not pose any issues.

2.21 Do you use any automated or manual screens for certain PV size classifications?

- Typically O&R's Distribution Planning manually reviews applications greater than 1MW for interconnection sizes greater than minimum daytime peak load on the circuit that the DG is interconnected.
- Engineers within Technology Engineering review projects where solar facilities are sized greater than the existing transformer at the customer premise or interconnected in that area.

2.22 What are the different means by which you can accept interconnection payments from customers (e.g. application fees, CESIR fees, etc.)? In what form are payments typically submitted?

- O&R accepts either a check or money order for application fees and CESIR's; typically, customers issue a check for tracking purposes.
- O&R does not currently accept digital payment

CESIR Process

2.23 Please explain criteria that trigger a CESIR requirement?

- Typically O&R's Distribution Planning manually reviews applications greater than 1 MW for interconnection sizes greater than minimum daytime peak load on the circuit that the DG is interconnected.
- Engineers within the Technology Engineering Group review projects where solar facilities are sized greater than the existing transformer at the customer premise or interconnected in that area.
- O&R tries to put projects through the expedited path whenever possible, and only does CESIR studies as a last resort.

2.24 What is your typical completion time for a CESIR?

- O&R has not had many projects that have required a CESIR until very recently (2 projects total); they have been compliant with the 60 day timeline.

2.25 What are the most common obstacles to completing a CESIR within the NY SIR time requirements?

- None have been identified yet with the current process/timeline; O&R has not had many projects that have required a CESIR until very recently.

2.26 Do you typically have all the information you need when you start a CESIR? If not, what missing information is most likely to cause delays?

- The CESIR process does not begin until all information has been submitted.
- The most common errors are location and customer information for those that require a CESIR.
- One of the more common delays is the result of waiting for the customer to send the application fees.

2.27 Who communicates with the customer before, during, and after the CESIR process? What is the typical content of these communications?

- Typically one of the Technology Engineers contacts the customer for the information required, in addition to any issues found in the process pre- and post-CESIR.
- O&R typically sends the customer the voltage at their location, the closest 3-phase power source, and a $6,000 estimate for the CESIR study (on average, CESIR's end up costing roughly that amount—costs are trued up at the end of the process).

2.28 Are third-party consultants utilized for CESIR studies? What percent of studies?

- At this time, there hasn't been a need to outsource CESIR studies to external entities. However, this option is available should it be needed.

2.29 What tools and resources do you use during the CESIR process? Modeling and load flow analysis tools; Commercially-produced or in-house?

- DEW will be utilized to study the system impact of the DG interconnected at a specific location on the circuit; DEW is a commercial software tool developed by Electrical Distribution Design (EDD).

2.30 Are there electronic maps for the entire distribution system? If no, what percentage is mapped electronically? Can/do the maps feed simulation tools for performing load flow analysis?

- The distribution system is mapped within the company; 100% of the system is mapped.
- The circuits are loaded into DEW for evaluating load flow analysis.

2.31 Are there any manual reviews that don't involve a full CESIR? If so, why? How many of each do you typically compete in a month?

- Engineers within the Technology Engineering Group may review projects where solar facilities are sized greater than the existing transformer at the customer premise or interconnected in that area.

2.32 For each type of manual review, what information is needed and how long does it usually take to complete?

- For a manual review, the location of the solar installation, the size of the installation, and information about the existing infrastructure are needed; it usually takes 20-25 minutes.

Summary Table

Interconnection Process		Which department performs step?	What Tools/Systems are used?	What data is needed?
All Applications	**Inquiry Received & Responded**	Technology Engineering	Phone, MS Outlook	A request for information.
	Application Received	Technology Engineering	Project Center, MS Outlook, Mail	Standard Application per NY SIR
	Application Fee Received (for systems > 50kW)	Technology Engineering	Mail	Project name and address
	Application Receipt Notification sent to customer	Technology Engineering	NUCON, MS Outlook	Email addresses
	Application reviewed for completeness	Technology Engineering	NUCON	Standard application
	Application Status Notification sent to customer (complete or incomplete)	Technology Engineering	NUCON, Project Center, MS Outlook	Standard application
	Application Tracking (communication with customer throughout)	Technology Engineering	NUCON, MS Outlook	Status of application process
	Application sent for screening/review	Technology Engineering	NUCON, MS Outlook	Project nameplate rating
Case 1:	**Screening or Technical**	Technology	NRG	Standard

Expedited Process	**Review**	Engineering		Application, feeder capacity, minimum day time load, etc.
	Application Approved	Technology Engineering	NUCON, MS Outlook	Standard application, results of preliminary review
	Request for Meter Set	Technology Engineering	NUCON, CIMS	Project name and address
	Add DG system to utility mapping	Mapping	NRG	Project address
	Verification Test	Technology Engineering	Site Visit	Project address
	Final Acceptance	Technology Engineering	NUCON, MS Outlook	Results of verification test
Case 2: Full CESIR Process	**Preliminary technical review**	Technology Engineering	NRG, CIMS	Standard application, feeder capacity, minimum daytime load, etc.
	Estimate of CESIR if needed to customer	Technology Engineering, LTS		
	Payment received	Technology Engineering, Payment Processing		
	Data request to customer	Technology Engineering	NUCON, MS Outlook	Standard Application
	CESIR study	Technology Engineering, Automation Engineering, LTS, Substation	NRG, DEW	?
	Application Approved	Technology	NUCON, MS	Results of CESIR

		Engineering	Outlook	
	Request for Meter Set	Technology Engineering	NUCON, CIMS	Project Name and Address
	Add DG system to utility mapping	Mapping	NRG	Project Address
	Verification Test	Technology Engineering	Site Visit	Project Address
	Final Acceptance	Technology Engineering	NUCON, MS Outlook	

III. Perspective & Expectations re: Online Portal

3.1 Please describe the specific challenges you foresee in meeting the NY REV's online portal requirements.

- The technology to perform advanced screenings linked to the application portal has yet to be fully functional at this time in the industry; the timeline to meet this requirement needs to be adjusted to accommodate the market and industry to achieve this target.
- The cost to integrate with existing internal systems and to train employees and customers has not been discussed.
- Releasing data to a 3rd party is a concern; O&R's model is proprietary, and there is value in its data and information systems; an NDA would be needed with any vendor, and data and models may need to stay behind the wall within our realm.

3.2 Please describe the specific opportunities you foresee in meeting the NY REV's online portal requirements.

- A simplified and more streamlined application management process will enhance the customer experience, as well as reduce the time needed to process applications.

3.3 What steps have you investigated or taken to develop an online portal?

- The company currently has an online portal to accept applications via NUCON and Project Center.
- Prior to the REV order being released, the company was in the process of reviewing the a specialized solar distributed generation company's software; a copy of the order was sent to the vendor for incorporation into an online portal for utilization, and a webinar was hosted on May 5th to discuss how O&R can move forward with integration of the software.

- O&R has met with a local start-up company recommended by Staff on numerous occasions to investigate their online portal offering, but found the technology to not be as advanced as the competitor; The local start-up company recommended by Staff's software also has not been utilized at this time by any other utility.

3.4 What specific steps do you plan to investigate or take through the end of this year to develop an online portal?

- The company will continue to evaluate a specialized solar distributed generation company's software as a front-end option to streamline the interconnection process in addition to evaluating the recent REV requirements.
- It is looking into developing an online FAQ and redeveloping the website to make it more user friendly and accessible. For the latter, it has reviewed San Diego Gas & Electric, Hawaii Electric Company, Duke, Next Era, and Southern Company's websites/portals.
- O&R is continuing to explore whether any vendor is competitive with the specialized solar distributed generation company's software.
- Interacting with other companies and attending conferences to find out what is working well for other utilities.
- In 2015/16, O&R is integrating a library of devices into its website from the Go Solar California website (http://www.gosolarcalifornia.ca.gov/equipment/index.php) to provide customers/developers with better information about PV equipment.
-

IV. Misc Questions (if time allows)

4.1 In your opinion, is there anything in the NY SIR that is unclear, difficult, or impractical to comply with? Are there parts of the SIR that may not be well aligned with your physical or IT infrastructure? Are there constructive solutions that you have developed or would suggest?

- The deadline for installation of meters in the expedited process sometimes causes meters to be exchanged before customers realize the project is going forward; therefore, the customers turn the meter crew away in many cases.

4.2 In response to NYSERDA, utilities have identified strategic locations for PV and microgrids. What is the utility's preferred frequency and timing for updating strategic locations? Other suggestions?

- The strategic locations are identified and updated annually as part of the Distribution Planning Process.

4.3 Do you currently have access to interconnected/operational DER performance data? If so, how does such visibility support utility planning or operations? If not, is there value in gaining such visibility (e.g. operational visibility and data resolution) regarding DER performance? At what scale of DER or type of DER is this most relevant?

- O&R has not had many large DER projects until very recently.
- The newest projects have monitoring equipment installed; the data for larger DG installations would be of value for facilities 1MW and greater.

4.4 Do you believe the adoption of smart inverters would provide benefits, e.g. reduce the need for CESIR studies?

- No, each DG would need to be studied over a certain size for system impacts; smart inverters may assist in allowing more interconnections on the system, but it will not eliminate the need for CESIR studies.

NEW YORK INTERCONNECTION ONLINE APPLICATION PORTAL GAP ANALYSIS

IN-DEPTH INTERVIEW TOPIC GUIDE (Rev 3)

Respondent Name(s):	Steve Cantore
Respondent Title(s):	Manager
Company Name:	PSEG Long Island
Contact Information (phone / email):	
Date / Time of Interview:	6/1/2015
EPRI Interviewer(s):	Tom Key, Lindsey Rogers, David Freestate

I. Background & Perspective – Questions to Answer Beforehand

1.1 What size (kW) classifications are used to segment interconnection applications?

- Fast Track: 0 to 25kW, or Inverter Based System (UL1741) up to 200kW.
- CESIR: 25kW to 2MW, or Inverter Based System 200kW to 2MW
- Study Process: 2MW to 10MW

1.2 Are there any tools or processes you are developing to help make interconnection faster/cheaper/better? If so, can these tools be shared?

- We are using a screening guide for small (0-200kW) fast track projects developed by a prominent power system consultant.
- The screening guide is shared on the PSEG Long Island website, and is implemented for PV applications using formulas in Excel spreadsheets
- We recently engaged the same consultant to make a guide for larger projects (200kW-10MW) as well, and are testing it.

1.3 What are the most significant issues in processing interconnection applications?

- Each application is processed manually and entered on a spreadsheet.

1.4 What tools do you use to ensure the privacy and security of your customers' information?

- Account information for all of our customers, both DG and non-DG, is stored in CICS; access to CICS is limited to internal staff.

1.5 Please complete the below table to give us an idea of volume of applications:

Question	< 50 kW	50-300 kW	> 300 kW
How many MW of PV and non-PV DG are currently interconnected?	~99.35	~11.75	~52
How many applications did you process in the last 12 mos?	~10433	~64	~100
What % of all applications in the last 12 mos were incomplete when received?	12%	30%	5%
What % of applications in the last 12 mos have been approved?	95%	90%	90%
What % of applications in the last 12 mos have been installed?	60%	40%	5%
Do you conduct a preliminary technical review for each of the project size categories (Y/N)	N	N	Y
In next 2 years, what are your projections for the level of interconnection applications received?	200% Increase	200% Increase	200% Increase

1.6 For approved project applications (both installed and not pursued) in the last 12 months, what percent have required utility infrastructure upgrades of between $0-$9,999, $10,000 to $49,999, >$50,000 to $100,000, >$100,000? Has this changed from prior years? If so, why?

$0-$9,999: 4 Application
$10,000 to $49,999: 7 Application
>$50,000 to $100,000: 14 Application
>$100,000: 65 Application

1.7 Please complete the below table to give us an idea of the tools and systems (business + technical) used in the interconnection process:

Process	Tool/System	How do you use it?	Used for something other than DG also?	In House/ Commercial
Business Management Systems	CICS	Store customer information	Stores customer info relating to their account, historical load data, and billing	In House

	Excel	Store DG application information	No	Commercial
Systems for Technical Review	GIS	Asset mapping	Yes	Commercial
	DG Screening (Excel)	Screening guide is applied to DG applications using Excel formulas	No	In House

1.8 How many utility staff are currently available to perform *administration and processing* of interconnection applications? What is the estimated total man years for this effort?

- PAM handles all technical studies and if required studies are supported by planning, meter engineering, protection engineering and electric service group
- 3 engineers on staff that are available to process applications.

1.9 How many utility staff are currently available to perform engineering and studies of interconnection applications? What is the estimated total man years for this effort?

- PAM handles all technical studies and if required studies are supported by planning, meter engineering, protection engineering and electric service group
- 10 engineers on staff

II. Interconnection Process – Getting into the Details

Receiving Application

2.1 How does your first contact with the DER customer typically occur? Which department is responsible for replying to initial customer inquiries, and what is their standard procedure?

- DG customers typically call or email the Power Asset Management Group (PAM) for interconnection inquiries.
- PAM is responsible for replying to all customer inquiries related to interconnection, and provides the website link for our standard procedure

2.2 What are the possible ways applications can be submitted for each PV system/size classification (e.g. online, by mail, in person, etc.)? Can customers attach supporting documents and utilize electronic signature?

- Nearly all applications are submitted via email, but they can also be submitted by mail or in person.
- For emailed applications, the customer downloads the form, fills it out, and emails the signed copy in PDF form, along with any supporting documents attached
- Scanned signatures are accepted, although a formal e-signature vendor is not being used.

2.3 Who reviews the application for completeness? Does the same person/people review the application for approval?

- Power Assets Management (PAM) reviews the application for completeness.
- Fast Tracked projects are reviewed for approval by PAM.
- CESIR and impact study projects are reviewed by PAM with the support of Planning, Protection, Distribution, Control and Telecom, Electric Service and Meter Engineering. PAM issues the approval of the application.

2.4 Who contacts the customer to inform them whether the application is completed adequately and/or whether it has been approved? Is this process automated in some way?

- Power Assets Management (PAM) manually emails the customer if the application is incorrect/incomplete and if it is approved.

2.5 What is your typical response time to customers after receiving complete and incomplete applications? What factors most affect this response time?

- Response time is within 10 business days; this is most affected by large volumes of applications.

2.6 Do you designate a single point of contact for the applicant? If so, what is the rationale for designating your utility point person and at what time is this designation made?

- The Power Assets Management group is designated as the single point of contact; this way anyone within that group can assist a customer.

2.7 What level of detail is provided and at what point is this communicated? (e.g. application completeness check, preliminary response, status update)

- By phone or email, Power Assets Management tells the customer what documents are needed and what the status of the application is.
- Fast Track: Projects are approved in 10 business days.
- CESIR: Within 5 business days we provide initial review/completeness.

2.8 After an application is received, what tools are used to store and access its information?

- Applications are accessed via the DG email inbox, and are manually entered into an Excel spreadsheet to store the information.

2.9 Who has access to the application once it is received (or in your database)?

- Only the Power Asset Management department has access to the database.

2.10 Can the customer/contractor access their application information online? If so, what project details and status information are available to them and when? If not, how else are they able to access information?

- The SGIP (Small Generator Interconnection Procedure) queue spreadsheet is posted on the PSEG LI website to access information, and is updated every two weeks.
- The spreadsheet is available to everyone who has a meter on our system, and contains each project's job number, customer name, address, system size, etc.
- We usually get about 10 duplicates per month on the spreadsheet; these are cases where applications for the same address were submitted by different developers.
- If the application hasn't been approved, it will say "missing" in that column of the spreadsheet.

2.11 How do you communicate to customers (verbal, written, email) and at what the steps of the application process?

- Communication with customers is typically via email; we contact customers during Initial Review, Tech Approval, Closeout Documents, and Final Approval.

2.12 What was your median response time for initial inquiries in 2014 and in 2015?

- Initial inquiry response time is typically within two days.

2.13 Using your current work management system, can you estimate the maximum number of applications you could process each month while still meeting SIR time requirements?

- A rough estimate of our maximum application processing capacity at the current time is 1,000 applications per month.

Expedited Process (< 50 kW)

2.14 The SIR lists a fast-tracked 6-step application path for smaller systems, is this same path your applications follow?

- Yes, similar path; the only exception is the Fast Track category of 0 to 25kW.
- We are currently one iteration behind on the SIR- we are using the 2012 version, rather than the 2014 version.

2.15 Are there any steps in your interconnection review process that are automated, and if so, what is the level of automation for each?

- Currently, no steps are automated.

2.16 What tracking tools do you currently use for applications throughout the interconnection process? Do your customers have access to these tools? Can the tracking tools be integrated into the utility's website (if they are not already)?

- Currently there is no automated tracking tool; the application status is manually tracked via the Excel spreadsheet.

2.17 How does the applicant track application status? Do any of your utility tracking tools inform customers of the status of individual review steps (e.g. the progress and expected completion date of a CESIR being conducted)?

- Status is communicated to customers by email when they inquire, when something is needed from the customer, and when approval is issued.

Application Approval and Processing

2.18 What is your procedure for adding distributed energy resources into the Geographic Information System (GIS)? At what point in the process does this happen? How often does this happen (daily, weekly, monthly)?

- Projects are sent to the Mapping department after COD (Commercial Operating Date) in a list of projects and approximately monthly updates.
- The projects are mapped into GIS when the lists are received once per month.

2.19 Which steps in the approval process are most commonly not passed the first time? What are the most common reasons for not passing and what measures are typically taken in these situations?

- Initial application review is the step most commonly not passed the first time; it's usually because information or documents are missing from the application, in which case Power Assets Management emails the applicant to inform them what is needed.

2.20 What is your procedure for installing new meters? When does that happen?

- Net Meters are installed after tech approval; all other meters are installed after the system is installed.
- A manual order is submitted to the metering department by Power Assets Management.

Systems Greater than 50 kW

2.21 The SIR lists an 11-step path for applications involving a Coordinated Electric System Interconnection Review – CESIR (please reference the attached flow charts); is this the same paths your applications follow?

- Yes; the only exception is for inverter based systems 25kW to 200kW, which follow an expedited path.

2.22 Do you use any automated or manual screens for certain PV size classifications?

- Manual screens are used for inverter based systems between 25kW-200kW, and are being developed for inverter based systems between 200kW-10MW.
- Screening is very important; without it, we would not be able to handle the volume of applications received each month.
- For small systems with no complications, 3-step screens are typically required; for more complicated systems, 2-step screens may be added to that.
- Below 200kW, nearly all applications pass the screens; in 2014 there were only 1 or 2 that didn't, and had to do additional review; now, there might be 1 application per month that doesn't pass the screens and requires additional review.

2.23 What are the different means by which you can accept interconnection payments from customers (e.g. application fees, CESIR fees, etc.)? In what form are payments typically submitted?

- Payments can only be made via mailed check.

CESIR Process

2.24 Please explain criteria that trigger a CESIR requirement?

- A CESIR is required for inverter based systems greater than 200kW, and for non-inverter based systems greater than 25kW.

2.25 What is your typical completion time for a CESIR?

- Typical CESIR completion time is 45 to 60 business days.

2.26 What are the most common obstacles to completing a CESIR within the NY SIR time requirements?

- Large application volumes and the limited engineering resources on hand to review those large volumes are the most common obstacles for satisfying the SIR timeframe.

2.27 Do you typically have all the information you need when you start a CESIR? If not, what missing information is most likely to cause delays?

- Additional information is typically requested during the CESIR; the most common requests are the site plan, point of interconnection, and one-line diagram.

2.28 Who communicates with the customer before, during, and after the CESIR process? What is the typical content of these communications?

- PAM communicates with the customer throughout the application process, including the CESIR; they answer any inquiries and inform the customer of any necessary documents or information.

2.29 Are third-party consultants utilized for CESIR studies? What percent of studies?

- No

2.30 What tools and resources do you use during the CESIR process? Modeling and load flow analysis tools; Commercially-produced or in-house?

- We use a DG screening guide developed by an outside consultant to support the review.
- The DG screening guide is similar to the Excel-based screens for non-CESIR applications, but with additional review with the support of other internal group such as distribution design, planning, protection, meter engineering and electric service group.

2.31 Are there electronic maps for the entire distribution system? If no, what percentage is mapped electronically? Can/do the maps feed simulation tools for performing load flow analysis?

- Electronic maps are available; they can be reviewed manually for any information that is needed.

- Prior to 2012, we couldn't guarantee something was in the mapping system; since then, all new projects have been added to the mapping system, and we've also been working on catching up the addition of old projects.

2.32 Are there any manual reviews that don't involve a full CESIR? If so, why? How many of each do you typically compete in a month?

- No

2.33 For each type of manual review, what information is needed and how long does it usually take to complete?

- Typical information needed for manual reviews includes Minimum Load, Feeder Distance, & Fault Studies.

Summary Table

Interconnection Process		Which department performs step?	What Tools/Systems are used?	What data is needed?
All Applications	**Inquiry Received & Responded**	**PAM**	**Email**	
	Application Received	**PAM**	**Email**	
	Application Fee Received (for systems > 50kW)	**PAM**	**Email**	
	Application Receipt Notification sent to customer	**PAM**	**Email**	
	Application reviewed for completeness	**PAM**	**Email**	
	Application Status Notification sent to customer (complete or incomplete)	**PAM**	**Email**	
	Application Tracking (communication with customer throughout)	**PAM**	**Email, Excel**	
	Application sent for screening/review	**PAM**	**Email**	

Case 1: Expedited Process	**Screening or Technical Review**	**PAM**	**Email**	
	Application Approved	**PAM**	**Email**	
	Request for Meter Set	**PAM**	**Email, Excel**	
	Add DG system to utility mapping	**System Mapping**	**GIS**	
	Verification Test	**PAM/Meter Test**	**Email**	
	Final Acceptance	**PAM**	**Email**	
Case 2: Full CESIR Process	**Preliminary technical review**	**PAM**	**Email**	
	Estimate of CESIR if needed to customer	**PAM**	**Email**	
	Payment received	**PAM**	**Email**	
	Data request to customer	**PAM**	**Email**	
	CESIR study	**PAM, Planning, Protection Engineering, Meter Engineering, Electric Service, Control and Telecom**	**Email, Excel, Cyme**	
	Application Approved	**PAM**	**Email**	
	Request for Meter Set	**PAM**	**Email**	
	Add DG system to utility mapping	**System Mapping**	**Email**	
	Verification Test	**PAM/Meter Test**	**Email**	
	Final Acceptance	**PAM**	**Email**	

III. Perspective & Expectations re: Online Portal

3.1 Please describe the specific challenges you foresee in meeting the NY REV's online portal requirements.

- Cost for the portal software could be significant depending upon the typical large volume we experience. If possible we could recover the cost on a per fee application basis.
- Automated analysis could be difficult to implement, and its results will have to be tailored to the input used. The applicant will have to fully understand the accuracy of such information and additional study may need to perform and possibly business decision would be made based on the application.
- If a short timeframe is required for implementing the portal, we have concerns about sacrificing quality for the sake of meeting that deadline.

3.2 Please describe the specific opportunities you foresee in meeting the NY REV's online portal requirements.

- Automating the administration part of the process could provide significant streamlining and time savings.
- The front end of application management is what takes the most time right now, as emailed application information often must be manually typed into SGIP Queue spreadsheets to process applications.
- Automation of tasks such as the meter exchange order, approval emails, GIS entry orders, etc. could significantly reduce processing time and labor needed.
- Processing time could be reduced by having the ability to receive online payments.
- Some of our manual screen can be automated that could potentially be applied to nearly all of our applications to streamline the technical review process.

3.3 What steps have you investigated or taken to develop an online portal?

- We met with a commercial software vendor who presented some concepts for an online portal and provided us preliminary cost information.

3.4 What specific steps do you plan to investigate or take through the end of this year to develop an online portal?

- Follow-up with commercial software vendor to investigate further an online portal.

IV. Misc Questions (if time allows)

4.1 In your opinion, is there anything in the NY SIR that is unclear, difficult, or impractical to comply with? Are there parts of the SIR that may not be well aligned with your physical or IT infrastructure? Are there constructive solutions that you have developed or would suggest?

- None

4.2 In response to NYSERDA, utilities have identified strategic locations for PV and microgrids. What is the utility's preferred frequency and timing for updating strategic locations? Other suggestions?

- Our preferred frequency is bi-weekly

4.3 Do you currently have access to interconnected/operational DER performance data? If so, how does such visibility support utility planning or operations? If not, is there value in gaining such visibility (e.g. operational visibility and data resolution) regarding DER performance? At what scale of DER or type of DER is this most relevant?

- If DER is metered we have performance data and if net metered we have net data.

4.4 Do you believe the adoption of smart inverters would provide benefits, e.g. reduce the need for CESIR studies?

- We are working with our outside consultant to review the smart inverter functionality. We think the smart invert function could enable us to interconnect a large percentage of DG. This will not replace CESIR studies.

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