



Fuel Cell Guide

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Consolidated Edison Company of New York: Guide to Fuel Cell Interconnection

Introduction

This guide is intended for Con Edison Customers who are considering installing fuel cell power generators less than 5 MW that are or will be connected to Con Edison's electric distribution system.

This guide is intended to provide high level details of the electric interconnection process, typical steps, challenges, and technical solutions associated with fuel cell projects. In addition, this guide will provide general procedural knowledge of the gas service installation/upgrade process as well as some details that pertain particularly to distributed generation requests. This guide is not a design or technical specification.

Interconnection of all types of technology less than 5 MW are subject to the New York State Standardized Interconnection Requirements (SIR). In all cases the SIR supersedes the content of this technology guide. This document is aligned to the January 2017 version of the SIR, and later revisions of the SIR will be integrated as expediently as possible.

Section 1: About Con Edison's Grid

Electric Service

Con Edison provides electric services to 3.2 million customers in New York City and portions of Westchester County. Electricity is delivered through approximately 94,000 miles of underground cable, and almost 37,000 miles of overhead cable.

The distribution system supplies power to the Company's low voltage network customers and radial customers from area substations at the 4kV, 13kV, 27kV, and 33kV primary service voltage levels. The majority of customers receive Low Tension (low voltage) service directly at the distribution system secondary voltage levels of 120/208V; 120/240V or 265/460V, while a small percentage of High Tension (high voltage) customers receive power at primary service voltage levels.

There are two types of electric distribution grid systems, radial grids and network grids.

Radial Grids traditionally have a single high voltage cable, often referred to as a feeder, sending energy from the substation to numerous distribution transformers tapped at various points along its length. The distribution transformers step the voltage down to low-voltage electricity and typically serve between 1-16 customers. These systems are called radial grids because the substation and feeders resemble a hub with spokes. Cables and transformers on radial grids are often above ground, seen predominantly in areas like Staten Island or Westchester.

Con Edison uses a reliable type of radial grid called an "auto-loop". An auto-loop typically has two feeders, two additional backup feeders, and automatic switches at various points along the feeder run. This means that a problem on the feeder affecting one point on the auto-loop can be isolated quickly, minimizing the number of customers affected by a problem on their radial line.

Network grids have multiple primary feeders supplying several network transformers tied together in parallel on the secondary side to provide energy into a low voltage grid (area network type) or a local building bus (spot or isolated network) where the consumer is connected. Thousands of low voltage customers are served off the low voltage grid of an area network. Cables and transformers on network grids are typically below ground and are used in densely populated areas. Network grids are used extensively throughout Manhattan, Brooklyn, Queens, and the Bronx, in addition to several small network grid areas in Staten Island and Westchester.

The different grid configurations have different associated characteristics. Network grids are considered more reliable than radial grids as there are redundant sources of backup power in case of failures on the grid. Additionally, with cables and transformers mostly underground, network grids tend to be less prone to outages resulting from severe weather conditions than above ground radial grids. Network grids are more complex than radial grids due to the increased number of system components and the redundant cabling.

Spot networks are a special class of network grids where one or multiple transformers are dedicated to a single, large energy consuming building like a skyscraper. A spot network is essentially a small network grid that is implemented for a single large user.

Both the radial and network grids are represented in **Figure 1**, below:

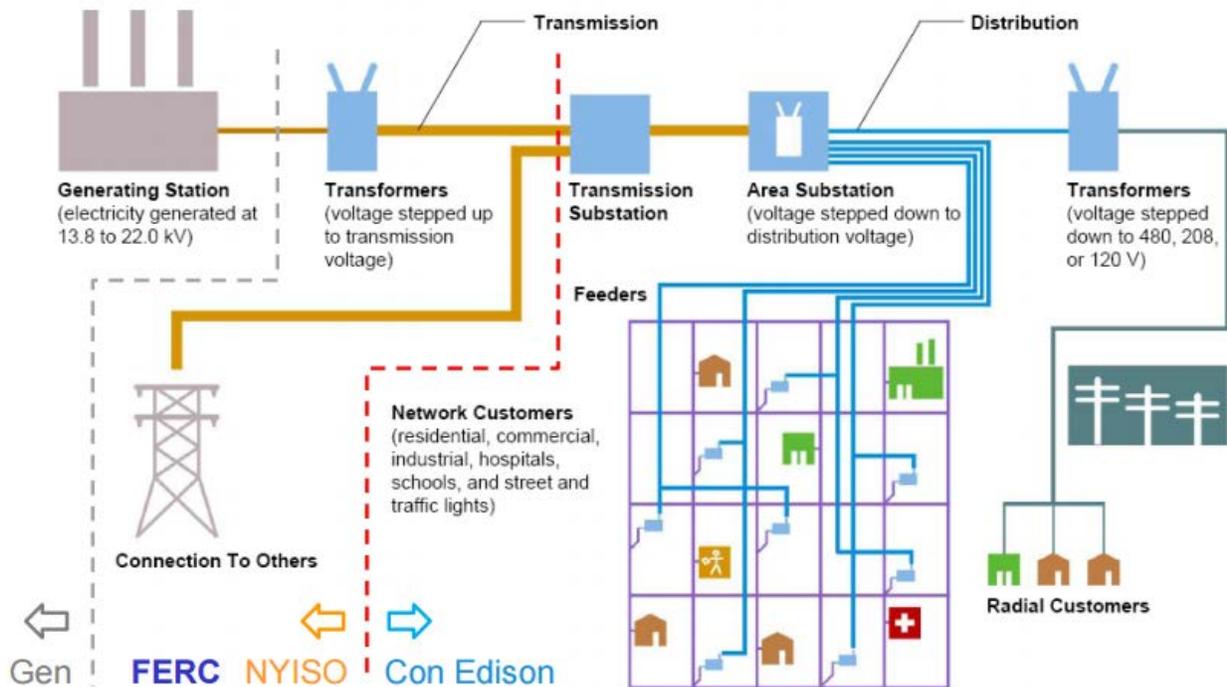


Figure 1 - Electric Distribution System

Gas Service

For more than 180 years, Con Edison has served the world's most dynamic and demanding marketplace – metropolitan New York -- while maintaining a safe and reliable natural gas supply to more than 1.1

million gas customers. Con Edison manages a large, complex underground natural gas transmission and distribution system. This system contains over 4,300 total miles of gas main with approximately 370,000 service pipes that transport more than 300 million dekatherms of natural gas each year. The more than 4,300 miles of gas mains consist of 92 miles of transmission mains operating at pressures greater than 125 psig and over 4,200 miles of distribution mains operating at pressures less than 100 psig. Over 600 miles are large-diameter distribution mains, greater than 12" that mostly connect the transmission mains to approximately 3,600 miles of smaller-diameter distribution mains. The distribution mains deliver natural gas to our customers at varied pressures: 33 percent at high-pressure; 11 percent at medium-pressure; 56 percent at low-pressure. 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. Con Edison does not connect typical DG customers to transmission mains.

Section 2: Technical Interconnection Considerations for Fuel Cells

Con Edison manages the interconnection of fuel cell generators less than 5 MW in capacity under the most recent version of the [Standardized Interconnection Requirements \(SIR\)](#). Please note that net metering for fuel cells in New York State is limited to projects 2 MW (AC) and below. The SIR draws a distinction between projects greater than and less than 50 kW. Generally, fuel cells are larger than the 50 kW threshold that distinguishes large and small projects, so the less than 50kW process will not be covered in great detail.

Though a fuel cell is typically designed and operated to provide base load generation, at times operational changes in load can inadvertently cause power to export. The export of power can cause undesirable system impacts, such as voltage fluctuation or opening network protector relays. The technical configurations for accommodating fuel cells vary depending on the electrical and gas configurations at the point of interconnection as well as the surrounding loads.

Radial Electrical Service

A typical radial service can accommodate minor, infrequent moments of exporting power from fuel cells due to operational load changes. Interconnecting exporting fuel cell generation with more significant or more frequent times of power export to a radial service can result in interconnection challenges. The fuel cell production or overall capacity may be limited by the capacity of the local electrical service, the high-voltage primary feeder's ability to accept DG output, the unit substation's ability to accept reverse power flow, or other switch and re-closer issues. The methods of resolving these constraints vary in complexity and cost, and typically require some form of engineering study by Con Edison in order to approve electrical interconnection.

Network Electrical Service

With network service, multiple high-voltage primary feeders supply power to local area network transformers which then feed the low-voltage network grid. If one of the primary feeders supplying a portion of the network grid was to experience an outage, the parallel connected secondary grid will try

to provide power into the dead feeder. As such, these transformers are designed with an automatic switch, known as a network protector, which will open when energy feeds back from the low voltage bus toward the high-voltage feeder. This is the same condition as when a fuel cell system provides more power into the area network grid than there is load to serve. While Con Edison's dense network grid system typically has enough load to "soak up" the exported power, the electric system can be adversely affected by the back-feed of power.

For applicants connecting to Con Edison's secondary grid, the engineering review will determine if the service cable to the site is adequate to carry the export, in addition to determining if export into the network will cause network protector operation. If the service cable is not rated for the expected fuel cell export capacity, the customer will need to upgrade the existing service or put in an additional service. For those projects where local network protectors will be impacted, Con Edison has a solution called "Adaptive Network Protector (NWP) Relay Settings" where modifications are made to the relays of nearby transformers.

In addition, in some cases the export of power from the fuel cell can cause overvoltage and/or power quality issues. In these cases, Con Edison can deploy Communication Aided Tripping (described below) to help keep select NWP relays closed and provide greater voltage stability. However in some cases, Con Edison will also need to rely on the inverter itself to help regulate voltage. This generally requires the inverter to consume VARs at a fixed power factor, or utilize the "Advanced" inverter features as outlined in the draft IEE1547 specification (Volt-Var and Volt-Watt Characteristics) with settings recommended by Con Edison. When the inverter is required to prevent overvoltage, the function shall be "supervised" by a utility grade overvoltage relay. Additionally, Con Edison requires communications be established to any inverter managing voltage by consuming VARs to ensure voltage is maintained within ANSI limits. These solutions would be determined via engineering study, and the cost of the solutions provided would be paid for by the applicant.

Spot or Isolated Networks

The design of a Spot or Isolated Network is comprised of multiple transformers and network protectors that are tied together on a common secondary voltage bus. For customers on dedicated spot or isolated networks, incidental export of power toward the common secondary bus will result in the opening of a network protector which could result in a total loss of power to the customer. Typically, interconnecting a fuel cell would require a reverse power relay to prevent that incidental export. This reverse power relay would trip the fuel cell inverter offline prior to reaching incidental export level in order to eliminate the potential for spuriously opening a network protector and preventing a possible loss of power to the customer.

However, since 2012, Con Edison has been offering solutions to enable export across network protectors through pilot programs, making it the only utility in the nation to allow export on network service. This solution is called "Communications Aided Tripping" (CAT) and it involves the following:

- 1.) Reducing sensitivity on local network protector relays – Reprogramming network protector relays to an "insensitive" mode that allows back-feed of up to 50% of the transformer rating.

- 2.) Supervisory Control and Data Acquisition (SCADA) and anti-islanding – Installing equipment to monitor the performance of the fuel cell generator and the network protectors and allow for remote tripping in the event of system contingencies and/or outage risk to the customer.

The solutions offered will be tailored to the specific service configurations. Generally speaking, the reduced sensitivity solution on local network protector relays is more suitable for interconnections to the low voltage grid, whereas the communication-aided tripping is more suitable for isolated or spot networks.

Equipment Details

The following list of equipment may be required (and installed as needed) for most Con Edison fuel cell projects, particularly those using the CAT solution. The exact requirements and specifications of the equipment will be determined during engineering review and site visits.

The customer is responsible for the cost of procuring and installing this equipment, regardless of whether the customer or Con Edison is installing it.

- **Supervisory Control and Data Acquisition (SCADA):** This equipment collects data from the customer's inverters and Con Edison's network protectors. In addition to providing communications, SCADA also allows for remote operations and controls of the network protectors.
- **Anti-islanding device:** This equipment is sometimes required, based on a case-by-case assessment of fuel cell system size and the type of service to the customer. The purpose of this device is to ensure that fuel cell generator export does not cause a customer outage if one or more feeders go out of service.
- **DNP3 Inverter or DNP3-enabled communications relay (ETI or other):** DNP3 communications protocols are required in order to ensure reliable, consistent communications between the customer's inverters and the local network protectors. This can be achieved by either installing inverters that "speak" DNP3, or by installing a DNP3 enabled communications relay. Translators from Modbus to DNP3 will not be allowed as they have not performed adequately in the field. The customer is responsible for providing either the inverter or the relay.
- **Network protector micro-processor relay and associated cabling:** A device to remotely monitor the operations of the network protector. This is required to enable two-way communications. Con Edison network protectors are typically installed with a standard non-communicating relay and must be upgraded for participation in this program. Con Edison will install the relays and any required cables.
- **Conduit/cable:** Cable and conduit will be run between the communications and protective equipment. The customer will be required to provide their own communications cable, specified by Con Edison. The *customer* will make the connections and bring the cable to Con Edison, who will then connect the fuel cell to the bus to complete the installation. Conduit may be required, depending on existing conditions at the site.

- **Metering and Gas Riser:** Residential customers served by Con Edison gas that qualify under the eligibility criteria of Rider J of the Con Edison Gas Tariff can use a single gas meter for both their fuel cell and residential gas use; however, due to the increased throughput of gas required to serve the fuel cell, the meter and/or gas service line may have to be upgraded. Commercial fuel cell customers that plan on taking advantage of the distributed generation gas rates under Rider H of the Con Edison Gas Tariff must have a dedicated meter and gas riser/piping for the fuel cell. This gas meter shall be located near the gas service entrance and existing gas equipment. For fuel cells located on floors above the gas service room that will utilize Rider H gas, a dedicated riser from the gas meter must be run – an existing riser serving non-fuel cell gas loads cannot be tapped to provide service to a fuel cell that receives Rider H gas rates. For more information, see the Gas Service section below.

Section 3: Interconnection Process

Interconnecting a fuel cell may require modifications to the interconnecting customer's gas and/or electric service. Generally speaking, the gas service work should precede the DG interconnection. In the event a fuel cell electric interconnection request is submitted prior to receiving a Con Edison ruling that adequate gas service exists or can be established at the premises, the interconnection request will be put on hold pending the final service determination of the gas service case. The general procedures for submitting gas service and electrical interconnection requests are discussed below:

3A - Gas Service

Before submitting a formal DG electrical interconnection 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. Gas service requests are processed through the Company's Project Center portal. The [Con Edison Customer Guide to Natural Gas Service Installation](#) (a.k.a. the Yellow Book) and [Con Edison Gas Operation Standard G- 2040-9](#) outline the overall gas service process and requirements for the installation of gas boosters, micro-turbines, and other protective devices respectively. These should be reviewed by the Customer prior to making your gas service request on Project Center. Other steps to be taken in advance of application submission include reading Gas [Rider H](#) and [Rider J](#), which describes the Commercial and Residential distributed generation tariffs, respectively, and registering with Project Center.

Con Edison also 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).

Taking the following steps prior to and during the application submission will help speed up the review:

- Include accurate account (14 digit) and meter (7 digit) numbers
- Include accurate customer email address
- Include the Con Edison service (electric and gas) information in all drawings
- Include additional existing on-site Distributed Energy Resources (DER) in the application
 - Provide details in the scope of work and note other DG's location on drawings
- Enter the rating per inverter and number of inverters
- Ensure consistency in all forms and documents

The gas service application will progress through the following high level process steps:



Figure 2 - High Level Process of a Gas Service Request

A gas service request can be initially discussed with a Con Edison representative through an exploratory meeting. Within 15 days of the exploratory meeting, an order of magnitude cost estimate will be provided, for customer decision making. When a gas service application is ready for formal submission, the following documents must be collected and attached to the application in Project Center:

- Detailed load letter
- Any applicable easements, rights-of-way, permits (excepting street permits), consents and certificates necessary to give the Company or its representatives access to the installation and equipment or to enable service pipe connection
- Any required service engineering diagrams

The gas process then follows the workflow depicted in **Figure 3** below:

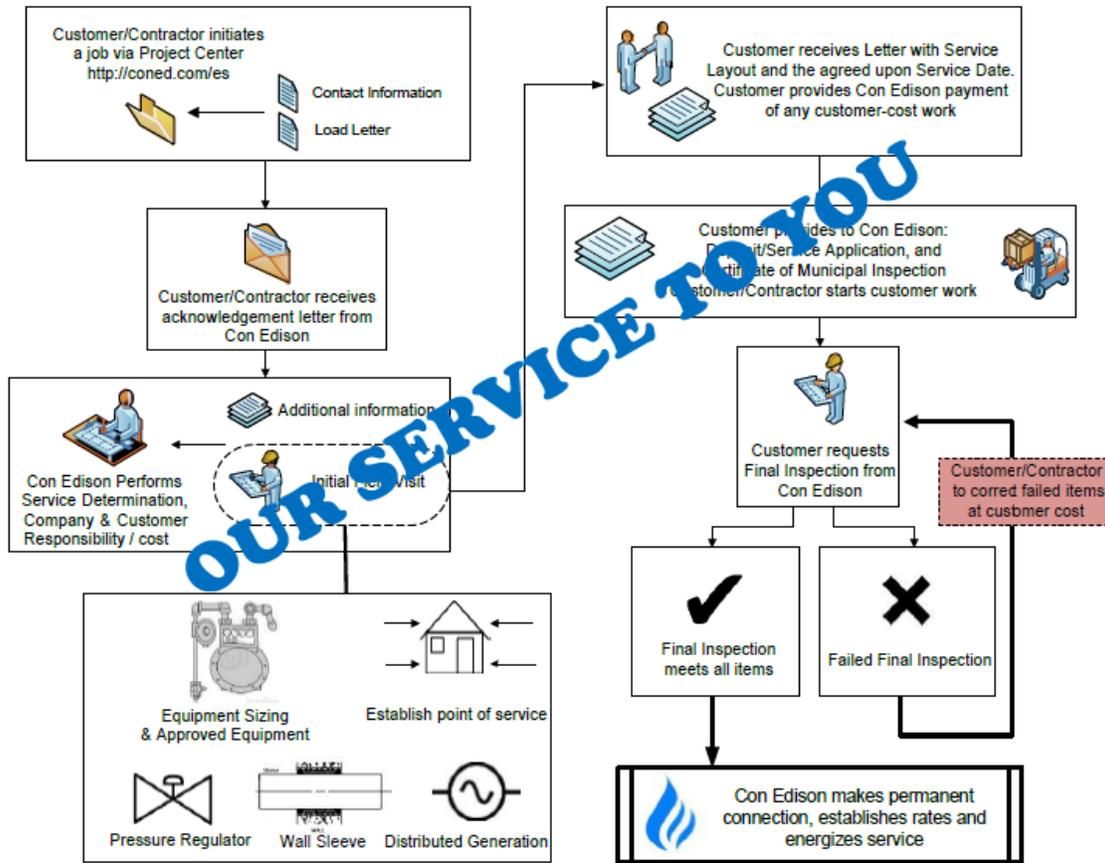


Figure 3 - Gas Work Request Flow Process

To provide additional guidance in preparing for gas service inspections, Con Edison has prepared checklists for the interim and final inspections:

- [Interim Gas Inspection Checklist](#)
- [Final Gas Inspection Checklist](#)

Roles and Responsibilities

Throughout the gas service process, applicants will interact with a number of Con Edison personnel with various roles and responsibilities, including:

- Energy Services – Handles communication and overall process oversight for your project
- Gas Engineering – Performs engineering reviews, studies, and inspections as applicable

3B - Electric Interconnection

As noted above, Con Edison follows the New York State SIR to review and approve all fuel cell projects under 5 MW. Prior to application submittal, please read the SIR thoroughly to familiarize yourself with application process and timelines, technical and operating requirements, and required contracts and

forms. Other resources to review in advance of application submission include [Rider R](#), which describes the net metering tariff, and registering with [Project Center](#).

When an application is ready for submission, the Applicant should upload the documents listed in [Appendix F of the SIR](#). The applicant should also include any additional rate application forms (Form G or Community DG Appendices A and B as applicable). If the applicant intends to operate the fuel cell in an Isolated Mode during grid outages, this should be clearly documented in the application package scope of work to facilitate the technical review.

Additional technical information, may be required if the application progresses to a Coordinated Electric System Interconnection Review (CESIR). Applicants who plan on operating their fuel cell in Isolated Mode or as part of a Microgrid should expect that additional documentation, engineering review time and a more detailed testing plan will typically be required.

To provide additional guidance in preparing materials for DG interconnection applications, Con Edison has prepared [checklists for three-line diagrams and field verification tests](#).

Examples of some of the features that should be called out on the three-line diagram are shown in **Figure 2** below:

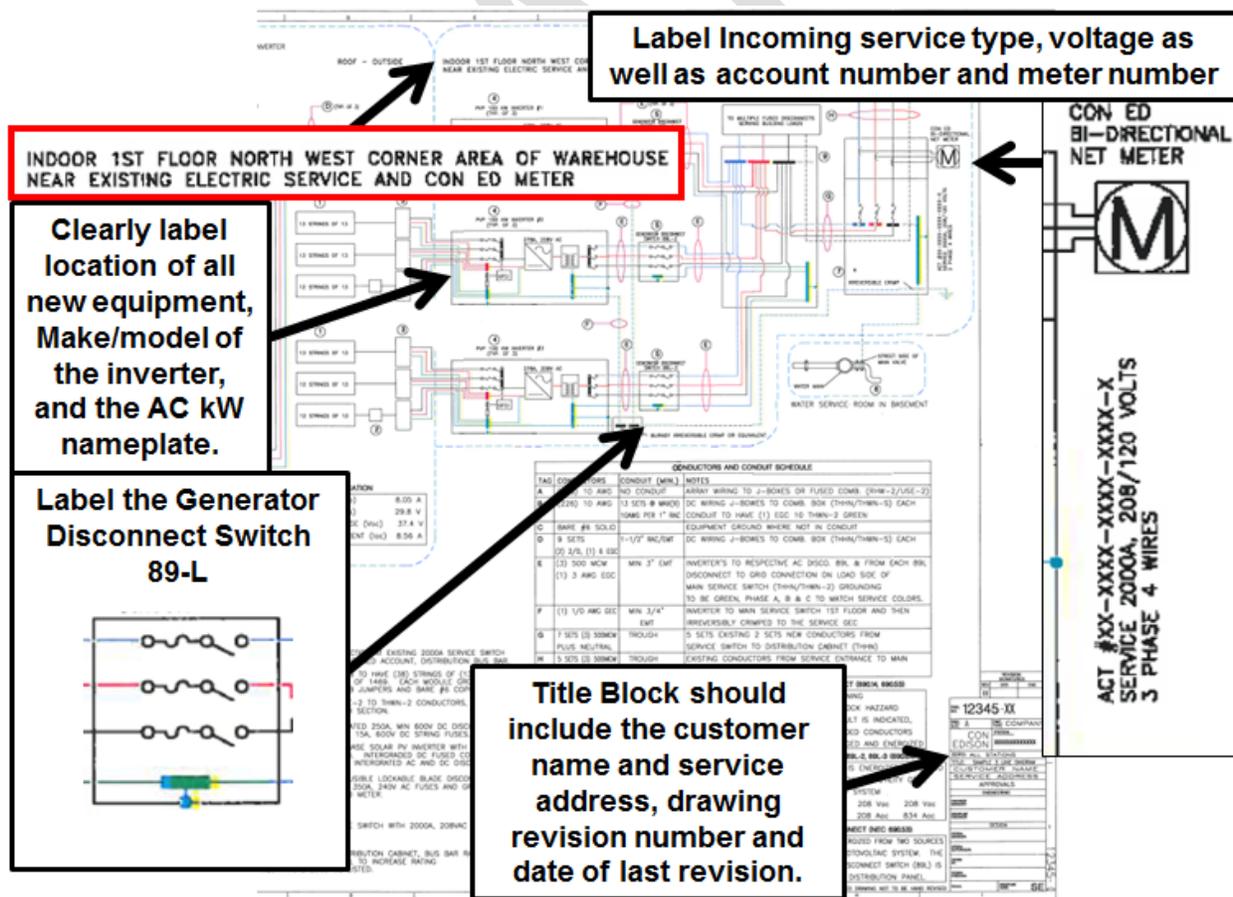


Figure 4 – Required elements of an acceptable drawing.

Applications are initiated through the Project Center, by selecting the Private Generation Facilities button on the Company's Energy Services page (www.coned.com/es). From there, select 'Create a New Request', and populate the fields for service area (Borough or Westchester), Request Type (Service Request), Utility (Electric), Building Type, and New or Existing Service (Existing). The next screen will present an option for Distributed Generation (including fuel cells). At this time, the relevant customer and project information should be entered with the documents described above and attached when prompted. Once all information is entered or attached and submitted, the application will be routed to the appropriate Con Edison Energy Services personnel and the application review will begin. At this time, the SIR process is different for small (< 50 kW) and large (>= 50 kW) projects.

Small Projects (< 50 kW) Process

For projects under 50 kW, after the application is submitted, the applicant can expect the following to happen:

- Con Edison will review the diagram and issue a line diagram approval letter if all documents have been submitted and are complete
- The applicant/contractor will complete construction
- The applicant/contractor will test the inverter
- Con Edison typically will inspect fuel cell installations and perform on-site verification testing.
- Upon successful inspection and verification testing, Con Edison will place the net meter order (if required) and issue the final acceptance letter

For more information, consult the [Standardized Interconnection Requirements \(SIR\)](#) or contact the Energy Services representative assigned to your interconnection request.

Large Projects (50 kW – 5 MW) Process

The application process for projects between 50 kW and 5 MW includes more complex applicant choices and utility responses. This is illustrated in the simplified flowchart in **Figure 4**, below:

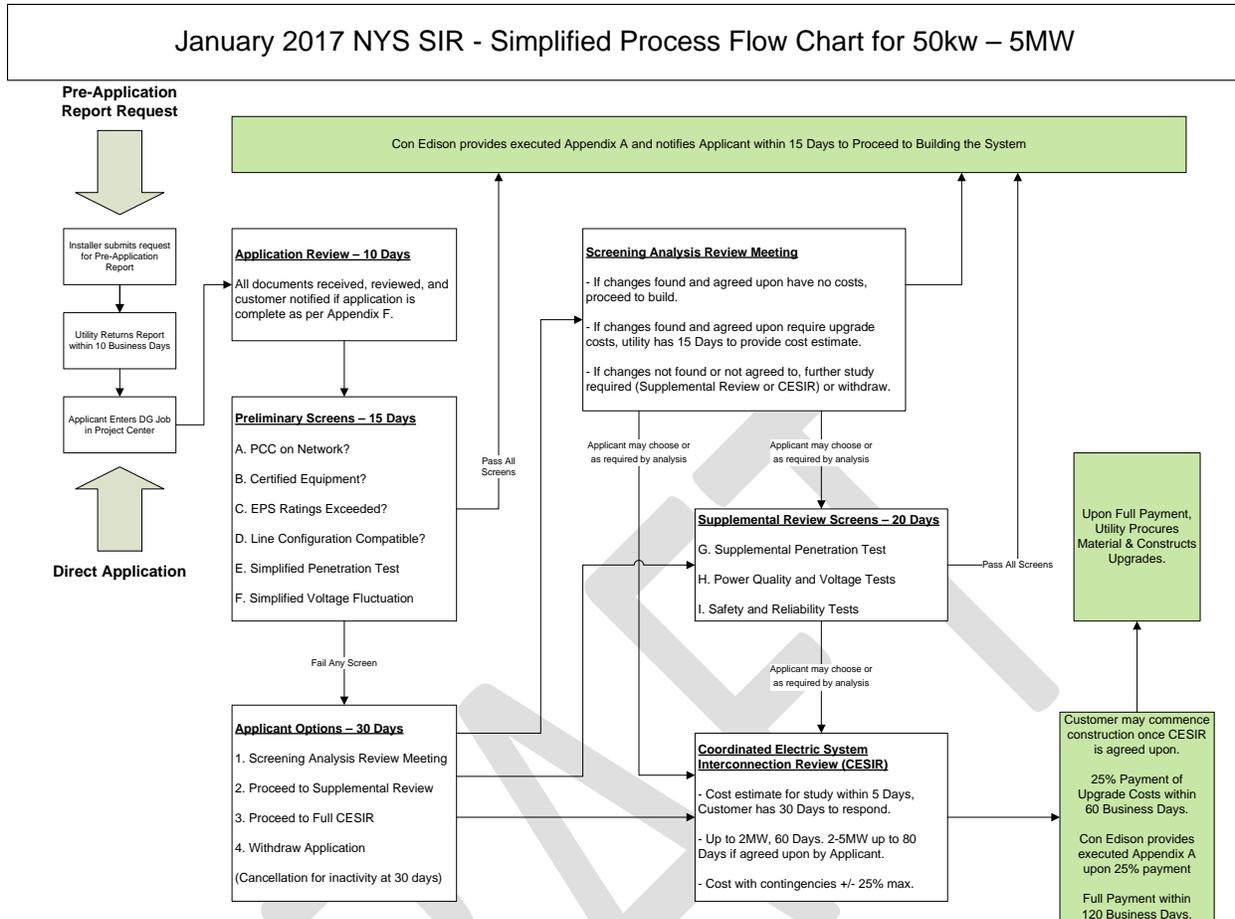


Figure 3 -Interconnection application process for > 50 kW SIR projects

The general steps in the process include:

- 1.) Applicant submits a Pre-Application Report request (Optional)
- 2.) Con Edison returns the Pre-Application Report (Optional)
- 3.) Applicant submits an application
- 4.) Con Edison reviews the application for completeness
- 5.) Con Edison performs preliminary screening analysis
 - a. If application passes the six preliminary screens, Applicant proceeds to construction
- 6.) Applicant selects additional review/meeting option (Note: this can be an iterative process)
 - a. Preliminary Screening analysis results meeting to explain the screening process and identify any simple changes that could lead to the project being approved.
 - b. Supplemental Screening Analysis, at customer choice of this option, to perform three additional screens, which if passed progress the application to construction.
 - c. CESIR, at customer choice of this option, to perform in depth analysis of the proposed DG system to determine the system changes and cost estimates needed to accommodate interconnection.

- d. Withdraw/cancel – the applicant has the option to withdraw or cancel their application at any time.
- 7.) Con Edison performs requested review
- 8.) If applicable, Applicant commits to construction costs and provides full payment within 120 business days
- 9.) Applicant and Con Edison complete their respective constructions
- 10.) Con Edison performs field verification testing
- 11.) If applicable, Applicant addresses any issues emerging from the field verification testing and Con Edison issues final acceptance letter
- 12.) Con Edison performs project closeout

Note on fuel cell projects that will require an outage to interconnect their project:

If you cannot connect your fuel cell's electrical interconnection point to an existing breaker and have to connect directly to a live bus, please work with your assigned Energy Services Customer Project Manager (CPM) to coordinate disconnecting electric service to the building, commonly referred to as an "outage." Please note: no electrical connections or customer current transformers (CT's) are permitted within Con Edison's revenue metering cabinet, also known as the CT Cabinet. Please coordinate where connections can be made to existing customer switchgear with your CPM prior to finalizing the outage request.

It is also important to note that Con Edison crews will be available to provide a customer requested outage at no charge during regular business hours: Monday-Friday, 7:00am – 3:00pm excluding holidays. However, if you request an outage outside these normal working hours, or if an outage extends beyond 3:00pm, you will be responsible for full payment of the cost to accommodate your request, including overtime.

Roles and Responsibilities

Throughout the interconnection process, applicants will interact with a number of Con Edison personnel with various roles and responsibilities, including:

- Energy Services CPM – Handles communication and overall process oversight for your project
- Distribution Engineering – Performs all engineering reviews, studies, and inspections
- Distributed Generation – Provides guidance on rules, tariffs, general information, and provides pre-application reports
- Customer Care Group, Net Metering – Handles net metering billing and post-installation billing question

Section 4: Rates and Service Classifications

Typical Gas Service Classifications

The two gas service classification riders that typically apply to fuel cell customers are Rider H and Rider J. The primary distinction between the two is that Rider H applies to non-residential customers, while Rider J applies to residential customers. Under both Riders, 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. Also under both riders, separate meeting is required, unless the Rider J customer is a small residential customer with fewer than five dwellings. The riders are structured similarly with a minimum charge for the first 3 therms (or approximately 300,000 BTUs), and a variable charge for each therm used beyond the minimum. Additional charges may apply, depending on whether the customer is taking firm gas service.

Typical Electric Service Classifications (SC-2, SC-8, SC-9)

The electric service classifications for customers typically installing fuel cell generation include:

- **Service Class 2 (SC2) – General – Small:** Energy usage (kwh) billing for customers with demand < 10 kW
- **Service Class 8 (SC8) – Multiple Dwellings:** Energy usage (kwh) billing with a variable demand charge (kW), adjusted monthly based on the highest 30 minutes of demand
- **Service Class 9 (SC9) – General Large:** Energy usage (kwh) billing with a variable demand charge (kW), adjusted monthly based on the highest 30 minutes of demand

In addition to the electric service class, Rider R of the electric tariff also applies to customers with fuel cell generators as a designated technology. Designated Technologies refer to distributed generators that are based on renewable energy sources (fuel cell, wind, solar thermal, photovoltaic, biomass, tidal, geothermal, and methane waste), and certain cogeneration technologies (Combined Heat and Power or “CHP”) that meet minimum efficiency criteria.

These service classification distinctions will determine how the net metering credits are applied, as will the specific net metering program (Net Metering, Remote Net Metering, or Community DG). All configurations use a variant of applying the excess generation from one generating system across one or multiple accounts.

Net Metering

Note: This technology guide is being drafted in parallel with an ongoing Public Service Commission proceeding in the 15-E-0751 docket In the Matter of the Value of Distributed Energy Resources. Current expectations are an upcoming order in that docket will modify the net metering arrangements, and this section will be revised accordingly.

SC2

For SC2 customers, when their export is greater than their import for a given month, monthly energy charges are reduced to zero with the bill reflecting only a basic service charge only. The excess energy (kWh) is rolled over to the next month as a credit. There is no annual reconciliation for SC2 customers under net metering – credits will continue to roll over monthly until they are utilized.

SC-8 and SC-9

For SC-8 and SC-9 customers, when export exceeds import for a given month, the monthly energy charges are zero, and the excess energy is converted to dollars and applied against the remainder of billing items (e.g., demand charges). If credit remains after addressing all other billing items, the dollars are converted back to kWh credits and applied to the next month's bill. There is no annual reconciliation for SC9 customers under net metering – typically the excess credits will be consumed on a monthly basis, otherwise credits will roll over monthly until they are utilized.

Remote Net Metering and Community DG

While Remote Net Metering and Community DG are available to fuel cell projects, presently the economics of these programs prevent typical projects from being developed for these purposes, so these programs will not be discussed further in this guide. If interested in pursuing a fuel cell RNM or CDG project, please contact Con Edison's DG office at dgexpert@coned.com.

Important Net Metering Considerations

When evaluating your net metering options, there are several concepts that apply that you should be familiar with: level billing, time of use, net meter vs. fuel cell production meters, and demand customers.

Avoided Cost vs. Retail Cost

A critical distinction with how net metering credits are applied for fuel cells relative to solar PV systems is that fuel cells receive the wholesale avoided cost rate for excess generation, whereas solar PV systems receive the full retail rate.

Level Billing

Level billing is an option offered by Con Edison which allows a customer to spread their total expected annual energy costs over twelve equal monthly payments throughout the year. After installing a fuel cell system, your total expected annual energy costs will be reduced by the fuel cell output. It will take some time for your level payment plan to adjust to this lower energy use, and in the interim you will be putting more money toward your total expected annual energy costs than would actually be required. For this reason, upon completing your fuel cell project you should call Con Edison (1-800-75-CONED) to be removed from the level billing plan. After a year off the program, you will have established your new lower total expected annual energy cost and can call us to re-join the level billing plan. Additional information on level billing can be found [here](#).

Time of Use Rates

Electric Time of Use rates generally do not apply to fuel cell only customers as the steady, flat output does not lend itself well to ramping up or down to take advantage of the varying electric rates. For fuel cell installations that plan to have a significant amount of exported power during low load times

(typically off-peak), time of use rates may not be beneficial either as the excess generation off-peak is held in an off-peak “bucket” and cannot be transferred to defer on-peak usage. Customers combining fuel cells with battery energy storage, however, may find value in storing excess production during off-peak hours to be discharged during peak hours. Additional information on time of use rates can be found [here](#).

Net Meters vs. Production Meters

A Net Meter records the in-and-out flow of energy at the facility to be used by Con Edison to create your monthly bill. The fuel cell production meters that are typically provided by developers are for quality assurance purposes to show the amount of power produced by the fuel cell, but do not account for the energy drawn from the grid or the overall consumption of the facility. Con Edison personnel or automated systems will not normally read or interpret the fuel cell production meter readings, and these readings are not used to determine your monthly bill. For questions regarding your fuel cell production meter, contact your fuel cell system installer.

Additional Resources

For more information on any topics related to Fuel Cell Generation or the relevant billing structures, please visit:

- [Con Edison Gas Yellow Book](#)
- [Distributed Generation Guide](#)
- [Con Edison Energy Services Page](#)

Section 5: Fuel Cell Paired with Other Technologies

Net metering considerations with Solar/Wind

As discussed earlier, monthly fuel cell excess generation is credited at avoided cost rates, versus solar PV and wind generation technologies which are credited at full retail rates. Therefore, the typical arrangement is to separate the solar/wind from the fuel cell by placing each behind its own Con Edison meter. This arrangement ensures that solar/wind receive full retail credits for excess generation, and allows a customer to place their steadier loads on a separate meter with the flat output of the fuel cell to serve the load’s needs.

Net Metering considerations with Battery Storage

Currently, battery energy storage is not eligible to net meter its energy output. (**Note:** As stated above, the ongoing Public Service Commission proceeding 15-E-0751 may modify the net metering arrangements; at which time this section will be revised accordingly.) As such, fuel cells that plan to net meter excess energy must provide engineering controls that ensure that the exported energy is only from the fuel cell and not the battery’s inverter. This can either be achieved through segregation of the technologies on separate meters, as discussed with solar/wind, or through the use of reverse power

relaying that will trip off the battery's inverter just prior to export. The set points for reverse power relays will be determined as part of the Con Edison Engineering's CESIR study.

Net Metering considerations with CHP plants

Similar to the discussion of battery energy storage above, fuel cells and CHP can be accommodated behind separate Con Edison meters or behind the same Con Edison meter provided that reverse power relaying is provided. However, fuel cells on the market today typically require significant amounts of time to ramp down, stabilize, and restart following a relay trip. Therefore, the more prudent approach to putting fuel cell and CHP behind the same meter might seem to be to configure the relay to make the CHP technology trip offline when power nears export levels. Unfortunately, experience has shown that while CHP is better at stopping and restarting than fuel cells, the CHP's overall efficiency is greatly affected by numerous trip/restart cycles. Installers should be aware that some state or federal funding programs, as well as some Con Edison electric tariff requirements, are driven by the overall efficiency of the CHP, which may make this option impractical over the long run.

Section 6: Contacts for Further Questions

If you have questions about your specific project application, please contact your Energy Services Customer Project Manager. You will receive their contact information when you submit your application in Project Center.

For general questions regarding DG interconnection, please contact the Distributed Generation group at dgexpert@coned.com.

Section 7: Definitions and Acronyms

Acronym	Definition
SIR	Standardized Interconnection Requirements
SCADA	Supervisory Control and Data Acquisition
DNP3	Distributed Network Protocol
RNM	Remote Net Metering
CDG	Community Distributed Generation
DER	Distributed Energy Resources
CESIR	Coordinated Electric System Interconnection Review
DOB	Department of Buildings
DEP	Department of Environmental Protection
DEC	Department of Environmental Conservation