NYSERDA
CHP Systems Manual

Updated December 2008

INTRODUCTION

This document presents procedures for Combined Heat and Power (CHP) Systems participating in NYSERDA's *Existing Facilities*. The CHP incentive offer is designed to achieve peak demand reduction during the summer capability period by providing performance-based incentives for efficient, clean, commercially available CHP Systems.

The document is divided into the following sections:

1.0 Eligibility

2.0 Incentives

3.0 Program Procedures
Details the required submittals and the procedures involved in preparing and reviewing them. Included are discussions about the Engineering Analysis requirements, reporting estimated and verified energy savings, and invoicing for payments.
- **3.1 Engineering Analysis (EA) Requirements**
- **3.2 CHP Document Review**
- **3.3 Commissioning Review**
- **3.4 Invoicing**

4.0 Measurement & Verification (M&V)
Provides specifications for Applicants to follow during the M&V period. Reporting procedures, deliverables, and penalties for non-performance are also described.
- **4.1 Specifications**
- **4.2 Reporting**
- **4.3 Non-Performance and Incentive Reductions**

5.0 SEQRA and Permitting
Details potential air and noise impact screening procedures and Applicant responsibilities for environmental impact assessment and permitting.

Appendix A - Definitions
Appendix B - Project Summary
Appendix C - Environmental Assessment Checklist

The terms of the Program Opportunity Notice (PON) in effect at the time the Application is received by NYSERDA shall govern this program and set forth the eligibility requirements for participants and CHP Systems, the incentive payments, and general requirements.

This manual will be updated from time to time by NYSERDA and posted on NYSERDA's web site under the corresponding Program Opportunity Notice (PON); currently Existing Facilities is PON 1219. No additional notice will be provided.

SECTION 1.0 ELIGIBILITY

This Section describes the eligible CHP Systems.

Eligible CHP systems:

- Must consist of commercially available reciprocating engine and gas turbine based combined heat and power systems that result in electric peak demand reduction or avoidance during the summer capability period;
- Existing facilities must install a CHP System with total capacity, based on manufacturer nameplate, of equal to or greater than 250 kW or installing 250 kW in additional capacity to an existing CHP System;
- May be either grid parallel or isolated;
- Must use at least 75% of the generated electricity on-site;
- Must demonstrate a minimum annual fuel conversion efficiency of 60% Lower Heating Value (LHV) at design; and
- Must have a NOx emission rate lower than, or equal to, 1.6 lbs./MWhr. Note Pending DEC regulations, when passed, will establish a new NOx emission rate that, if stricter, will supersede the 1.6 lbs/MWhr.

The following are ineligible:

- Microturbines;
- Fuel Cells;
- Multi-family facilities;
- Distributed generation (DG) systems without heat recovery;
- Direct drive natural gas engines providing mechanical energy only;
- A CHP System previously contracted for installation under another SBC or SWP funded program;
- CHP Systems receiving funding from the Con Edison Targeted Program; and
- Projects eligible to submit to the customer sited tier of the Renewable Portfolio Standard.

A CHP System is comprised of all electricity generating prime movers at a site and balance of plant equipment. Commissioned CHP System operations, emissions and efficiency must be documented and substantial reductions in incentives will occur for those CHP Systems that do not achieve required system efficiency, electric peak demand reduction or avoidance during the summer capability period, and the maximum allowable emissions.

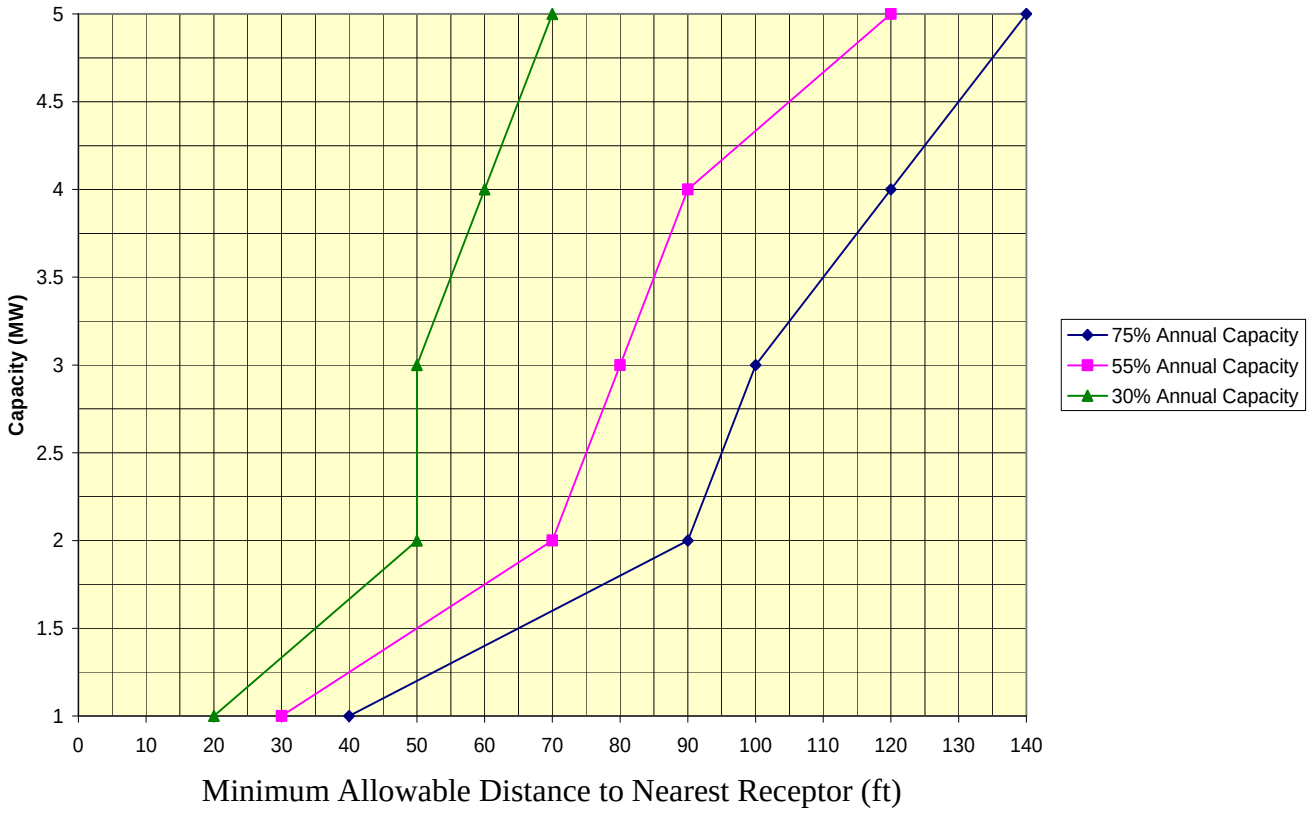
The proposed CHP system must meet the Clean Distributed Generation ("Clean DG") definition. This "Clean DG" definition can be found in the New York State Public Service Commission's Order (Order) on Demand Management Action Plan (Case 04-E-0572), effective March 16, 2006 (http://www.dps.state.ny.us/fileroom.html). CHP Systems must not exceed a NOx emission limit of 1.6 lbs/MWhr. The Order also includes a specification on the allowable distance between the CHP system exhaust stack and the nearest receptor[1] shown below in Figure 1.1.

For CHP Systems between 500 kW and 1000 kW installed capacity, no significant impacts are predicted at or beyond 40 feet from the exhaust stack to a sensitive receptor;

[1] A **receptor** could include operable windows, balconies, and air intakes on nearby buildings (residential and commercial).

for CHP Systems below 500 kW, no significant impacts are predicted at or beyond 30 feet from the exhaust stack to a sensitive receptor.

Figure 1. 1 Capacity vs. Minimum Distance to Avoid Significant Adverse Air Quality Impacts[2]



In addition to meeting the eligibility requirements listed above, the Applicant is responsible for complying with all applicable Federal, State, and Local emissions limits and regulations for the proposed equipment type and locations.

SECTION 2.0 INCENTIVES

Estimated funding will be set aside upon NYSERDA receipt of a completed CHP application. Application requirements are location in Section 3.0. Funds will not be contracted for until NYSERDA approves the engineering analysis and issues a Purchase Order (PO) to the Applicant.

CHP system incentives include both an electricity generation and a peak demand reduction component.

[2] New York State Public Service Commission's Order (Order) on Demand Management Action Plan (Case 04-E-0572), effective March 16, 2006.

Electricity Generation incentive: $0.10 x kWh_a

Peak Demand Reduction incentive:

Upstate: \$600 x kW_p x [PR^2 or 1, whichever is less]

Consolidated Edison Territory: \$750 x kW_p x [PR^2 or 1, whichever is less]where:

kWh_a - Total electricity generated by the CHP system in a 12 month period net of parasitic electricity use. NYSERDA's incentive will not be paid for electricity generated beyond on-site electricity usage. The comparison between the electricity generated by the CHP System and that used on-site will be assessed on an hourly basis.

kW_p - Average power produced by the CHP system during the summer capability period, net of parasitic electricity use. Electricity generated beyond on-site electricity usage will not be included in the calculation of kW_p. The comparison between the electricity generated by the CHP System and that used on-site will be assessed on an hourly basis.

kW_{PO} - The projected peak demand reduction stated in the NYSERDA PO, as agreed to between the applicant and NYSERDA.

PR - Power ratio. PR= kW_p/kW_{PO}. PR must equal or exceed 0.6 to receive an incentive. kWh_a and kW_p will be determined by NYSERDA and its contractors based on metered data collected and transferred to the NYSERDA CHP Data Integration Website.

The **summer capability period** is between the hours of 12 pm and 6 pm, Monday through Friday, from May 1 through October 31, excluding legal holidays.

CHP Systems are subject to non-performance incentive reductions for not achieving minimum fuel conversion efficiency and air emissions requirements (*see Section 4.3*). NYSERDA reserves the right to adjust project incentives at its sole discretion.

2.1 TOTAL PROJECT INCENTIVE FOR CHP SYSTEMS

The total project incentive, the sum of the kWh incentive and kW incentive, is included in the PO. The total project incentive paid to an Applicant may not exceed \$2 million or 50% of project costs, whichever is less.

A progress payment of 10% of the incentive may be issued by NYSERDA upon the Applicant's request after the construction documents are submitted to and approved by NYSERDA. A second progress payment of 20% of the incentive may be issued by NYSERDA upon the Applicant's request upon proof of purchase and delivery of the generation equipment and heat exchangers (i.e bill of lading). An additional payment, the "project installation payment", of 10% may be issued upon request and NYSERDA approval to start the M&V period.

The final two payments of up to 30% of the incentive will be made after the completion of each one year M&V period. Depending on the M&V results, the performance payment(s) will be for up to the balance of the project incentive due under the PO. Incentives will not be paid in excess of 100% of the total project incentive stated in the PO.

SECTION 3.0 PROGRAM PROCEDURES

1. Application. The first step is for the Applicant to submit a completed application for the proposed CHP system. Please refer to the current, relevant PON for the application form. Applicants must also submit an engineering analysis, environmental assessment form (Appendix C), and fuel utility bills at the time of application.

The following outlines the process for application review and approval:

a. **Eligibility Review** - NYSERDA will first review the application for program eligibility. The Applicant may be contacted by NYSERDA or its Technical Consultant for application clarification. After eligibility review, NYSERDA will issue a letter to the Applicant either accepting or rejecting the application for further review. If accepted, the letter will specify which NYSERDA Technical Consultant(s) is assigned to the review. This usually takes 1 to 2 weeks.

b. **Detailed application review** – NYSERDA or its Technical Consultant will review the application and engineering analysis within 90 days and, if necessary, issue written comments to the Applicant requesting changes or clarification. The application and engineering analysis must be approved by NYSERDA.

c. **Pre-Installation Inspection** - The Technical Consultant conducts a pre-installation Project site inspection to verify the accuracy of the information in the application with regard to both existing conditions and the feasibility of installing the proposed CHP system. NYSERDA's Technical Consultant will schedule this site visit after an initial review of the engineering analysis.

d. **Revised Application** – The Applicant submits a revised engineering analysis. Most likely, the application and engineering analysis will require clarification or updates.

2. Purchase Order (PO). Upon approval of the revised application, NYSERDA will issue a PO. Funds are reserved only upon NYSERDA's written approval of the Applicant's application and issuance of the PO.

The PO, signed by both the Applicant and NYSERDA, specifies the Total Project Incentive.

3. CHP Documents (Schematic Design, Air Permitting, Interconnection and Other) The Applicant has 90 days after receipt of the PO to submit a copy of the schematic design, an instrumentation plan (IP) (described in *Section 4.1*), a copy of the air permit application, and documentation that the site has submitted interconnection approval. *Section 3.2 contains information on the Schematic Design requirements.*

At this point NYSERDA or its Technical Consultant will also begin discussions on commissioning plans. *Item 8 below and Section 3.3 provides further detail.*

The Applicant is responsible for ensuring that all the applicable State and Local permitting procedures are completed for the proposed Project. Most CHP Systems will require an air permit or permit modification with NYSDEC to ensure compliance with all State regulations. There are three (3) permit classifications depending upon the annual amount of each pollutant emitted: (1) Registration Permit (minor source); (2) State Facility Permit (minor source); (3) Title V Permit (major source). Typically, facility NOx emissions will dictate the appropriate permit for a given installation. The Applicant is responsible for ensuring that all the applicable local and State and Federal permitting procedures are completed for the proposed project.

4. Measurement and Verification (M&V). NYSERDA's Technical Consultant will work with the Applicant to develop a suitable M&V Plan. NYSERDA's Technical Consultant will provide specification language to the project's engineer of record for inclusion in the bid package. *M&V specifications and reporting requirements are presented in Section 4.0 of this document.*

The Applicant is responsible for the purchase and installation of sensors as described in *Section 4.1 M&V Specifications.* The site shall provide the necessary instrumentation and communications to monitor their CHP system including a phone line, internet access or other means of communication acceptable to NYSERDA and its Technical Consultant for remote data collection. Connecting sensors and meters to the data acquisition system will be the responsibility of NYSERDA's Technical Consultant.

The M&V data will be maintained within NYSERDA's CHP Data Integration Website (NYSERDA DG/CHP Integrated Data System). NYSERDA and its Technical Consultant will specify the savings analysis procedures and will provide data analysis services. This NYSERDA CHP Website will be used to prepare the M&V reports and determine the performance incentive for the Applicant.

5. Construction Documents. Copies of the final design documentation shall be submitted to NYSERDA and should highlight any changes that have been made since the Schematic Design.

6. Maintenance Contract. NYSERDA requires that an O&M contract be in place for the duration of the M&V period to ensure that the CHP equipment is properly maintained. A copy of this agreement should be sent to NYSERDA.

7. Progress Payments. Progress Payments may be requested at specified development times:

> Following submittal and approval of the Construction Documents, the Applicant may request to receive a progress payment of up to 10% of the estimated incentive in the PO.

Following proof of purchase and delivery of the CHP System on site (i.e. Bill of Lading), the Applicant may request a second progress payment of up to 20% of the estimated incentive in the PO.

Once the Applicant has approval to start the first years M&V period, a Project Installation Payment of up to 10% of the estimated incentive in the PO may be requested. The Applicant has up to 3 months from the date of NYSERDA's approval to begin the M&V period.

If the progress payments are not requested, an entire 40% Project Installation Payment will be made when the Applicant begins M&V and submits the relevant invoices.

8. Commissioning. Commissioning is required for all CHP systems. The Commissioning Agent must be under contract to the Applicant. *A detailed description of the deliverables is provided in Section 3.3.* The Applicant is responsible for submitting a Final Commissioning Report summarizing the results of the commissioning process. The report must include a summary discussion of the following items:

- The findings of the Construction Checklists
- The results of the Test Procedures and Test Data Reports
- Outstanding items in the Issues Log
- The results of the training process

9. Post-Installation Inspection. After review and approval of all required documents, the Applicant has 12 months to install the CHP system. After the CHP system has been installed and commissioned, the Applicant has 3 months to submit commissioning reports and contact NYSERDA and its Technical Consultant to conduct a post-installation inspection of the CHP system to verify that the system specified in the approved PO has been installed and is operating according to its design intent. The NYSERDA Technical Consultant will also conduct emissions testing at this point to ensure program compliance.

The NYSERDA Technical Consultant will provide a report summarizing the project and its ability to meet program performance requirements. The Applicant will sign the summary report and add the following statement: "Additionally, I certify that the installation and commissioning of the CHP System described above have been completed and all requirements of the *NYSERDA Performance Program* are being adhered to."

This is the final opportunity for the Applicant to request a revision to the estimated peak demand reduction. Any revisions require NYSERDA approval.

The energy generated and demand reduction estimates in the post-installation report may fall short of the earlier estimated energy generated and demand reduction based on the engineering analysis for one of the following two reasons:

1. The Applicant has met all of its obligations by properly installing the CHP System specified in the engineering analysis; however, project performance

does not initially appear to meet expectations (based on spot measurements, observed operating conditions, etc.), or

2. The Applicant has not fulfilled its obligation by failing to properly install the CHP System specified in the engineering analysis.

In both cases, the Project Installation Payment may be reduced accordingly. However, in the first case, the maximum potential incentive may remain unaffected following the M&V period if the CHP System performs as estimated in the engineering analysis.

In the second case, NYSERDA reserves the right to reduce the maximum potential incentive based on the portion of work that was not completed in accordance with the approved engineering analysis. If the majority of work was not completed in accordance with the approved engineering analysis and the Applicant failed to provide timely notice of the change, NYSERDA may withhold any incentive payment. The Applicant has 60 days from the date of the rejection to provide necessary information and resolve all outstanding issues with NYSERDA.

10. M&V Reporting. After installation and commissioning the Applicant has a maximum of 3 months to begin M&V reporting. 30 days from the end of Year 1 of M&V, NYSERDA's Technical Consultant will prepare an M&V report. The M&V report will include clear and verifiable data and describe the baseline assumptions and calculations used to calculate actual energy savings. The M&V report results will become the basis for the performance payment amounts. The M&V data will be in NYSERDA's CHP Website. NYSERDA's CHP Website will be accessible by the Applicant. In addition, overview and summary information regarding the Applicant's project may be publicly available on NYSERDA's CHP Website.

30 days from the end of Year 2 M&V, a second M&V report will be generated by NYSERDA's Technical Consultant.

11. Performance Payments. NYSERDA will issue performance payments after reviewing, verifying, and approving the M&V report(s) of up to 30% of the total project incentive in the PO. Each payment will be based on the total verified electric energy generated and peak demand reduction during the summer capability period, after adjusting for differences between the estimated and verified energy savings. The sum of the progress payments and the performance payments may not exceed 100% of the total project incentive included in the PO. Performance payments are also subject to non-performance incentive reductions (*see Section 4.3*).

3.1 ENGINEERING ANALYSIS (EA)

This section includes a discussion of the requirements of the EA. The EA is submitted as part of the application and must be approved by NYSERDA. The estimated amount of electric energy generated and peak demand reduction or avoidance during the summer

capability period in the approved EA will become the basis of the NYSERDA Incentive payable to the Applicant.

Submittal and Notification Schedule

If an application is received without an EA, it will be rejected. An original and electronic version of the EA should be submitted to NYSERDA. The electronic copy should not be in PDF format. It should contain a spreadsheet-based model that describes system operation, including site-specific electricity produced and heat recovered on a daily basis for one year.

EA Requirements

The following information must be included in the EA:

Project Summary Table – Appendix B

Environmental Assessment Checklist – Appendix C

System Information

- Energy use profiles including electricity produced and heat recovered on an hourly basis for twelve months. Assumptions and description of the system operation used in the model should be clearly indicated in the EA.

- The type and rating of the prime mover, an energy balance around the prime mover, including the uses for the recovered heat must be applied to a schematic of the system. Annual totals for each energy input/output must be shown along with maximum, minimum, and average instantaneous values. Temperatures for each waste heat transfer fluid and sink must also be indicated.

- CHP system efficiency and emissions must be described.
    - Annual thermal utilization percentage must be given (i.e., the annual amount of heat that is recovered for space and/or process heating and/or cooling divided by the annual recoverable thermal output from the prime movers).
    - Fuel conversion efficiency (FCE) for the prime movers must be provided. FCE is defined as the ratio expressed as a percentage of the total usable energy produced by a technology to the sum of all fuel or other energy inputs to the technology measured at each fuel's heating value. Please specify using or HHV.
    - The annual emissions of the proposed system must be provided.
    - Any additional emission control technology must be provided if necessary to meet emission regulations.

- A preliminary floor plan indicating equipment location.

- If natural gas is used as the fuel for the proposed CHP system, the pressure and

availability of gas must be described in the study. If fuel oil is to be used as the fuel for the proposed CHP system, system cost must include tank construction requirements.

- An operational sequence must be included that specifies the control system to be used along with a discussion of its integration with other on-site control systems and who will have responsibility for system operation.

- A project schedule that includes durations for design (engineering & architectural), utility coordination and review, permitting (environmental and construction), construction, start-up and commissioning must be provided.

Economic Evaluation

- Electricity, fuel, operation and maintenance costs before and after the proposed installation on a monthly basis along with a summary of project economics must be included.
    - Electricity and fuel costs should be broken down by on-peak and off-peak periods. Electricity usage and costs should be further broken down by consumption and average daily demand.
    - Economics must be presented in a simple payback format. Additionally, a cash flow analysis or life cycle cost analysis must be presented.
    - Operational costs must include any impact to the customer's energy tariffs.
    - Maintenance costs can be listed in $/kWh, but must also be annualized. This should include M&V costs.

    Capital costs must include:
    - Itemized equipment purchase and system installation
    - Structural (new building, existing building modifications, etc)
    - Interconnection and Utility Connection (construction & utility fees)
    - Electrical distribution system changes
    - Rigging
    - Permitting
    - Design fees
    - Commissioning

Maintenance

- In addition to inclusion in the economic analysis described above, maintenance items must be described in detail. The source of the maintenance costs must be included along with a list of what would be covered (i.e. annual major overhaul of prime mover, oil changes, etc.).

- An estimate of downtime that would occur due to routine maintenance must also be included.

Tariff Impacts and Interconnections

- In addition to inclusion in the economic analysis described above, a detailed

description of the relationship between the proposed CHP facility and the Customer's existing, or planned, energy tariffs must be included. Contract dates and dates of potential tariff rule changes must be included. In the case where such future changes would significantly impact the economics of the Project, sensitivity analysis must be presented assuming the potential tariff or contract changes occurred.

- Site-specific grid interconnection issues and costs must be discussed. A brief, clear plan for if and how the system will be properly interconnected to the grid, natural gas pipelines and/or the Con Edison steam system must be presented.

Permitting

- A brief description of the necessary environmental and building permits that the Customer needs to obtain must be provided. The permit determination should be based on the annual emissions potential for the size of the unit and the emissions of any existing equipment at the facility. Anticipated time frames and durations for environmental, utility and construction permitting should be incorporated in the Project schedule.

System Reliability and Availability

- The reliability and availability of the CHP System must be quantified (e.g. number of hours the system would be available at less than full capacity). This must be compared to service and discussed in the context of the Customer's core business and tolerance for risk.

3.2 SCHEMATIC DESIGN REQUIREMENTS

All Applicants are required to submit a copy of the schematic design to NYSERDA. The following provides a listing of specific information that must be included in the schematic design.

Equipment Operating Specifications

- Equipment capacity and predicted summer-peak demand reduction
- Annual:
  - Operating efficiency
  - Fuel input
  - Electric (kWh) output (less parasitic electric use)
  - Waste heat generated
  - Waste heat usable
- Operating noise level
- Emissions parameters
- Systems reliability and uptime requirements

Equipment Layout

- Schematic Plans should be developed showing the following:

    - Floor plan showing equipment location within the building, or if an addition is required to house the equipment
    - Layout of major pieces of equipment location including, generator, stack, switchgear, gas booster and heat rejection equipment
    - Utility interconnection location including electrical, gas, and steam (if applicable)
    - Sensor locations to meet program M&V requirements
    - Any required changes to the building's structural components
- Indicate required maintenance and service clearances
- Discuss means of rigging for large components
- Indicate means of noise attenuation
- Indicate means of providing makeup air

Site work Requirements

- Any large scale trenching, additional utility poles, ground repairs, etc must be described and detailed.

Permitting & Inspection

- Responsibilities for permitting, inspections and signoffs must be specified.

3.3 COMMISSIONING REQUIREMENTS

Construction phase commissioning is required for all CHP systems. The Commissioning Agent (CxA) must be under contract to the Applicant, and shall be a third party independent of the design team and the construction team. The commissioning process must include the following deliverables, which will be reviewed by the NYSERDA Technical Consultant.

Issues Log and Issues Reports

- A spreadsheet, database or text document tracking commissioning related issues throughout the Cx process must be maintained by the CxA. The Issues Log must include at a minimum a description of the issue, the date the issue was identified, the party responsible for resolving the issue, the documentation of the resolution, and the date of resolution.
- Issues Reports summarizing outstanding items in the Issues Log must be submitted monthly to the NYSERDA Technical Consultant.
- A final Issues Report summarizing any outstanding items, as well as a Resolved Issues Report summarizing all issues that were raised and resolved during the commissioning process must be included in the Final Commissioning Report described below.

Final Design Review

- A review of the final design documents must be performed by the CxA prior to issuance of bid/construction documents. The intent of the final design review is to ensure adherence with the EA and compliance with the CHP program requirements.

Additionally, the review should verify that construction checkout documentation, system testing, staff training and close-out documentation is sufficiently specified. Issues identified during the design review should be listed in the Issues Log.

Construction Checklists

- The CxA must develop a detailed Construction Checklist for each primary piece of equipment. The purposes of these checklists are to (1) aid the NYSERDA Technical Consultants by providing specific information on the installation requirements for the equipment/assembly and (2) formally document for the NYSERDA Technical Consultant that the installation contractor has fully installed and calibrated the equipment. Each checklist must include:
    - Equipment/assembly verification (equipment make, model, capacity, etc. that was specified, then submitted and finally installed)
    - Pre-installation checks (equipment condition at delivery, equipment voltage, mounting point configuration, etc).
    - Installation checks (controls installed, equipment grounded, vibration isolation, piping complete, piping specialties installed, venting/ductwork installed, etc).
- The Start-Up Report should be attached to the Construction Checklist upon completion.
- The CxA must perform spot check verifications in the field of the items attested to on the Construction Checklists by the Technical Consultant(s).

Test Procedures and Test Data Reports

- The CxA must develop detailed procedures for testing the operational sequences (including safeties) of the CHP System. These Test Procedures are then executed by the site operator, in the presence of the CxA and owner, prior to turning the system over to the owner.
- Note that this testing is not the same as system start-up, which is performed by the installation contractor or Project Developer as part of the tuning process.
- The Test Procedures shall include testing, at a minimum, the following sequences:
    - System enable/startup including staging (if multiple prime movers are used)
    - Normal system shutdown
    - Emergency system shutdown
    - All safety sequences (low gas pressure, high gas pressure, overcurrent, over/under voltage, etc.)
    - Utility to CHP System power transfer and isolation
- The CxA must develop Test Data Reports formally documenting the results of the Test Procedures. The reports must list the key design performance specifications of the installed equipment that will affect the system overall annual fuel utilization, list of the measured performance during the initial post-installation test and the test conditions, and list the measured performance after the system commissioning is complete, if any adjustments were made.
- Emissions testing must also be documented by the CxA. Copies of test reports for all emissions testing must be compiled and included in the Systems Manual described below.

- Settings and test procedures required by a Utility must also be documented and verified by the CxA.

3.4 INVOICES

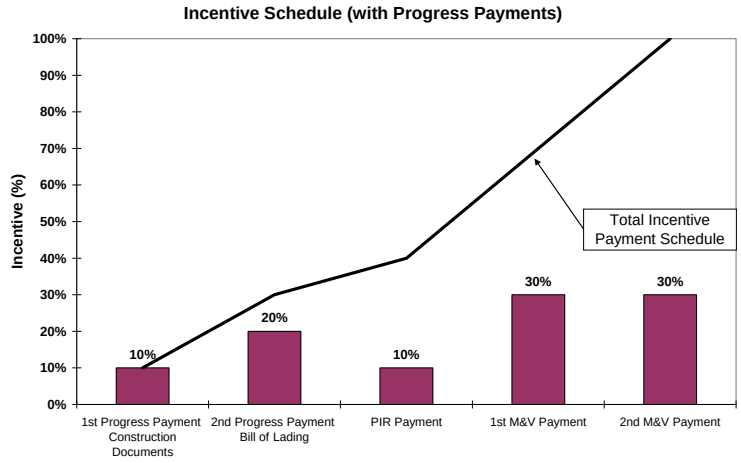
This section presents the procedures involved in the preparation, submittal, and processing of the invoices that Applicants must submit to receive incentive payments.

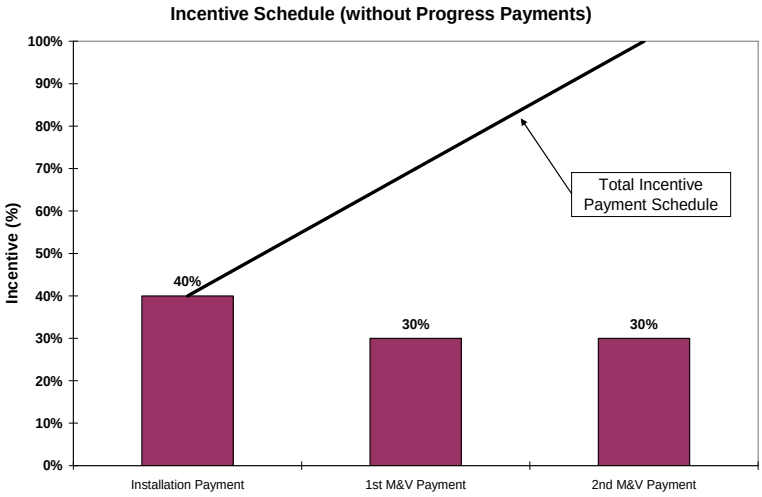
Submitting the Invoice

An Applicant will use its own invoice form to request payment and will submit the following invoices to NYSERDA over the course of a Project:

- Progress Payment Invoice – Construction Documents: This invoice is optional. It is for up to 10% of the total project incentive stated in the PO. It is submitted when the Construction Documents are finalized and approved by NYSERDA.
- Progress Payment Invoice – Bill of Lading: This invoice is optional. It is for up to 20% of the total project incentive stated in the PO. It is submitted after the equipment is delivered to the site.
- The total of all progress payments may not exceed 50% of documented costs incurred for the purchase of the CHP System.
- Project Installation Payment Invoice: This invoice, based on energy generation and kW generation estimates, is for up to 40% of the total project incentive stated in the PO, less any amount paid on a Progress Payment Invoice. It is submitted following NYSERDA's approval of both the installation and the Applicant's request to start M&V.
- 1st M&V Invoice: Based on the approved M&V plan, there are two performance invoices. The 1st M&V Invoice is for the balance of up to 70% of the total project incentive stated in the PO. It is submitted following NYSERDA's approval of the first M&V Report.
- 2nd M&V Invoice: This invoice is for up to the balance of the total project incentive stated in the PO based on verified annual energy savings. It is submitted following NYSERDA's approval of the second M&V Report.

The performance payments may be reduced if the installed CHP System fails to achieve the energy savings estimated in the EA or underperforms on emissions or fuel conversion efficiency (see *Section 4.3*).





SECTION 4.0 MEASUREMENT & VERIFICATION (M&V)

This section specifies the rules, procedures, roles and responsibilities of measurement and verification (M&V) for CHP systems.

The purpose of M&V is to quantify:

1. Generator power output (kW) at 15-minute intervals during key on-peak periods;
2. Cumulative energy generated and used on-site by the CHP System (MWh) on an annual basis;
3. Annual fuel conversion efficiency;
4. NOx emissions.

All M&V data shall be transmitted to NYSERDA's CHP Website (http://chp.nyserda.org/home/index.cfm). Incentives will be paid based on review and

approval of the M&V data by NYSERDA or its Technical Consultant. Incentives shall be based upon generator output minus ancillary or parasitic loads.

4.1 MEASUREMENT & VERIFICATION SPECIFICATIONS

M&V will involve the Applicant as well as several NYSERDA Technical Consultants. The Applicant is responsible for ensuring that data collected and transmitted to NYSERDA and its Technical Consultants accurately represents the operation of the CHP system.

NYSERDA and its Technical Consultants will:

- Provide oversight and quality control for the monitoring and verification efforts;
- Confirm the necessary data collection instrumentation is installed by the site and install any additional data collection systems (hardware and software) required to transfer data to NYSERDA's CHP Website;
- Verify sensor readings, document sensor locations, and develop a CHP system description (schematics, specifications, and narrative) to document that collected data meet program goals;
- Validate the monitored data and load it into NYSERDA's CHP Website;
- Confirm the validity of the collected data, define error checking procedures; and
- Integrate the site documentation to the NYSERDA's CHP Website.

The M&V Process

The M&V process includes:

- Specification, approval, procurement and installation of the required instrumentation by the Applicant or Applicant representative;
- Installation and verification of monitoring equipment during the commissioning process by NYSERDA's Technical Consultant;
- Automatic loading and verification of the collected data into NYSERDA's CHP Website over the verification period, 2 years arranged by NYSERDA's Technical Consultant; and
- Periodic determination of performance based on the net measured power output, CHP efficiency, and NOx and CO emissions levels measured by NYSERDA's Technical Consultant.

Specifying, Procuring, and Installing Instrumentation

The Applicant is responsible for supplying and installing the instrumentation (see requirements in Table 1) as well as a communication medium (phone, broadband or other medium as agreed to with NYSERDA) at the site. Table 2 provides examples of instrumentation specifications. The Applicant shall submit an Instrumentation Plan (IP) that includes a list of proposed instrumentation, along with a system schematic or drawing showing the location of each instrument. The IP will be submitted by the site as part of the design document submittal. The list of instrumentation shall include

manufacturer, model numbers, accuracy specifications, instrument range and other pertinent data.

Manufacturers "cut sheets" may also be provided. The system schematic must show a simplified representation of the CHP System along with pertinent information to demonstrate proper sensor placement and installation. NYSERDA will review and approve the IP. If submitted information is inadequate or incomplete, NYSERDA's Technical Consultant will work cooperatively with the Applicant to develop an acceptable IP.

Once the IP is approved, NYSERDA's Technical Consultant will prepare a draft M&V Plan that documents the measurements and how they will be used to calculate the required information. The M&V Plan will be provided to the Applicant for review and approval.

The Applicant will procure and install the specified instrumentation per the manufacturer's instructions and based on feedback from NYSERDA's Technical Consultant. Once the instrumentation is installed, NYSERDA will visit the site and confirm the specified instrumentation is properly installed.

Installing and Verifying the Monitoring System

Before CHP System operation begins, NYSERDA's Technical Consultant will install a data collection system that uses the instrumentation and communications provided by the site. General monitoring guidelines in NYSERDA's Monitoring and Data Collection Standard for DG/CHP Systems [2] and the ASERTTI DG/CHP Long Term Monitoring Protocol [3] will be followed. The system will log or record data at 15-minute intervals, averaging or integrating readings as required providing accurate and meaningful readings. Heat transfer calculations will be performed at a minimum of 15 second intervals. The resulting heat transfer values (BTU or equivalent) will be averaged and logged to 15 minute intervals. The monitoring 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. The system will automatically transfer data to the NYSERDA's CHP Website at least once per day.

Correct functioning of all instrumentation and sensors will be verified with handheld sensors or by another independent method during the CHP system commissioning process. NYSERDA's Technical Consultant will confirm that the installed system is capable of measuring the net power output, after considering parasitic or auxiliary power use of the system. Parasitic power may be determined by recording power or equipment runtime readings at 15-minute intervals, and/or by taking one-time true power readings with handheld meters. NYSERDA's Technical Consultant may also provide and install additional instrumentation to measure equipment loading, speed, current draw or duty cycle for variable parasitic loads such as pumps and fans. Similarly, NYSERDA's Technical Consultant will confirm that the measured thermal output from the system used

in the CHP efficiency calculations represents heat recovery that displaces fuel or energy consumption from a boiler, furnace, chiller or other system.

NYSERDA's Technical Consultant will update the M&V Plan based on the actual equipment installed at the site. The M&V Plan will include a schematic of the CHP System and instrumentation, provide verification details, instrument multipliers, and one-time readings; and provide calculation procedures for determining net power output and CHP efficiency. The M&V Plan will be posted on the NYSERDA CHP Website as part of the project documentation. **Loading and Verification into the NYSERDA CHP Website**

Once the on-site monitoring system is installed and verified, NYSERDA's Technical Consultants will work together to setup an automated process to load the collected data into the database at least daily. Automatic error checking and screening procedures will also be established to gauge the data quality and to notify appropriate Project team members if a sensor failure or other abnormality occurs at a site. NYSERDA's Technical Consultant will carefully analyze and review the first few weeks of data and the M&V Plan to confirm the validity of the collected data.

Annual Emission and Efficiency Performance Verification

The emissions performance of the CHP system will be checked by NYSERDA's Technical Consultant 12 and 24 months after the beginning of the M&V Period. NYSERDA's Technical Consultant will also calibrate and check onsite sensors. The annual performance validation will include:

- Emissions testing for NO_X, CO, and non-methane HC using a portable analyzer or equivalent (EPA CTM 030, http://www.epa.gov/ttn/emc/ctm/ctm-030.pdf);
- Fuel meter calibration or function test; and
- Power meter and thermal metering field calibration checks.

Table 1. Provisional Instrumentation Requirements for CHP Systems

This table defines the instrumentation requirements for the site. If the instrumentation is used by the on-site control system, provisions must be made to also provide additional outputs from each sensor as agreed to with NYSERDA. The following basic instrumentation shall be supplied, installed and commissioned by the site:

- a power meter with an accuracy of 0.5% that is capable of supplying either a kWh pulse output, 4-20 mA kW output, or other output as agreed with NYSERDA or its Technical Consultant for the following points:
  - generator output
  - facility power consumption
  - parasitic loads generator or heat recovery system loads (one time measurements with equipment runtime may also be acceptable)
- a fuel meter with an accuracy of ± 1% to measure generator fuel consumption. The meter should be temperature and pressure compensated (if located outdoors

or in an unconditioned space). Uncompensated meters may be permissible if located in conditioned space and if gas pressure is less than 1 psig,

- a flow meter with an analog output that is capable of measuring 120% of the nominal flow rate. The meter must be installed per the flow meter manufacturer's instructions. For hot water flow meters, an accuracy of ± 1% is required. For steam flow meters, an accuracy of ± 1% is required with temperature (and pressure) measurements
- At a minimum, ¼ inch thermowells must be provided by the site at appropriate locations in the system.

Table 2. Example Instrumentation Specifications

This table lists recommended metering specifications as outlined in the ASERTTI Field Validation Protocol [1].

Measurement	Example Instrument Make / Model	Recommended Accuracy	Instrument Output	Supplied by
Power generation	Wattnode WNA-3Y-480-P meter with CTS-1250-400A	0.5 % reading + 0.05% full scale through 25th harmonic	Solid state pulse output	Site
Fuel flow rate	Roots Series B3 8C175	± 1 % reading	Solid state pulse output	Site
Return water flow rate	Data Industrial Model 226B	± 1 percent full scale	Pulse output	Site
Supply and return water temperature	Paired Omega 10,000 ohm thermisters	± 1 °F	4 – 20 mA	NYSERDA Technical Consultant
Heat recovery rate	Data Industrial Model 340 Btu transmitter	± 2 % reading	Solid state pulse output	NYSERDA Technical Consultant

Definitions and Calculation Procedures

Net power output in the on-peak period is defined as

$$kWp = \frac{\sum_{j=1}^{T} (kWh_{output,j} - kWh_{parasitic,j})}{T}$$

where T is the number of hours in the on-peak period. The cumulative annual energy output (kWh_a) will be determined by the same method, but will be summed for all hours of the 12-month period.

The annual CHP efficiency (based on higher heating value) is defined by:

$$\eta_{chp,lhv} = \frac{\sum_{i=1}^{8760} Q_{useful,i} + 3{,}412 \cdot (\sum_{i=1}^{8760} kWh_{output,i} - \sum_{i=1}^{8760} kWh_{parasitic,i})}{HHV_{gas} \sum_{i=1}^{8760} gas_{input,i}}$$

Where:

$Q_{useful,i}$	-	Useful heat recovery provided for hour i (Btu)
$kWh_{output,i}$	-	Generator power output provided for hour i (kWh)
$kWh_{parasitic,i}$	-	Parasitic power consumption for CHP system for hour i (kWh)
$gas_{input,i}$	-	Generator gas input for hour i (cu ft)
HHV_{gas}	-	Higher heating value for natural gas supplied at site from utility bills, average of 12 months (Btu per cu ft)
3,412	-	Conversion from kWh to Btu

8760 corresponds to the number of hours in a year. For determining a monthly CHP efficiency, substitute the number of hours in the month.

Useful heat recovery is:

- thermal output that displaces fuel use in a boiler, furnace or other system,
- thermal input into a chiller, desiccant system, or other system that provides a useful output or service such as cooling or dehumidification.

Parasitic power is electricity consumption by a component that, in the absence of the CHP system, would not be required at the facility. This includes controls, pumps, fuel compressors and fans associated with the generator, used to provide heat recovery to the load, or used to reject unneeded heat. Parasitic power can be the sum of several power measurements, or be derived from one-time power readings with component runtime information.

Procedure to Account for Loss of Measured Performance Data

The formulas above are used to calculate the average on-peak power output (kW_P), the annual energy output (kWh_a), and the annual CHP efficiency ($\eta_{chp,lhv}$). These values form the basis for determining the performance incentive. In some cases, a sensor or monitoring system failure or other problem at the site may result in data being lost or failing to pass the data validation process for part of the performance period (i.e., a M&V

outage). If data loss occurs, the following procedures will be used to calculate the necessary performance information to determine the incentive:

- The ***net power output*** for the missing period, will be determining by taking the average output measured from similar length periods just prior and just after the M&V outage. This procedure will be used for up to two M&V outages for up to 36 hours each per 12 month period. If more than two M&V outages occur per 12-month period, then the site shall be required to provide independent cumulative meter readings or other documentation to demonstrate that the CHP system power output during M&V outage. Otherwise, the generator output will be assumed to equal zero for the outage period.
- The ***CHP efficiency*** of the system for an M&V outage period will be determined using measured performance from similar periods when the CHP system operated normally, as determined by the NYSERDA Technical Consultant. If thermal and power output varies with ambient temperature or other weather conditions, then temperature-dependent correlations or trends will be used to predict the performance during the M&V outage. If CHP system performance varies seasonally or weekly, appropriate similar periods will be used to predict performance during the M&V outage.

References

[1]. *Interim Distributed Generation and Combined Heat and Power Field Testing Protocol*, Association of State Energy Research and Technology Transfer Institutions, Madison, WI, October 2004.

[2]. *Monitoring and Data Collection Standard for Distributed Generation/Combined Heat and Power (DG/CHP) Systems, chp.nyserda.org (under Links section)*, December 2002.

[3]. *Distributed Generation and Combined Heat and Power Long Term Monitoring Protocol*, Association of State Energy Research and Technology Transfer Institutions, Madison, WI, April 2005.

4.2 MEASUREMENT AND VERIFICATION (M&V) REPORTS

This section presents a review of the submittal procedures and schedules and a discussion of the content of the reports.

Submitting the M&V Reports

NYSERDA will prepare the M&V reports. NYSERDA will submit the M&V reports to the Applicant for approval and the Applicant may then submit an invoice based on the savings in the M&V report. The Applicant is responsible for ensuring that data collected and transmitted to NYSERDA and its Technical Consultants accurately represents the operation of the CHP system.

First M&V Report

The first M&V report shall be issued within 30 days after the first performance period ends. This report will include the results of the emission testing as well as the energy generated and the kW generated during the summer capability period. The required performance period will be defined in the approved M&V plan and may extend for up to 12 months.

Second M&V Report

The second M&V report is due 30 days after the second performance period ends. This report will include the results of the emission testing as well as the energy generated and the kW generated during the summer capability period.

M&V Inspection

Periodically, NYSERDA may choose to visit a project site to verify that the information provided 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 preparation of an M&V report by NYSERDA. Should NYSERDA decide to inspect a site, NYSERDA, or its Technical Consultant may or may not contact the Applicant to schedule the inspection. In other words, an inspection may occur without advance notice given to the Applicant. If the M&V activities are found to be different from those represented in either the M&V plan or the M&V report, NYSERDA may refuse any further incentive payments. If NYSERDA deems an inspection necessary, an M&V report that is under development will not be submitted to the Applicant for approval until the inspection has been completed.

SECTION 4.3 NON-PERFORMANCE AND INCENTIVE REDUCTIONS

CHP system incentives are based on the Applicant's ability to generate electricity and provide peak summer demand reduction using clean and efficient CHP Systems. CHP System incentives are subject to incentive reductions for not achieving minimum fuel conversion efficiency and air emission requirements.

NON-PERFORMANCE

Incentives will be reduced if the CHP System does not meet the minimum performance requirements stated in this Section 3.3. The required actions of an Applicant and the reduction in incentives resulting from the failure to meet the requirements are as follows:

Emissions

- CHP Systems that do not achieve 1.6 lbs/MWh or lower in NOx emissions will be given a period of time to take corrective action. If the correction action fails to bring the Project into compliance or should the improvements be deemed invalid, then no further payments will be issued. Emissions testing will occur after commissioning and at the end of each year of M&V for a total of three times.

Efficiency

- FCE greater than 55 and less than 60% (LHV)
  - The Applicant's M&V payment for the project will not be reduced.
- FCE between 50 and 55%
  - The Applicant's M&V payment for the project will be reduced by 50% for that year of M&V.
- FCE less than 50%
  - The Applicant will not be eligible to receive an M&V payment for that year of M&V.

Power Ratio

- The incentive for any project that achieves a Power Ratio ($kW_{p/}kW_{PO}$) of less than 0.6 will be reduced to zero.

CORRECTIVE ACTION (FOR EMISSIONS ONLY)

NYSERDA will allow the Applicant to take corrective action for a system that does not meet the program's emission requirements. The following is the corrective action process:

- The Applicant will be required to submit a corrective action plan (CAP) to NYSERDA for approval within 30 days of notification of non-performance;
- Upon approval by NYSERDA, the Applicant has a further 60 days in which to implement the CAP; and
- The system modifications will then be inspected and measurements repeated to confirm that the corrective action has resulted in compliance.
- If the system fails to meet the Program emission requirements no further incentive payments will be administered.

SECTION 5.0 STATE ENVIRONMENTAL QUALITY REVIEW ACT (SEQRA) AND PERMITTING

STATE ENVIRONMENTAL QUALITY REVIEW ACT (SEQRA):

NYSERDA will carefully review the environmental impact of all potential CHP systems. NYSERDA is required under SEQRA to consider the environmental implications of all funded projects. All proposals must include a completed SEQRA environmental assessment form (EAF), along with supporting documentation. The first page of the two-page EAF must be completed and signed by the Applicant and submitted as part of the Schematic Design submission.

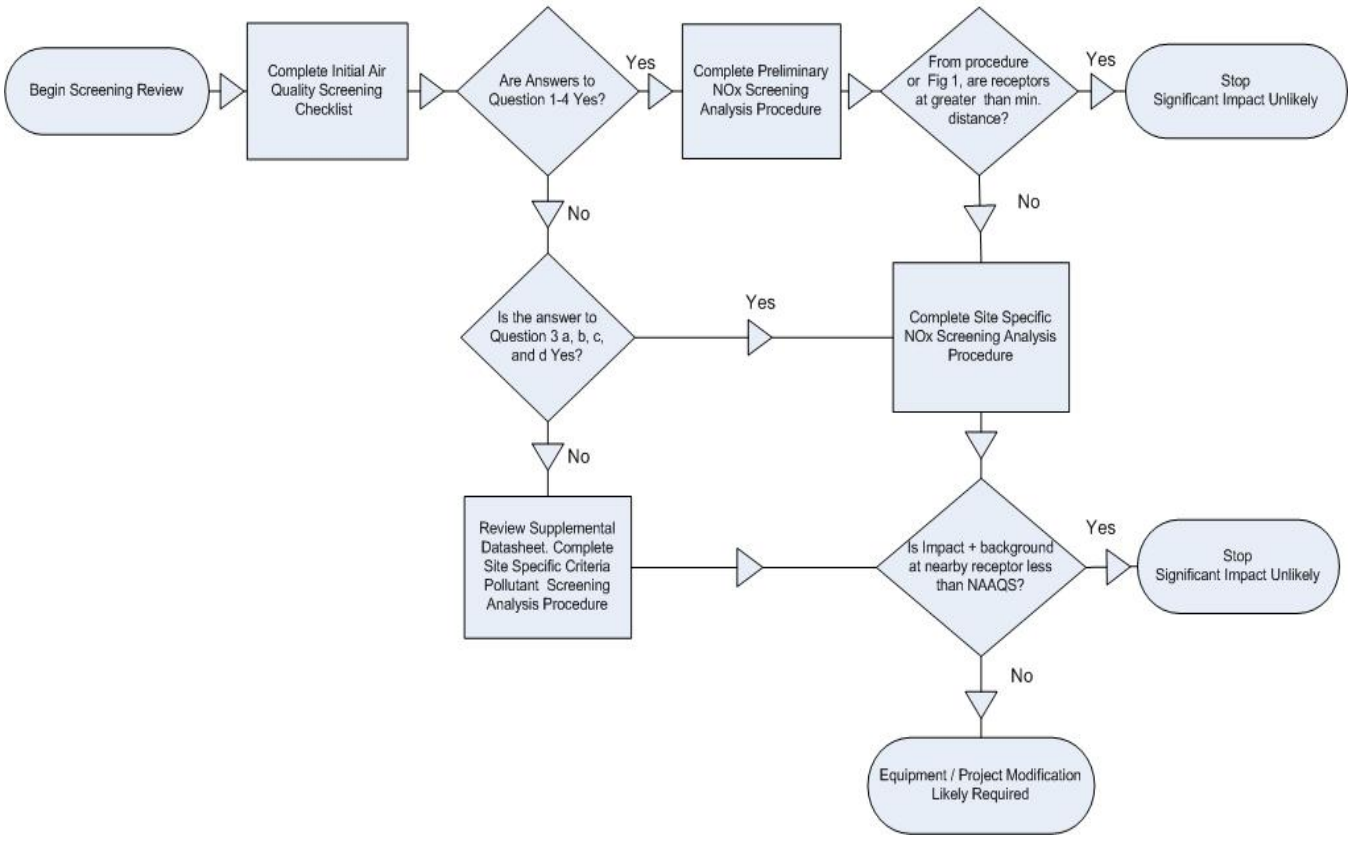
This Section presents screening procedures to determine if a CHP system has the potential for significant air quality and noise impacts as defined in the New York State Public Service Commission's Order (Order) on Demand Management Action Plan (Case

04-E-0572), effective March 16, 2006. A project that is deemed to have the potential for significant environmental impact by the screening procedures or does not meet the screening criteria will require further analysis to demonstrate no significant adverse environmental impacts. This analysis may include dispersion modeling to demonstrate compliance with all appropriate air quality standards and criteria. The methodology used for such modeling analysis will follow the guidance published by the New York State Department of Environmental Conservation (NYSDEC) and, if applicable, guidance provided by the local regulatory agency.

Screening Procedure

Figure 4.1 illustrates the steps for reviewing a CHP system for any potential significant adverse air quality or noise impacts. The Applicant shall provide NYSERDA with the completed NYSERDA Environmental Assessment Checklist-Appendix C as part of the application.

Figure 4.1
Process Flow Chart for Air Quality Screening Analysis



Permitting

Most CHP systems will require an air permit with NYSDEC to ensure compliance with all State regulations. There are three (3) permit classifications depending upon the annual amount of each pollutant emitted: (1) Registration Permit (minor source); (2) State Facilities Permit (minor source); and (3) Title V Permit (major source). Typically, facility NOx emissions will dictate the appropriate air permit for a given installation.

The Applicant is responsible for ensuring that the proposed project complies with all federal, State and local codes and regulations, including, but not limited to those specifically identified on Page 43 of the PSC Order on Demand Management Action Plan (Case 04-E-0572) (http://www.dps.state.ny.us/fileroom.html), effective March 16, 2006.

The Applicant is responsible for ensuring that the system receives all pertinent Federal, State and local permits.

Instructions for completing the NYSERDA Environmental Assessment Form:

Line Number and Name		Specific Instructions
Unit Data		
1	Unit Manufacturer	Enter the name of the CHP Unit Manufacturer
2	Model Number	Provide the model number for the unit to be installed (this is provided by the manufacturer).
3	Model Year	Provide the model year for the unit to be installed (this is provided by the manufacturer).
4	Equipment Rating (MW)	Provide the size of the unit be installed, or equipment rating in Mega Watts (MW).
5	Fuel Type	Provide the type of fuel which will be used e.g., Natural Gas, Diesel. If a combination of fuels will be used (for example as an ignition fuel) indicate each fuel and its use.
6	Distance of Exhaust Stack to Nearest receptor (ft)	Using the proposed location and height of the exhaust stack, find the horizontal distance, in feet, to the nearest receptor which is at a height similar to or greater than the stack. A receptor could include operable windows, balconies, and air intakes on nearby buildings (residential and commercial).
NOISE		
7	What is the equipment noise rating in dBA without noise attenuation equipment and the distance at which these measurements were made?	Provide the noise level (in dBA) for the equipment to be installed. This information is generally available from the manufacturer.
8	Noise Code Compliance	Does the unit comply with local noise codes or ordinances* ? (where there is no local noise code, the NYC noise code should be used).

		eg. In NYC, Noise Control Code Title 24, Subchapter 6, Section 24-243. New York City Zoning Resolution Article IV, Section 42-21. CEQR Technical Manual, 2001, Section 3R and Appendix B. *All units must comply with local noise codes.
9	Will sound attenuation equipment (mufflers, silencers) be required to meet noise code?	Is the rated noise level of the equipment to be installed above that allowed by the local noise code? (where there is no local noise code use the noise levels from the NYC noise code).
10	What sound attenuation equipment will be installed?	Provide a description of the type of sound attenuation equipment that will be installed (e.g. silencer)
11	If sound attenuation equipment is required, what will be the resultant noise rating in dBA?	When the sound attenuation equipment is installed on the equipment what will be the final noise level?
AIR QUALITY		
12	Is the proposed unit between 0.5 and 5 MW?	Using manufacturer's information (line 10 above), if the proposed unit rating falls within the range of 0.5 to 5 MW answer Y, otherwise answer N.
13	Will the annual capacity be between 30 and 75%?	If the planned usage of the unit is within the range of 30 to 75 %, answer Y, otherwise answer N.
14	Is the proposed CHP exhaust stack located on the tallest building onsite where reasonable?	
15	Exhaust Stack Height (feet)	Enter the height of the exhaust stack in feet
16	Exhaust Stack Diameter (in)	Enter the diameter of the exhaust stack in inches
17	Exhaust Gas Exit Velocity (ft/s)	Enter the velocity of the gas leaving the exhaust stack in feet/second
18	Exhaust Gas Flowrate (acfm)	Enter the flowrate of the exhaust gas in actual cubic feet per minute (acfm)
19	Exhaust Gas Temperature (deg F)	Enter the temperature of the exhaust gas in degrees F
20	Exhaust Gas NOx emission rate (lbs/MW-hr)	Enter the emission rate for the unit of NOx in lbs/MW –hr. This data can be obtained from the manufacturer.
21	Exhaust Gas PM10/PM2.5 emission rate (lbs/MW-hr)	Enter the emission rate for the unit of PM10/PM2.5 in lbs/MW –hr. This data can be obtained from the manufacturer.
22	Exhaust Gas CO emission rate (lbs/MW-hr)	Enter the emission rate for the unit of CO in lbs/MW –hr. This data can be obtained from the manufacturer.
23	Exhaust Gas VOC emission rate (lbs/MW-hr)	Enter the emission rate for the unit of VOC in lbs/MW –hr. This data can be obtained from the manufacturer.

APPENDIX A - DEFINITIONS

Bill of Lading. A document issued by a carrier to a shipper, listing and acknowledging receipt of goods and specifying terms of delivery.

Clean DG. The proposed CHP system must meet the Clean Distributed Generation ("Clean DG") definition. This "Clean DG" definition can be found in the New York State Public Service Commission's Order (Order) on Demand Management Action Plan (Case 04-E-0572), effective March 16, 2006 (http://www.dps.state.ny.us/fileroom.html).

Combined Heat and Power (CHP). The simultaneous production of both electricity and thermal energy to be utilized at the host site.

CHP System. A CHP System is comprised of all electricity generating prime movers at a site and balance of plant equipment.

Commissioning. A systematic process of detailed documentation and verification designed to ensure that systems are installed and perform interactively according to the owner's programmatic and operational needs and the design intent.

Construction Documents. Final design documents (drawings and specifications) fully describing and detailing all aspects of the project. Documents describe to the Technical Consultant what is to be built and the construction standards to be adhered to.

Customer. The owner or tenant of the site at which the Project is implemented that pays the Monthly Adjustment Clause (MAC).

Engineering Analysis (EA). Submitted with the application, it is the required detailed information about the Applicant's proposed CHP System, including equipment surveys, projected electricity generated and peak demand reduction.

Electricity Generated. Electricity generated net of any system parasitic or ancillary equipment use.

Fuel Conversion Efficiency (based on higher heating value) is defined by:

$$\eta_{chp,lhv} = \frac{\sum_{i=1}^{8760} Q_{useful,i} + 3{,}412 \cdot \left(\sum_{i=1}^{8760} kWh_{output,i} - \sum_{i=1}^{8760} kWh_{parasitic,i}\right)}{HHV_{gas} \sum_{i=1}^{8760} gas_{input,i}}$$

Where:

$Q_{useful,i}$	-	Useful heat recovery provided for hour i (Btu)
$kWh_{output,i}$	-	Generator power output provided for hour i (kWh)
$kWh_{parasitic,i}$	-	Parasitic power consumption for CHP system for hour i (kWh)

$gas_{input,i}$	-	Generator gas input for hour i (cu ft)
HHV_{gas}	-	Higher heating value for natural gas supplied at site from utility bills, average of 12 months (Btu per cu ft)
3,412	-	Conversion from kWh to Btu

8760 corresponds to the number of hours in a year. For determining a monthly CHP efficiency, substitute the number of hours in the month.

Installation Phase . The phase that includes preparation of the proposed CHP System designs and specifications, equipment procurement and installation, commissioning and completion of the Project Installation Report.

kW. One kilowatt of electricity.

Electricity Generated (kW_a) Total electricity generated by the CHP system in a 12 month period net of parasitic electricity use. NYSERDA's incentive will not be paid for electricity generated beyond on-site electricity usage. The comparison between the electricity generated by the CHP System and that used on-site will be assessed on an hourly basis.

Peak Demand Reduction (kW_p) Average power produced by the CHP system during the summer capability period, net of parasitic electricity use. Electricity generated beyond on-site electricity usage will not be included in the calculation of kW_p. The comparison between the electricity generated by the CHP System and that used on-site will be assessed on an hourly basis.

kW_{PO} - The projected peak demand reduction, as agreed to between the applicant and NYSERDA in the Purchase Order.

Power ratio (PR). The ratio of the achieved peak demand reduction to the projected peak demand reduction (kW_p/kW_{PO}). PR must equal or exceed 0.6 to receive an incentive.

kW nameplate. The full load net continuous rated generating capacity of the CHP system minus ancillary generating system loads, as indicated in the PA.

kWh. One kilowatt-hour of electricity.

Measurement and Verification (M&V). The process of monitoring and measuring the performance of the CHP System. Such M&V shall be set forth in the M&V Plan.

Monthly Adjustment Clause (MAC). A tariff applicable to certain Consolidated Edison electricity utility customers served under the Full Service Schedule, except for SC 11, and to customers served under the Retail Access Rate Schedule, except for SC 15-RA.

Parasitic power Electricity consumption by a component that, in the absence of the CHP system, would not be required at the facility. This includes controls, pumps, fuel compressors and fans associated with the generator, used to provide heat recovery to the load, or used to reject unneeded heat. Parasitic power can be the sum of several power measurements, or be derived from one-time power readings with component runtime information.

Performance Phase. The final phase of the Project that commences on the approval of the Project Installation Report.

Project. The CHP System contemplated herein and described in the PA. It consists of the CHP system and all associated equipment or improvements that are installed by the Applicant to achieve the Total Project Incentive.

Project Application (PA). The Applicant's initial submission to NYSERDA which includes a Engineering Analysis (EA), an environmental assessment form (EAF), and, if applicable, a copy of recent electric and fuel utility bills

Project Installation Report (PIR). The detailed description of the installed Project including an equipment inventory, the operating conditions and schedule, up-dated savings calculations, and a commissioning report for the installed CHP System.

Receptor. The locations where potential air emissions would have an impact, these could include operable windows, balconies, and air intakes on nearby buildings (residential and commercial).

Site. One or several adjacent buildings, or group of buildings on a contiguous site, owned or operated by a single Customer.

Summer On-Peak or Summer Capability Period. The period May 1 to October 31, and the hours between 12 PM and 6 PM, Monday to Friday, excluding holidays.

Schematic Design. Preliminary design documents (drawings and/or specifications) describing the scope and primary components of the project. Documents identify the major design issues and layout how these issues will be addressed.

Therms: One hundred thousand Btus.

Useful heat recovery.

- thermal output that displaces fuel use in a boiler, furnace or other system,
- thermal input into a chiller, desiccant system, or other system that provides a useful output or service such as cooling or dehumidification.

APPENDIX B – PROJECT SUMMARY

Total Project Installed Cost ($)	Net Annual Energy Cost Savings ($)	Net Annual Electricity Generated (kWh)	SOx (lbs/MWh)
			PM (lbs/MWh)
Summer On-Peak Demand Reduction (kW)	Nameplate kW (kW)	NOx Emissions (LB/MWh)	
			CO (lbs/MWh)
			VOC (lbs/MWh)
Annual Gas Used (MMBtus)	Annual Fuel Saved (MMBtus)	Total Recovered Output Thermal Energy (MMBtus)	
			CO2 (lbs/MWh)
Total kWh Incentive ($)	Total kW Incentive ($)	Total CHP Incentive ($)	

APPENDIX C – NYSERDA ENVIRONMENTAL ASSESSMENT FORM

Unit Data		
1	Unit Manufacturer	
2	Model Number	
3	Model Year	
4	Equipment Rating (MW)	
5	Fuel Type	
6	Distance of Exhaust Stack to Nearest receptor (ft)	
NOISE		
7	What is the equipment noise rating in dBA without noise attenuation equipment and the distance at which these measurements were made?	
8	Noise Code Compliance	Yes or No
9	Will sound attenuation equipment (mufflers, silencers) be required to meet noise code?	Yes or No
10	What sound attenuation equipment will be installed?	
11	If sound attenuation equipment is required, what will be the resultant noise rating in dBA?	
AIR QUALITY		
12	Is the proposed unit between 0.5 and 5 MW?	Yes or No
13	Will the annual capacity be between 30 and 75%?	Yes or No
14	Is the proposed CHP exhaust stack located on the tallest building onsite where reasonable?	Yes or No
15	Exhaust Stack Height (feet)	
16	Exhaust Stack Diameter (in)	
17	Exhaust Gas Exit Velocity (ft/s)	
18	Exhaust Gas Flowrate (acfm)	
19	Exhaust Gas Temperature (deg F)	
20	Exhaust Gas NOx emission rate (lbs/MW-hr)	
21	Exhaust Gas PM10/PM2.5 emission rate (lbs/MW-hr)	
22	Exhaust Gas CO emission rate (lbs/MW-hr)	
23	Exhaust Gas VOC emission rate (lbs/MW-hr)	