

Distributed Generation Guide

Version 4 / May 2017



LEGAL DISCLAIMER: This guide is for informational purposes only and does not constitute legal advice. This does not substitute for any applicable laws, rules or regulations, tariffs, and/or specifications. Further, any information is subject to change without notice. To the extent there is any conflict between this guide and any applicable laws, rules, regulations, tariffs, and/or specifications, the applicable laws, rules, regulations, tariffs, and/or specifications control. Consolidated Edison Company of New York shall not be held liable for indirect, special, incidental, punitive, or consequential damages of any kind, including loss of profits, arising under or in connection with this guide.

Table of Contents

Welcome	2
What Is Cogeneration (CHP)?	2
Technical Support.....	3
The Process.....	3
Project Communication	4
Connecting to Electric and Gas	4
1. Exploratory Meeting.....	5
2. Formal Application	5
3. Preliminary Determination and Cost Estimate.....	6
4. Gas Construction Cost	6
5. CESIR (Coordinated Electric System Interconnection Review)	6
6. Interconnection Agreement.....	6
7. Payment Agreement	6
8. Project Installation	7
9. Gas Integrity Test	7
10. Verification Test	7
11. Interconnection and Operation	7
12. Final Acceptance and Cost Reconciliation.....	7
13. Final Meeting.....	8
Common Concerns, Scheduling, and Cost Considerations	9
Rates	Error! Bookmark not defined.
Questions? Problems?	12
Definitions	13
Acronyms	14

Welcome

Congratulations on your decision to consider installing Distributed Generation (DG).

This guide is for Con Edison customers who are either installing or upgrading natural gas-supplied DG systems that are or will be connected to Con Edison's electric distribution system, **generate up to 20 MW, and are primarily dedicated to supporting customer load**¹.

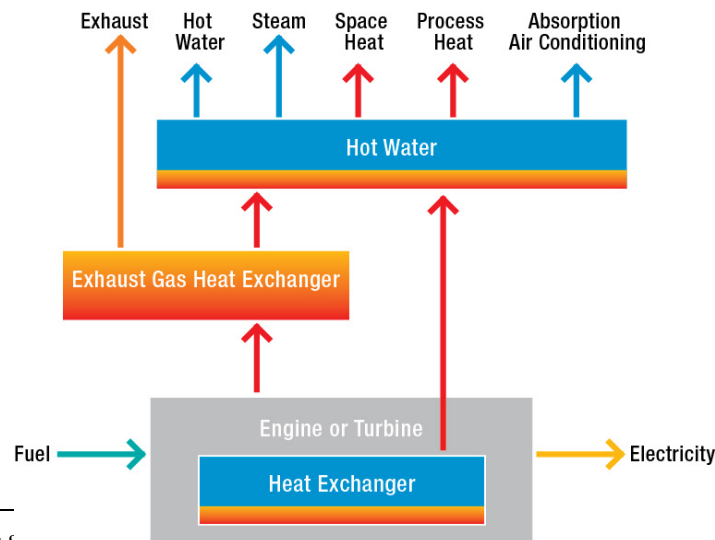
This guide provides a high-level overview of the process, typical schedule, and challenges associated with electrical and gas connections for DG. This guide is not a design or technical specification².

More information may be found at the links listed below:

- Con Edison Distributed Generation Website: conEd.com/dg
- Department of Buildings CHP Handbook: nyc.gov/html/dob/downloads/pdf/combined_heat_and_power_systems.pdf
- Public Service Commission Standard Interconnection Requirements (SIR): <http://www3.dps.ny.gov/W/PSCWeb.nsf/All/DCF68EFCA391AD6085257687006F396B>
- National Grid: www2.nationalgridus.com
- NYSEERDA: <https://www.nyserda.ny.gov/All-Programs/Programs/Combined-Heat-and-Power-Program>
- To learn more about demand response programs such as the Distribution Load Relief Program (DLRP) and the Critical Peak Rebate Program (CPRP), visit conEd.com/dr
- Con Edison High Tension Handbook: <https://www.coned.com/en/save-money/using-private-generation-energy-sources/specs-and-tariffs>

What Is Cogeneration?

Cogeneration, or Combined Heat and Power (CHP), is a system that makes good use out of the waste heat output from a typical electric generator, such as using it to supplement heat or hot water. Systems range in size from smaller (1-10 kW) to larger (up to 20 MW).



¹ This guide does not apply to generators connected to a separate electric distribution system, such as most generators used solely for emergency service, nor does it apply to photovoltaic (PV) or wind and systems less than 10 kW (such as residential micro-CHP and fuel cells). For these please refer to the [New York State Standardized Interconnection Requirements \(SIR\)](#) and the [Con Edison Distributed Generation website](#).

² For detailed technical requirements, please see [EO-2115 'Handbook of General Requirements for Electrical Service to Dispersed Generation Customers'](#), the Con Edison DG website, (conEd.com/dg), and the PSC's DG website, (<http://www3.dps.ny.gov/W/PSCWeb.nsf/All/DCF68EFCA391AD6085257687006F396B>).

Technical Support

Con Edison recommends customers hire a registered professional engineer who is both licensed by New York State and experienced in CHP systems to evaluate their property and choose or design an appropriate system. Projects greater than 5 MW require a professional engineer of record (the Interconnection Guide for Large Combined Heat and Power Projects 5-20 MW is now available on the Con Ed DG site, www.coned.com/dg). A professional engineer can also help guide customers through the interconnection process and help secure project permits from the agencies involved.

The Process

Electric, Gas, and Steam Rate Considerations

Customers are responsible for researching the impact that rates for gas, electric, and steam may have on their project when connecting DG. Please review the more detailed section on rates at the end of this guide.

Gas Considerations

Before submitting a formal DG application, customers should submit a gas inquiry to their gas supplier (Con Edison or National Grid) to determine if their current gas service is sufficient to supply the proposed additional load, and if there will be costs associated with any required upgrades. Con Edison's low-pressure gas system supplies minimum pressure of 4 inches water column and a maximum pressure of 12 inches water column, and its high pressure gas system supplies a minimum pressure of 15 psi. Availability of low- or high-pressure gas can be discussed during the Exploratory Meeting. The Con Edison Gas Operation Standard (G-2040-9) laying out the requirements for the installation of gas boosters, microturbines, and other protective devices should also be reviewed by the Customer³

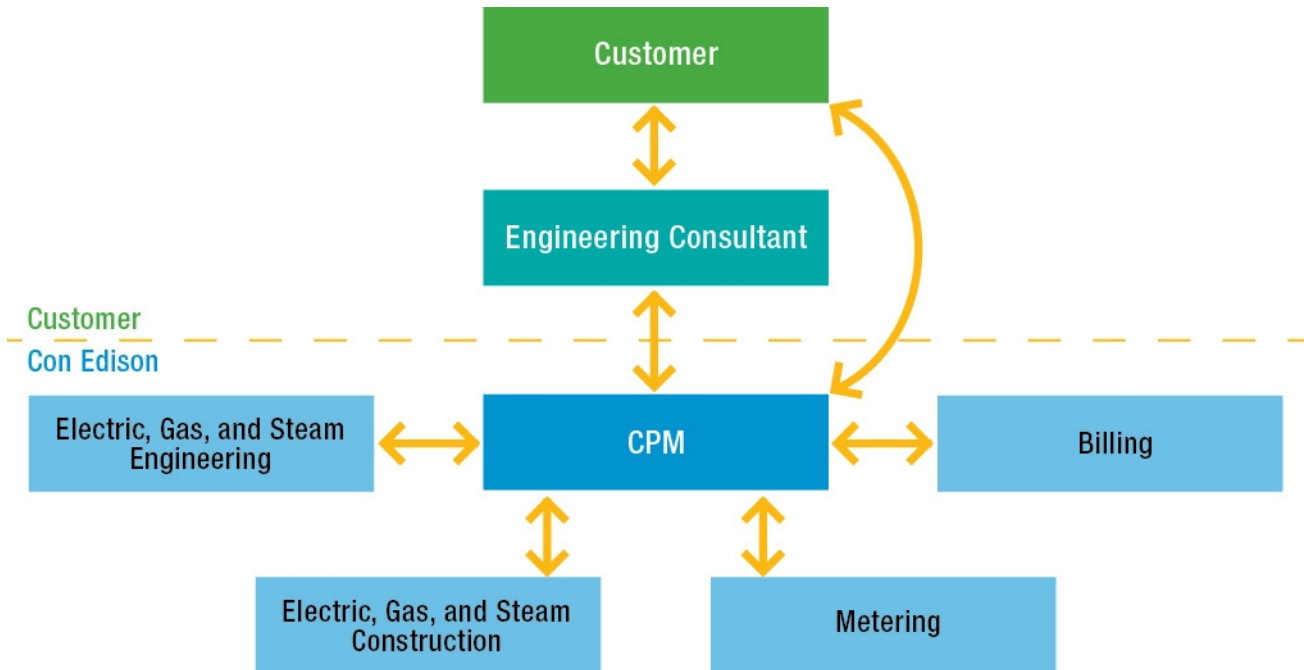
Approval

Approval is required before the gas can be turned on. Con Edison advises discussion with the New York City Department of Buildings (DOB), or the appropriate municipality, in the earliest stages possible to avoid delay. The DOB approval process can be complex and time-consuming. Air permits may also be required through New York City's Department of Environmental Protection (DEP) or through New York State's Department of Environmental Conservation (DEC).

³ <http://coned.com/es/specs/gas/G-2040-9.pdf>

Project Communication

DG installation requires involvement from various groups within Con Edison. Con Edison will appoint an Energy Services Customer Project Manager (CPM) to act as a liaison and serve as a central point of contact throughout your project. CPM contact information will be provided once a project is submitted



Electric, Gas, and Steam Engineering will determine if the customer's current service is adequate for the proposed DG installation. If additional equipment upgrades are required, Engineering will:

1. Determine what system impact studies need to be performed.
2. Estimate the costs associated with any necessary corrective actions needed to ensure safety and reliability of the Con Edison distribution system.
3. Develop the design requirements and cost estimates for any needed equipment upgrades.

Electric, Gas, and/or Steam Construction will specify and in some cases install Con Edison-owned ducts, vaults, and any needed electric, gas, and steam line extensions.

Metering determines any needed upgrades to the existing metering, and costs associated with such upgrades.

Billing determines applicable rates, and processes gas, electric, and steam bills.

Connecting to Electric and Gas

For DG projects with an aggregate capacity of 5 MW or less, Con Edison follows the New York State Standard Interconnection Requirements (SIR) to connect DG projects to the electric grid. The steps are outlined below.

For projects greater than 5 MW, Con Edison's timeline may be longer than SIR's, depending on the complexity of the project.

1. Exploratory Meeting

The customer or contractor can start the process by emailing dgexpert@coned.com, or if familiar with our requirements, submit an application electronically through Project Center (www.coned.com/esweb)

The customer will be assigned a Customer Project Manager (CPM), who will set up a meeting to discuss the scope of the project, schedule, rate impacts, and billing. The interconnection and gas construction processes will be explained, including common concerns, potential scheduling issues, and potential costs. The customer or contractor must bring a high-level draft of the project schedule plus information about the expected gas load, expected generator size and type, voltage, and customer connection mode. Con Edison will supply appropriate documentation such as a process outline, standardized contract or site-specific Interconnection Agreement, technical requirements, and listings of qualified type-tested equipment. The type of service and the feasibility of synchronous generation will also be discussed at this time.

If Con Edison is your gas supplier and additional gas service is needed for your DG project, Con Edison's gas department will generate an order-of-magnitude cost calculation within 15 business days after the Exploratory Meeting. After receiving this cost calculation, and if the customer chooses to proceed, the customer then submits a more detailed Load Letter to Con Edison. If applicable, the Company will review the steam distribution system map and determine if an extension or reinforcement of the Company's main is required to serve the customer's premises.

2. Formal Application

The customer will submit a formal DG application to Con Edison, electronically through the Project Center portal on the Con Edison website (conEd.com/esweb). Customers will be notified of application problems or omissions within ten business days.

A complete DG Application contains everything included in Appendix F of the SIR, including the following:

- *Authorization Letter* – authorizing contractor to represent customer for purposes of the interconnection
- *Equipment Detail Application Form*
- *Addendum to Application for Service* – to determine customer's DG electric rate
- *New York State Standardized Contract* (for systems up to 5 MW) – this agreement between Con Edison and the customer (not the contractor or installer) takes effect once the project has received design approval to build
- *Three Line Diagram* – electrical interconnection detail
- *Manufacturer Data Sheets*
- *Operation and Verification Test Procedures*
- *\$750 Application Fee*
- *Gas Load Letter & Preferred Point-of Entry (POE) Construction Information* – if Con Edison is the gas supplier and new or additional gas service is required
- *Project Schedule*

3. Preliminary Determination and Cost Estimate

Approximately 15 business days after the formal DG application is submitted, Con Edison will inform the customer whether the proposed interconnection is viable. Con Edison will also provide a cost estimate for performing the Coordinated Electric System Interconnection Review (CESIR), an engineering study usually required for larger projects. The CESIR determines how the customer's project will affect the Con Edison system, details any adverse impacts (e.g., relay coordination, fault current, or voltage regulation problems), identifies necessary corrective actions, and estimates any costs associated with mitigating these issues. The customer pays for all costs associated with the CESIR. The customer can either authorize Con Edison to conduct the study, or hire an outside engineering consultant to perform the study according to Con Edison's requirements.

After receiving a CESIR determination and cost estimate, the customer will decide whether to authorize the study and move forward with the project.

4. Gas Construction Cost

Con Edison will provide a detailed gas construction cost within 20 business days of Load Letter submission. If Con Edison is the gas supplier, the proposed DG project requires new or additional gas supply, and the customer agrees to pay these detailed construction costs, Con Edison reserves gas capacity for the customer for six months. After six months, if there is no commitment from the customer, Gas Engineering may re-evaluate this detailed cost.

NOTE: At this point the customer is strongly advised to submit an application for a Gas Permit to the NYC DOB (or appropriate municipal authority).

5. CESIR (Coordinated Electric System Interconnection Review)

The customer will provide any design documentation Con Edison requires for the CESIR, along with payment. Within 60 days of commitment, Con Edison will complete the CESIR and provide the customer with the results of the study and a cost estimate. The estimate will cover the interconnection of the customer's DG for operation in parallel with the distribution system.

NOTE: The information provided by the CESIR gives the customer another opportunity to decide whether to proceed.

6. Interconnection Agreement

For DG systems over 5 MW, the customer will sign a custom Interconnection Agreement. The agreement is a contract that addresses issues such as rates, termination, scope, installation, operation and maintenance of the unit, disconnection of the unit (including emergency and non-emergency disconnection), access, dispute resolution, and liability. (For these larger DG projects, at this point Con Edison begins development of the site-specific design and operating specifications that the customer will ultimately co-sign.)

For all DG systems, the customer will pay Con Edison for the estimated interconnection costs. This payment from the customer is placed into an escrow account. The customer will also be required to submit a final set of design drawings, specifications, and descriptions of all protection devices and auxiliary equipment to be installed. The costs will be reconciled at the end of the project.

Receipt of the signed Interconnection Agreement and Con Edison approval of the final documents are required before a DG project may operate in parallel.

7. Payment Agreement

Con Edison gas customers requiring upgrades must select a payment method (lump sum or surcharge) and sign a Payment Agreement with Con Edison.

Once the Payment Agreement is signed, the customer will install a gas sleeve at the point of entry (POE). Con Edison will inspect the POE, order gas meters, construct the gas line to the head-of-service (HOS) valve, and order gas regulators.

NOTE: If the application for an NYC DOB (or relevant municipal authority) permit has not yet been submitted, the customer is advised to apply for the permit at this time to avoid potentially significant delays.

8. Project Installation

While the DG facility is being installed in accordance with the approved designs, the customer's design will be formally submitted to Con Edison for design review. The customer's design team should meet with the Con Edison design review engineer to discuss interconnection details and requirements as they pertain to the specific project. In addition, the [CPM](#) and the customer or contractor should arrange site meetings to perform electric and gas and steam inspections, as applicable, to ensure that the system is being installed according to the approved design documents and drawings. During the course of the installation, the project schedule should be reviewed periodically to ensure that key milestones are being met. Outage and embargo schedule impacts should also be discussed regularly, and schedule adjustments should be made as necessary.

During installation, Con Edison will make any necessary electrical system or metering changes to accommodate the customer's DG.

If new or additional gas service is required, Con Edison or the appropriate gas supplier will schedule construction and perform interim inspections. Once the customer has an approved gas permit (Blue Card) from the NYC DOB (or relevant municipal authority), the gas supplier will perform a final inspection (including a gas booster compliance inspection, if necessary) and install the meter.

NOTE: NYC Department of Buildings (or relevant municipal authority) approval is required before the gas can be turned on.

9. Gas Integrity Test

Before the gas can be turned on, for those projects where Con Edison upgraded gas service, the CPM will perform an integrity test on the additional gas piping. The integrity test consists of a series of pressure tests along the different sections of the line.

10. Verification Test

Once installation is complete and all gas requirements have been met, the customer should schedule an electric verification test of all protective devices (including relay test sheets and trip checks) with Con Edison within two weeks.

11. Interconnection and Operation

Upon satisfactory completion of the gas integrity (if necessary) and verification tests, installation of the appropriate metering, and receipt of completed documentation, the customer's system is allowed to operate in parallel with Con Edison's system. At this point the CPM will place the customer accounts on the applicable gas, electric, and steam rates.

12. Final Acceptance and Cost Reconciliation

Con Edison will review results of the verification test and issue a list of deficiencies or a formal letter of acceptance for interconnection within 10 business days. The customer will receive either a bill for the balance due or reimbursement for the difference between its application fee and advance payments and actual interconnection costs.

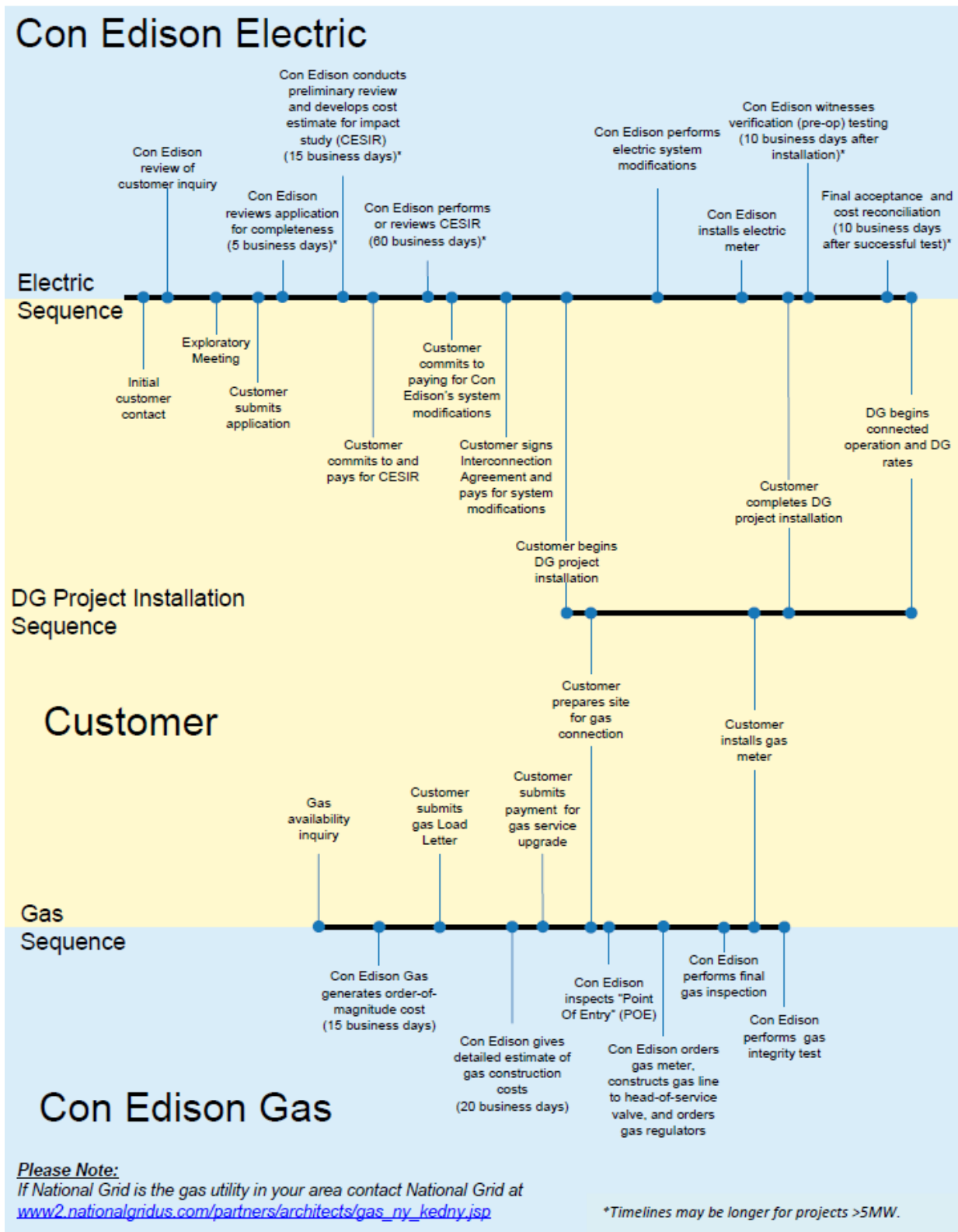
13. Final Meeting

The [CPM](#) will schedule a meeting to discuss any outstanding issues and to review any changes to the gas, electric, and steam bills.

Common Concerns, Scheduling, and Cost Considerations

The following issues have been known to cause delays or cost overruns:

- **Gas Availability:** Customers should contact their local gas supplier (e.g., Con Edison or National Grid) to determine the availability of gas lines *before* beginning a DG project. If the site has insufficient gas availability, the proposed DG project could require redesign or incur significant costs and/or delays.
- **Gas Pressure:** If the proposed equipment uses elevated gas pressure, additional DOB and FDNY permits might be necessary. These permit applications may be complex and time-consuming, so begin the application process as early as possible.
- **Customer Cost Responsibility:** The customer will bear any costs directly incurred as a result of interconnection. These interconnection costs include, but are not limited to, engineering studies, purchase and installation of electric protection devices for company system protection (such as direct transfer trip [DTT], anti-islanding devices, telemetry, fault current limitation devices, etc.), metering, and any safety provisions. These costs should be determined and communicated after the CESIR is completed.
- **Fault Current Limitations:** In certain areas, DG may contribute fault current that will require additional protective devices to preserve the safety and reliability of the Con Edison system. These devices may increase the project's engineering complexity and cost. Fault current limitations will be determined and remedies outlined during the CESIR review, described in step 3 above.
- **Outage and Embargo Scheduling:** Scheduling of Con Edison feeder outages and NYC-imposed street work embargoes may delay and add costs to DG projects. Close coordination with Con Edison and relevant NYC agencies will help mitigate these delays.
- **Rates and Billing Changes:** Customers may wish to design systems to take advantage of various billing options, which are outlined below. Upon request, the [CPM](#) will set up meetings with relevant billing specialists early in the process.
- **Interconnection Agreement:** Before any DG project greater than 5 MW can operate, the customer (not the contractor or installer) must sign a custom formal Interconnection Agreement with Con Edison (step 7).
- **Selection of Contract Demand:** The electric standby rate includes a monthly charge, called "contract demand," that should be very carefully selected. If the contract demand level selected is too low, there can be significant surcharges.
- **NYC Department of Buildings (DOB):** The customer should seek approval from the NYC Department of Buildings early in the process, as **neither Con Edison nor any other gas utility will turn on the gas without DOB approval**. For additional information please refer to the [DOB CHP Handbook](#).
- **High Tension Service** – Some very large customers – generally with loads greater than 5 MW – may be installing new High Tension services at the same time they are adding DG. For an understanding of the engineering, timing, and scheduling of High Tension installations, please see the company's [High Tension Guide](#). It will likely be necessary to coordinate the two efforts.
- **Type of Service:** Synchronous generation is not allowed to connect into the secondary (area) networks, and export is not allowed in spot networks.
- **Steam:** The steam process can be costly and complex, so it should be addressed early in the project.



Note: This diagram illustrates the sequence of steps for completion of a DG project. This sequence does not include obtaining funding or permits or parts of the process associated with other agencies (e.g. NYC Department of Buildings). Project duration will vary according to its complexity and other factors.

Rates

DG customers may be subject to certain rates, which are explained generally below. Some of these rates depend upon customer classification (residential or commercial) and the type and intended operation of the equipment being installed.

Before beginning installation, customers should thoroughly review the details of rate alternatives set forth in the tariffs. In addition, after receiving initial bills, customers should schedule a meeting with Con Edison to discuss them. Rates are subject to change without notice; please see www.coned.com/rates for most updated tariffs.

Electric Standby Service (General Rule 20) - Standby service is available to replace or supplement the energy ordinarily generated by a generating facility on customer premises. If the customer's generation is unable to supply the customer's maximum connected load, called "contract demand," Con Edison ensures the appropriate infrastructure is in place to meet that maximum. Contract demand charges are used for the maintenance and repair of the equipment that is in place to provide standby service to the customer and generally represent the most significant part of a standby bill under General Rule 20. *Please note that there can be substantial surcharges if the customer sets the contract demand level inaccurately.* Other charges include customer charges, as-used demand charges, metering charges, associated MACs, and an O&M charge for additional equipment installed on the Con Edison system to accommodate the generator.

Steam Back-Up/Supplementary Service (SC-4) - Steam standby service is supplied to customers that use steam from the Con Edison steam system for any purpose and employ another energy source for the same purpose between the months of November and April. The customer will be subject to several charges, including customer charge, usage charge, contract demand charge, interconnection charge, and all other charges described in the General Information sections of the steam tariff. The contract demand charge is based on the maximum potential demand between the months of November and April that is specified in the customer's request for service. The specific rates vary by the Service Classification (Rate I or II of SC Nos. 2 or 3) the customer would otherwise be billed under. Please refer to "Service Classification No. 4 Back-up/Supplementary Service" of PSC No. 4.

SC-11 Electric Buy-Back - A customer who would like to sell energy to Con Edison may take service under SC-11 Buy-Back Service. The payment rate for energy will be based on the applicable wholesale rate, which is the Locational Based Marginal Price (LBMP) set by the New York Independent System Operator (NYISO). Customers delivering energy at the secondary distribution level will have the LBMP increased by a factor of adjustment of 1.066 to account for line losses. Under this service agreement, the customer will pay a customer charge and a contract demand charge based on the facilities in place to deliver energy.

Rider H – Non-Residential DG Gas Rate - Non-residential DG customers have the option to utilize Rider H gas rates. To be eligible for Rider H, a customer must maintain a 50 percent annual load factor, which means that usage must be greater than or equal to half of the maximum winter period gas load. A separate meter is required to meter and bill this service.

Rider J – Residential DG Gas Rate - Residential DG customers have the option to utilize Rider J gas rates. Customers with five or more dwelling units must meet a 50 percent annual load factor to be eligible for Rider J and will require separate metering. Small residential customers with fewer than five dwelling units have no annual load factor requirement and do not require separate metering, so a small residential customer’s entire gas usage bill will be at residential DG gas rates.

Standby Reliability Credit

For Customers billed under Standby Service rates, Standby Reliability Credit (“Credit”) is available toward their Contract Demand charge. Credit will be based on their ability to reduce their demand below their Contract Demand level during the Measurement Period. To be eligible for the Credit: (a) the generating facility’s output must be separately metered using an output meter that the Customer arranges to be furnished and installed at Customer expense; (b) the Customer, at their expense, must provide and maintain the communications service for the Output Meter; and (c) the output of the generating facility must be connected at a voltage lower than 100 kV.

The output meter must be: (a) PSC approved, revenue grade interval metering with telecommunications capability, and (b) compatible with Con Edison’s metering infrastructure, including compatibility with Con Edison’s meter reading systems and meter communication systems. Below are additional guidelines for the output meter.

Additional metering guidelines:

- 1) The meters must be full-core CTs and PTs. Split-core CTs & PTs are not acceptable. List of PSC approved metering equipment can be found at [PSC Approved Meter List](#).
- 2) Using lower voltage-rated (i.e., 600V) window CT for higher voltage (i.e., 4kV) bus is acceptable for metering purposes. However, Con Edison will not be liable for any equipment failure. Please refer to your CT manufacturer and professional electrician.
- 3) Only the meters listed below are compatible with Con Edison’s metering infrastructure. All meters (i.e., GE KV2c and Itron Sentinel) must have data storage and communication capability.
- 4) Meter Device ID needs to be numerical only and 7 digits long.
- 5) No totalizer will be eligible.
- 6) Con Edison will work with the customer to set up the communication between customer’s meter(s) and Con Edison’s meter data system.

Manufacturer	Model
GE/Aclara	KV2c
Itron	Sentinel
EIG	NEXUS 1262
Schneider Electric	ION 8650

Questions? Problems?

Always call your CPM first. If you need still more information, visit conEd.com/es/contact_us.asp to send us an email.

Additional resources:

DG Ombudsman: DGExpert@coned.com

Energy Efficiency: <http://www.coned.com/energyefficiency/>

Definitions

Distributed Generation:

A generally small (up to 20 MW) electric production facility that is dedicated to the support of nearby associated load.

Types of Generation:

Synchronous

An electric generator that provides alternating current. These generators can be configured for stand-alone operation. However, their contribution of fault current without fault current mitigation has an impact on utility operations, and must be evaluated prior to acceptance on the local utility system.

Induction

An electric generator that supplies alternating current. These generators draw excitation current from the power system, and generally cannot be configured for stand-alone service.

Inverter

A machine, device, or system that changes direct current (DC) power to alternating current (AC) power. Inverters that are self-commutating can be configured for stand-alone service. Inverters that are line-commutated cannot be configured for stand-alone service.

Types of Interconnection:

Spot Network

Depending on your DG site's location and the size of your generation, you may be served by a spot network, which can be either at 277/480 volts or 120/208 volts. This is the standard low-tension service for larger customer loads throughout the Con Edison service area. Spot Networks are served by three or more feeders (depending on size of load and contingency design level) through dedicated transformers. A common bus connected to the secondary side of the transformers directly supplies the distribution service. Standby customers can connect induction or inverter-based generators at this level, but they can only connect synchronous generation without fault current mitigation, following a successful evaluation of their impact during system fault conditions.

Area Network:

Depending on your DG site's location and the size of your generation, you may be connected to network supply. This is the standard of service in Manhattan, most areas of all the other boroughs, and Westchester County. Area Networks are large distribution voltage grids fed by multiple high-tension primary feeders. The distribution service voltage is 120/208 volts. Standby customers can connect induction or inverter-based generators at this level, but are not allowed to connect synchronous generation, due to their impact during system fault conditions and anti-islanding concerns.

Radial Overhead:

Depending on your DG site's location and the size of your generation, you may be connected to a non-network, or radial supply. This is typical in Westchester, Staten Island, and parts of Brooklyn, Queens, and the Bronx. The available distribution service voltages will vary by area but will either be 120/208 volt,

120/240 volt, or 277/480 volt configurations. For standby service, the customer may connect small generators to the distribution voltage level or large units to the high-tension primary feeder level through one or more transformers, according to the utility's constraints at their location. Buy-Back service is available, although contractual arrangements may require multiple ties to ensure continued operation through the loss of any one tie to the utility system. Standby service requires that the connection from the utility be opened immediately in the event of loss of utility supply.

High Tension:

High-tension (HT) equipment includes all transformers, cables, wires, buses, instrument transformers, and other equipment operating at 600 volts or higher.

Fault Current:

Fault current, also called "short-circuit current" (I_{SC}), is the current that flows through the circuit in the event of a fault (short circuit). This current passes through all components in the affected circuit and is generally significantly larger than normal loading conditions.

Acronyms

- DG – Distributed Generation
- SIR – Standardized Interconnection Requirements
- CESIR – Coordinated Electric System Interconnection Review
- CPM – Customer Project Manager
- POE – Point of Entry
- DOB – New York City Department of Buildings
- DEP – New York City Department of Environmental Protection
- DEC – New York State Department of Environmental Conservation
- HOS – Head of Service