

PON 2828 APPENDIX E: QUALITY ASSURANCE/QUALITY CONTROL AND REPORTING REQUIREMENTS

Quality Assurance/Quality Control (QA/QC) and reporting processes are required for all projects to verify that the equipment proposed in the application has been installed, to describe the installed equipment, to verify that it meets the intent of the ADG-to-Electricity Program, and to verify the quantity of biogas-generated electricity produced by the ADG-to-Electricity System. The QA/QC and Reporting Processes include the following:

- Developing a QA/QC Plan.
- Generating the Project Commissioning Report and invoices to document installation of the project components and establish the basis for Interconnection and Capacity Incentive Payments
- Generating Annual Performance Reports, which form the basis of the Production Incentive Payments.

A number of individuals are involved in the QA/QC and Reporting Processes: NYSERDA, the Contractor (the entity awarding the funding), NYSERDA's Technical Consultant, and NYSERDA's CHP Website Contractor. NYSERDA's Technical Consultants are engineering firms that have been contracted by NYSERDA to provide QA/QC support for the ADG-to-Electricity Program. In consultation with the Contractor, the Technical Consultant will develop the QA/QC Plan in accordance with NYSERDA's requirements, and will help NYSERDA review the various deliverables developed by the Project Participant. NYSERDA's CHP Website Contractor is an engineering firm that has been contracted by NYSERDA to develop and manage NYSERDA's CHP Website. The CHP Website Contractor may also install the site's datalogger.

I. SUMMARY OF PROJECT RESPONSIBILITIES

NYSERDA will:

- Assign a Technical Consultant to work with each Contractor.
- Review and approve acceptable QA/QC Plans and Reports (e.g., Project Commissioning Report and Annual Performance Reports).

The Contractor will:

- Work with the Technical Consultant to develop the QA/QC Plan. ***The QA/QC Plan must be submitted to, and approved by, NYSERDA prior to the submittal and payment of all capacity and performance incentive invoices beyond the first capacity incentive payment.***
- Provide NYSERDA, its Technical Consultant, and its CHP Website Contractor with relevant information about the site, facilities and equipment installed, and operational data, and access to the installed ADG-to-Electricity System.
- Purchase the necessary QA/QC equipment (biogas meter, power output meter, communications hardware and software), as described later in this Appendix.
- Provide the necessary communication service to monitor the ADG use and kWh output of the ADG-to-Electricity System. The communication service can be provided as a phone line or broadband connection or other medium selected in agreement with NYSERDA.
- Install, commission, and maintain the biogas and power output meters, and communications hardware. This will include installation of wires, as needed, to bring the data signals from the biogas and power output meters to the datalogger. (Note: the CHP Website Contractor is responsible for connecting wires at the datalogger.)

- Prepare the Annual Performance Reports and invoices for performance incentive payments, in conjunction with the Technical Consultant, for the verified, biogas-generated electricity produced by the system.
- **Ensure that all information provided to NYSERDA accurately represents the operation of the ADG-to-Electricity System.**

NYSERDA's Technical Contractor will:

- Develop the QA/QC Plan (see following section) in conjunction with the Contractor.
- Verify that facilities and equipment have been installed as specified in the Agreement Application
- Verify that the biogas and power output meters, datalogger, and communication hardware have been installed correctly.
- Assist the Contractor in preparing the Annual Performance Reports and invoices for performance incentive payments for the verified, biogas-generated electricity produced by the system.
- For systems selected for evaluation using the National Protocol for Digester Evaluation, provide for additional measurement equipment, digester input and output testing, and technical consultant services, as needed.

NYSERDA's CHP Website Contractor will:

- Connect the wires bringing the signal to the datalogger from the biogas and power output meters. (Note: The Contractor is responsible for providing a reliable connection to the signal and installing signal connection wires as needed.)
- Accept performance data from the Applicant's ADG system (via the internet) and load the data to the CHP Website.
- Evaluate the quality of the data transferred to the CHP website.
- Integrate relevant site information into NYSERDA's CHP website.

II. QA/QC PLAN

The QA/QC plan will include the actions and procedures that will document whether requirements have been met for the payment of Interconnection, Capacity and Performance Incentives.

Description of the ADG System

At a minimum the description will include a schematic showing the as-built: locations of the major equipment and meters; specifications for the major equipment; a list of alternate fuel sources, if applicable; and the heat rate of the New Equipment engine gen-set (BTU/kWh. If the installed equipment deviates from that listed in the Application Package, an explanation of the deviation must be provided for determination by NYSERDA whether the installed equipment adequately meets the terms of the Agreement.

Procuring and Installing Instrumentation

The QA/QC Plan will specify the monitoring, datalogging, and communications instrumentation to be installed, and the proposed installation locations. Provisional instrumentation requirements are provided in Table 1. Example instrumentation specifications are provided in Table 2.

Table 1. Provisional Instrumentation Requirements

<ul style="list-style-type: none">• A revenue grade power generation meter with an accuracy of at least $\pm 0.5\%$ that is capable of supplying either a kWh pulse output, 4-20 mA kW output, or other output as agreed to by NYSERDA or its TC for measuring generator output.• A fuel meter with accuracy of at least $\pm 2\%$ to measure generator fuel (ADG) consumption. The meter should be temperature and pressure compensated. Uncompensated meters may be permissible if located in conditioned space and if gas pressure is less than 1 psig.• For projects for which H₂S reduction incentives have been requested, an automated hydrogen sulfide level measuring device with an accuracy to within $\pm 5\%$ or ± 150 ppm (under normal operating conditions) for hydrogen sulfide levels ranging from 100 – 3000 ppm and capable of at least hourly sampling of hydrogen sulfide levels for the gas exiting the H₂S removal system and daily sampling of the (raw) gas entering the H₂S removal system. <p>Note that NYSERDA will consider the use of alternative measurement types or techniques that meet similar standards to those indicted above.</p>
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Table 2. Example Instrumentation Specifications

Measurement	Example Instrument Make / Model	Accuracy	Instrument Output	Supplied by
Power generation	Electro Industries/ Gauge Tech Shark 200	$\pm 0.2\%$ for power and energy functions - meeting ANSI C12.20 accuracy requirements (Class 0.2%)	Solid state pulse output	Site
Fuel flow rate	Roots Meter 3M175	$\pm 1\%$ reading	Solid state pulse output	Site
H ₂ S levels	Ados 401	$\pm 5\%$ or $\pm 1\%$ 150 ppm min. range of 100-3000 ppm	Solid state pulse output	Site

Verifying the Monitoring System Installation

The QA/QC Plan will document the procedures to be used by NYSERDA’s Technical Consultant to confirm that the instrumentation is installed correctly.

Transferring data to the NYSERDA CHP Website

The QA/QC Plan will document how data will be transferred to the NYSERDA CHP Website. In general, the procedures and monitoring requirements described in NYSERDA’s Monitoring and Data Collection Standard for DG/CHP Systems and the ASERTTI DG/CHP Long Term Monitoring Protocol will be followed. These include, but are not limited to, the following:

- The system will log or record data at 15-minute intervals, averaging or integrating readings as required providing accurate and meaningful readings.
- The system shall have on-board storage sufficient to retain a minimum of 14 days of data in the event that communications or site power is lost.
- It is anticipated that the data will be transferred daily to the NYSERDA’s CHP Website.

Evaluating the Quality of the data provided to the NYSERDA CHP Website

The QA/QC Plan will document how data received by the NYSERDA CHP Website will be verified as good quality data. The QA/QC Plan will specify the range and relational checks for data that will be used

to measure electricity production and to compare electricity production with fuel energy input to the engine. The Website Contractor will implement the basic range and relational checks described below. The range check identifies whether the meters are reporting data in their expected ranges. The Contractor will provide the expected ranges for both meters in the QA/QC Plan. The relational check ensures that both meters always provide non-zero readings at the same time. Only hourly data that passes these quality checks are used in the “RPS: Customer-Sited Tier Anaerobic Digester Gas-to-Electricity Program NYSERDA Incentive Program Reports”. However, all hourly data, those that pass the checks and those that do not, can be downloaded from the NYSERDA CHP Website using the “Download (CSV file)” option. The QA/QC Plan will specify who will be responsible for performing all of the specified range and relational checks.

The QA/QC Plan will also document the procedures that will be followed to notify project team members of sensor failure or other abnormalities at the site (e.g., receipt of automated emails from the Website Contractor).

Performing Monitoring System Maintenance

The QA/QC Plan will document the routine maintenance and quality assurance/quality control measures that the Project Participant will perform to ensure that data produced, including calibration requirements for any H₂S gas monitoring equipment, from the ADG-to-Electricity System accurately describes system performance.

Preparing Annual Performance Reports

If the Contractor agrees with the verified data posted on the Website, they will provide their Annual Performance Reports using the format described in Section IV.

If the Contractors disagree with the verified data posted on the Website, they will provide their Annual Performance Reports using data they consider to be verified, along with a narrative justifying why their approach is more appropriate. Acceptance of this alternate data will be at NYSERDA’s discretion, or as resolved in accordance with the procedure specified in the section labeled “Resolving Disagreements over QA/QC”.

In some cases, a sensor or monitoring system failure or other problem at the site may result in data being lost for part of the performance period. The QA/QC Plan will document the procedure that will be followed to account for loss of measured performance data. The recommended approach is as follows:

If data loss occurs, the output for the missing period may be determined by taking the average output measured from similar length periods just prior and just after the outage (or other method acceptable to NYSERDA). This procedure will be used for up to two outages for up to 36 hours each per 12 month period. If more than two outages occur per 12-month period, then the site shall be required to provide independent cumulative meter readings or other documentation to demonstrate any system power output during outages. Otherwise, the generator output will be assumed to equal zero for the outage period.

QA/QC INSPECTIONS

Periodically, NYSERDA and/or its Consultant/Contractor may choose to visit a project site to verify that the information provided in the Annual Performance Report is accurate with regard to project equipment, site conditions, and monitoring configurations. These inspections may occur at any time after project installation, both prior to and after the submittal of an Annual Performance Report. If the QA/QC activities are found to be different from those represented in the QA/QC Plan or the Annual Performance Report, NYSERDA may refuse any further Performance Incentive payments. If NYSERDA deems an inspection

necessary, an Annual Performance Report that is under review will not be approved until the inspection has been completed.

RESOLVING DISAGREEMENTS OVER QA/QC

The following approach will be used to resolve any disagreements between NYSERDA and a Contractor concerning the adequacy of an Annual Performance Report or the adequacy and interpretation of performance data:

1. If an Annual Performance Report is rejected by NYSERDA, NYSERDA will provide a written explanation of the rejection with suggestions for changes that would make the submittal acceptable.
2. If the Contractor disagrees with the rejection, it must provide a written explanation (with references and any required additional documentation) to NYSERDA.
3. Upon receipt of the Contractor's written explanation, the Contractor and NYSERDA representatives will meet and attempt to resolve the disagreement.
4. The Contractor must submit a new submittal in a manner that complies with any resolution agreed to concerning the original submittal's rejection.

If either party believes the disagreement cannot be resolved by the above approach, the parties will use the dispute resolution mechanism defined in their Standard Performance Contract Agreement.

III. PROJECT COMMISSIONING REPORT

The Project Commissioning Report must be submitted to NYSERDA within 14 months of the Effective Date of the Agreement. If the Project Commissioning Report is not completed and submitted within 14 months of the Effective Date, the Project Participant must request an extension, in writing, from NYSERDA as per milestone requirements of section 3.7 of the Standard Performance Contract Agreement.

Project Commissioning Report Requirements for All Projects Requesting Capacity Incentives

The following are the required elements of the Project Commissioning Report for projects requesting Capacity Incentives:

- Description of the Installation and Commissioning process, which includes the following:
 - Documentation that construction of the ADG-to-Electricity System is complete;
 - Documentation that the System has been interconnected with the utility grid, where applicable;
 - Documentation that the System has satisfactorily operated for at least seven consecutive days, which is defined as operating with an average minimum 75% Capacity Factor of the Total Contracted Capacity and is not emitting or venting significant quantities of methane not combusted by a flare or other means; and
 - Documentation that the System has demonstrated the ability to upload information to NYSERDA's CHP Data Integration Website ("CHP Website").
- As-Built Diagrams of the installed system; if the installed equipment deviates from that listed in the Application Package, the Project Participant must provide an explanation of the deviation in the Project Commissioning Report.

Project Commissioning Report Requirements for Projects Requesting only Performance Incentives

The following are the required elements of the Project Commissioning Report for projects requesting only Performance Incentives:

- Documentation that the System is capable of operating satisfactorily, which is defined as operating for a minimum of seven consecutive days with an average minimum 75% Capacity Factor of the Total

Contracted Capacity and is not emitting or venting significant quantities of methane not combusted by a flare or other means;

- Documentation that the System has been interconnected with the utility grid, where applicable;
- Documentation that the System has demonstrated the ability to upload information to NYSERDA's CHP Data Integration Website ("CHP Website"); and
- As-Built Diagrams of the installed system; if the installed equipment deviates from that listed in the Application Package, the Contractor must provide an explanation of the deviation in the Project Commissioning Report.

Post-Installation Site Inspection

NYSERDA's Technical Consultant will contact the Contractor to schedule the Post-Installation Site Inspection. The inspection must be completed before the Project Commissioning Report is submitted to NYSERDA. The Contractor or a representative must be present during the inspection.

Project Commissioning Report Approval

NYSERDA will review the Project Commissioning Report and determine whether to approve it as submitted, approve it with minor revisions, or reject it. NYSERDA will review the Report to ensure the following:

- The project meets all of the ADG-to-Electricity Program requirements.
- A post-installation site inspection has been performed by the Technical Consultant.
- The Project Commissioning Report contains complete and accurate information.
- The equipment listed in the Application Package has been installed or the Project Participant has explained any variance.

NYSERDA will work with the Contractor on making minor revisions to the Project Commissioning Report as necessary. If NYSERDA finds the Project Commissioning Report to be complete, but the Total Incentive for the project to be incorrect based on the installed conditions, NYSERDA may make an adjustment to the Interconnection, Capacity and/or Performance Incentive payment estimates and will notify the Contractor of those changes in writing. Within 60 days after its receipt of the Project Commissioning Report, NYSERDA will notify the Contractor in writing as to whether or not the Report has been approved.

IV. ANNUAL PERFORMANCE REPORTING

It is the Contractor's responsibility to demonstrate the extent to which the installed project is generating the amount of energy projected in the Standard Performance Contract Agreement. This is done through the Annual Performance Reports.

Commencement of the First Year's Performance Period

The total performance period of the Standard Performance Contract Agreement shall be ten (10) years. The first year's (consecutive 12-month) performance period must begin no later than the 30th day after NYSERDA's approval of the Project Commissioning Report. If NYSERDA determines that data collected prior to approval of the Project Commissioning Report is satisfactory, the first year's performance period may begin at an earlier date approved by NYSERDA.

Within 60 days from the end of the first year's performance period, the Contractor must submit an Annual Performance Report to NYSERDA, which will become the basis for the first Performance Incentive payment. Performance data may be downloaded from the NYSERDA CHP Website. Annual Performance Reports must also be submitted to NYSERDA within sixty (60) days from the end of each of the remaining

performance periods. The Contractor is responsible for ensuring that data provided in the Annual Performance Reports accurately represent the operation of the ADG-to-Electricity System.

Content of the Annual Performance Report

The Annual Performance Report will include a table summarizing the Monthly Data for the annual period. NYSERDA Performance Incentives are only paid on power generated from ADG biogas. For projects using only biogas as a fuel source, it will not be necessary to provide data regarding additional fuel sources. If an additional fuel source is used, the Contractor must calculate the proportion of power generated from ADG biogas, which will be listed under “Adjusted Electricity Production” column of the table. Equations for calculating the “Adjusted Electricity Production” and other values required in the table are also provided in the Sample QA/QC Plan which can be obtained from NYSERDA. For projects for which H₂S removal incentives have been requested, compiled hourly H₂S level data for the year must be presented.

The Contractor may use data summarized in the RPS: Customer-Sited Tier Anaerobic Digester Gas-to-Electricity Program NYSERDA Incentive Program Reports (downloaded from the CHP Website) to populate this table. If the Contractor disagrees with the verified data posted on the Website or if data loss occurred during a Reporting Period, they will provide their Annual Performance Reports using data they consider to be verified, along with a narrative justifying why their approach is more appropriate.

Submitting the Annual Performance Report

The Contractor must submit an Annual Performance Report for each of the ten years. Upon approval of the each year’s Annual Performance Report, the Contractor may submit invoices for the Performance Incentive payment associated with that Report. The Contractor must submit their Annual Performance Reports within 60 days after the annual performance period ends.

A statement must be included with each invoice affirming whether or not a Federal Grant under 1603 Treasury and/or NRCS/EQIP Programs has been received regarding one or more components of the project.

Annual Performance Report Approval or Rejection

NYSERDA will notify the Contractor in writing, within 30 days after receiving an Annual Performance Report, whether or not the Report has been approved. As part of the review process, NYSERDA may request clarification or additional information and may choose to conduct an inspection of a project site. NYSERDA will review the contents of the Annual Performance Report to ensure the following criteria are met:

- The Contractor has adhered to the QA/QC Plan.
- All required monitoring data are provided.
- The verified electricity generated is properly calculated from the monitoring data.
- The installed equipment is operating as per the approved Application Package.