Seattle City Light

DISTRIBUTED ENERGY RESOURCES INTERCONNECTION HANDBOOK

2026 Edition

Seattle City Light

Distributed Energy Resources Interconnection Handbook

Welcome to the inaugural edition of the Seattle City Light Distributed Energy Resources (DER) Handbook. We are excited to share this guide, created to help you understand the essential requirements for connecting your solar, battery storage, and other power generation projects to the City Light electrical distribution grid.

This handbook reflects our commitment to making your experience smoother, whether you are a customer or a contractor. You can also find helpful resources and information on our website at seattle.gov/city-light.

Keep in mind that while this handbook provides valuable insights, it is not exhaustive. We encourage you to carefully review all the specific requirements related to your project and ensure you adhere to your interconnection agreement with City Light. If you have questions or need assistance, we're here to help!

Thank you for being a customer of Seattle City Light.

R. Craig Smith, Chief Customer Officer
Seattle City Light

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Distributed Energy Resources Interconnection Handbook 2026 Edition

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1. Purpose and Scope

1.1. Purpose

This Distributed Energy Resources (DER) Interconnection Handbook is a public document describing Seattle City Light's (City Light's) processes and technical requirements for Applicants seeking the interconnection of new DER to Operate in Parallel with City Light's Electrical Distribution System and for managing DER interconnections after they have been commissioned. Interconnection is a multistep technical, administrative, and financial process to enable a power generation source (such as a rooftop solar project) to connect and supply power to the Electrical Distribution System.

Though the great majority of DER in City Light's service territory are solar or battery storage projects, DER include any power generation source located on the Applicant's side of the Point of Common Coupling (PCC) with the Electrical Distribution System. The requirements in this Handbook apply to all DER, unless otherwise noted as applying to specific types of DER. See Chapter 3 in this Handbook on Definitions, Abbreviations, and Acronyms for further definition of DER. City Light's interconnection processes and requirements are intended to mitigate possible adverse impacts caused by DER on Utility equipment and personnel and on other Customers of the Utility and to assure that the Electrical Distribution System remains safe and reliable as more DER are added to it.

This Handbook is highly technical and is geared primarily towards DER installation firms and end-use electricity Customers who seek to self-install DER on their homes or businesses. The timelines for City Light reviews and actions in this Handbook are best estimates and are subject to change. Capitalized terms in this Handbook are generally defined in the Definitions, Abbreviations, and Acronyms section, while "chapter" and "section" references are to main sections and sub-sections, respectively, in the Handbook.

1.2. Scope

This Handbook addresses interconnections of DER that are either Inverter-Based Resources (IBRs) or Machine-Based Resources with a Nameplate Capacity of 20 Megawatts-alternating current (AC) (MWAC) or less to Operate in Parallel with City Light's Electrical Distribution System and that are not under the jurisdiction of the Federal Energy Regulatory Commission (FERC) because they are seeking interconnection with City Light's Electrical Transmission System or for other reasons. City Light is issuing this Handbook as the Authority Governing Interconnection Requirements (AGIR) on its Electrical Distribution System.

Applicants with electrical generation or storage resources with a Nameplate Capacity above 20 MW seeking interconnection to City Light's Electrical Distribution System or that are under FERC's jurisdiction should contact City Light for relevant interconnection information. Applicants seeking to interconnect with City Light's Electrical Transmission System can obtain information on pertinent City Light requirements from the Open Access Transmission Tariff portion of City Light's website at: https://seattle.gov/city-light/about-us/working-with-us/transmission-services.

Customers seeking to install emergency backup generators, inclusive of energy storage devices, that will not Operate in Parallel with the Electrical Distribution System are not within the scope of this document and do not require City Light interconnection review and approval. City Light's requirements for emergency backup generators and emergency backup energy storage systems are in Chapter 8 of the most recent edition of the *Requirements for Electric Service Connection (RESC)*.

2. Revision History

This is the first edition of the *DER Interconnection Handbook*. The *Handbook* will be updated annually at the beginning of each year, beginning in 2027. Future editions will include a revision history.

This document addresses topics also addressed in the current City of Seattle, Seattle City Light Department, Department Policy & Procedure (DPP) 500 P III-305, *Standards for Interconnection of Generators 20 MW and Less in Capacity to Seattle City Light's Electrical Distribution System*, with an effective date of January 11, 2012, and DPP 500 P III-417, *Service Installations*, with an effective date of June 25, 2025. A list of and links to City Light's current DPP documents are available at: https://seattle.gov/city-light/about-us/what-we-do/public-policies. City Light intends to update DPP 500 P III-305 and DPP 500 P III-417 soon. The updated DPPs are expected to address City Light's overall interconnection policy and procedures, including the assignment of fees and other costs, as applicable, for application processing, engineering studies, design and construction of new Interconnection Facilities and System Upgrades, operations and maintenance of new Interconnection Facilities and System Upgrades, metering, Utility inspection and re-inspection of DER, and service reconnection.

3. Definitions, Abbreviations, and Acronyms

3.1. Definitions

Abnormal Operating Conditions: A situation in which City Light is operating the Electrical Distribution System in other than normal configuration, or under conditions that do not normally exist.

Absolute Minimum Load: The minimum annual electrical load, expressed in kW at an electricity location (Host Facility, Line Section, or Feeder) at any time during the year. This value is determined irrespective of whether it occurs during daytime or nighttime.

Aggregate DER: The combination of DER in the Aggregate DER Nameplate Capacity at an Electrical Distribution System location.

Aggregate DER Nameplate Capacity: The sum of the Nameplate Capacity in AC at an Electrical Distribution System location of (i) the DER proposed for interconnection, (ii) all other proposed DER with a Queue Position ahead of the proposed DER, and (iii) all currently interconnected DER.

Alternating Current (AC): An electric current that alternates or changes in magnitude and polarity (direction) in what is normally a regular pattern for a given period. City Light supplies electricity as alternating current.

Anti-Islanding: A control scheme installed as part of the DER or Interconnection Facility(ies) that senses and prevents the formation of Unintentional Islanding.

Applicant: Any person, corporation, partnership, government agency (including City Light itself), or other entity seeking to interconnect a DER with the Electrical Distribution System. An Applicant can also be referred to as a Customer.

Area Networks: Portions of the Electrical Distribution System in which secondary services are served from street networks, where the transformers and related equipment are located in facilities in the right-of-way. Area Networks are intended to have the same meaning as "secondary grid networks" in IEEE 1547 standards.

Authority Governing Interconnection Requirements (AGIR): As defined in IEEE 1547-2018, the "cognizant and responsible entity that defines, codifies, communicates, administers, and enforces the policies and procedures for allowing electrical interconnection of DER to the Area EPS." EPS is the acronym for electric power system, and City Light is the Area EPS Operator for its Electrical Distribution System.

Authority Having Jurisdiction (AHJ): The local government jurisdiction which permits, inspects, and approves electrical services, including issuing electrical, building, or other permits that may be required for installation of new or modified DER. The AHJ does not, however, review or approve applications for interconnection with a utility distribution or transmission system; doing so is the role of the AGIR. For the City of Seattle, the AHJ is the Seattle Department of Construction & Inspections. There are different AHJs for portions of City Light's service territory that are outside the City of Seattle's physical limits.

Business Day (BD): Monday through Friday, excluding holidays observed by the City of Seattle.

Circuit: A conducting part through which an electrical current is intended to flow.

City Light: A shortened name for Seattle City Light. See also definition of Utility.

Customer: See definition of Applicant. "Customer" is also used to designate a person or entity receiving City Light end-use electricity service.

Daytime Minimum Load: The minimum annual electrical load, expressed in kW, during the hours of 8am to 6pm at an electrical location (Host Facility, Line Section, or Feeder).

Deemed Complete: Status of a DER interconnection application to City Light once City Light has determined that the application contains all required information for City Light analysis and has met other submission requirements.

Deemed Withdrawn: Status of a DER interconnection application to City Light after either the Applicant withdraws the application or City Light determines that the application has not met the requirements in this *Handbook*.

Department Policy & Procedure (DPP): Documented, publicly available policies of City Light to ensure the safety, equity, and efficiency of the work that City Light does for the customers and communities it serves. A DPP is also known as a City of Seattle's Director's Rule.

Direct Current (DC): A unidirectional electrical current in which the changes in value are either zero or so small that they may be neglected.

Direct Transfer Trip: A Protective Function that trips a DER remotely by means of an automated communications link controlled by City Light.

Distributed Energy Resources (DER): A source capable of delivering electrical energy that is owned by the Applicant or Interconnection Customer and located on the Applicant's or Interconnection Customer's side of the PCC, including all facilities which the Applicant requests to interconnect with the Electrical Distribution System or has already interconnected with the Electrical Distribution System. In the context of this document, DER include: (i) electrical generation systems, (ii) energy storage systems, and (iii) and Microgrids if the Microgrid itself is seeking interconnection as a single controllable generator and load. In contexts other than this document's focus on interconnection, DER may include additional technologies that City Light Customers may implement, such as electric vehicles, controllable loads, and energy efficiency measures.

Electrical Distribution System: All electrical wires, equipment, and other facilities owned or provided by City Light that are used to transfer electricity to Customers at distribution voltages (typically 26.4 kV and below).

Electrical Transmission System: All electrical wires, equipment, and other facilities owned or provided by City Light, including interconnections with systems of neighboring utilities, generally operated at transmission voltages of 115 kV or higher.

Fault Current: Electrical current that flows through a Circuit and is produced by an electrical fault, such as single-phase to ground, double-phase to ground, three-phase to ground, phase-to-phase, and three-phase. A Fault Current is typically several times larger in magnitude than the normal current that flows through the Circuit in non-fault conditions.

Federal Energy Regulatory Commission (FERC): The independent federal agency that regulates the interstate transmission of natural gas, oil, and electricity. The DER interconnections covered by this document are not under FERC's traditional regulatory purview.

Feeder: A Circuit with the distribution of electrical energy as its primary purpose.

Flicker: The subjective impression of fluctuating luminance caused by voltage fluctuations. Flicker can be caused by momentary motor starting currents, switching currents, or Fault Current on the Electrical Distribution System.

Force Majeure Event: Any event: (a) that is beyond the reasonable control of the affected party; and (b) that the affected party is unable to prevent or provide against by exercising reasonable diligence, including, but not limited to: acts of war, public disorder, insurrection, or rebellion; floods, hurricanes, earthquakes, lightning, storms, and other natural calamities; explosions or fires; strikes, work stoppages, or labor disputes; embargoes; and sabotage.

Host Facility: The end-use Customer premises at which a DER is to be interconnected and co-located behind the PCC with the metered or net metered consumption load. This definition is only applicable to Applicants seeking to interconnect proposed DER behind-the-meter.

Institute of Electrical and Electronics Engineers (IEEE): This organization publishes utility industry standards.

Interconnection Agreement (IA): The terms and conditions that govern the interconnection of a specific DER to the Electrical Distribution System, including cost allocations and billing arrangements.

Interconnection Customer: An Applicant with a DER that has been both approved by City Light and energized.

Interconnection Facilities: Electrical wires, switches, metering, and other equipment owned by City Light or the Applicant and used to interconnect a DER to the Electrical Distribution System. Interconnection Facilities are located between the DER and the PCC. These facilities do not include System Upgrades.

Inverter-Based Resource (IBR): A DER that relies on one or more power electronic devices that convert DC power to AC power by means of electronic switching. IBRs include, but are not limited to, solar photovoltaic systems and battery energy storage systems.

Islanding: The condition that occurs when electrical energy from the Electrical Distribution System is no longer present, and the DER continues exporting energy to isolated co-located loads behind (on the Applicant DER side of) the PCC.

Kilowatt (kW): One kW is equal to 1,000 watts. One watt is equivalent to one joule per second.

Kilowatt-hour (kWh): A unit of electrical energy equal to one kW of power supplied to, or taken from, a Circuit for one hour.

Line Section: A portion of the Electrical Distribution System connected to the DER and bounded by sectionalizing devices or the end of a distribution line.

Looped Radial System: Portions of the Electrical Distribution System in which electricity is supplied to Customers from a single source, and the distribution Feeders are arranged in an open loop pattern from the source.

Machine-Based Resources: A generator that converts mechanical energy into electrical energy. This resource category includes, but is not limited to, synchronous and asynchronous generators. A synchronous generator converts mechanical energy from a prime mover technology into AC electrical energy at a particular voltage and frequency. Typical fossil fuel turbine- or reciprocating engine-based generation systems are examples of synchronous generators. An asynchronous generator uses the principles of induction motors to produce electric energy and operates by mechanically turning rotors faster than at synchronous speed. Asynchronous generators are also called induction generators. Typical wind turbine and run-of-the-river hydropower systems are examples of asynchronous generators.

Megawatt (MW): A unit of electrical power equal to 1,000 kW.

Microgrid: A group of interconnected loads and DER within clearly defined electrical boundaries that acts as a single controllable entity with respect to the Electrical Distribution System. A microgrid can connect and disconnect from the Electrical Distribution System to enable it to Operate in Parallel or in an Islanding condition.

Nameplate Capacity: The rated capacity of a DER in AC. For an inverter-based DER, Nameplate Capacity is the combined rated capacity in AC of the inverter(s) that are part of the DER.

Network System: Portions of the Electrical Distribution System served by multiple transformers interconnected in a low voltage electrical network circuit generally used in large, densely populated metropolitan areas to provide high reliability of service. Area Networks and Spot Networks are part of the Network System.

Operate in Parallel. See Parallel Operation.

Parallel Operation: The synchronous operation of a DER while interconnected with the Electrical Distribution System. This is also called Operate in Parallel.

Pending Status: Status of a DER interconnection application to City Light after it fails Technical Screens and before the Applicant decides whether to provide any additional information required for review by City Light.

Permission to Construct Letter (PTC): Document issued by City Light to the Applicant indicating that a proposed DER has met all City Light requirements to be constructed by the Customer. The PTC does not authorize the DER to be energized. The PTC is issued prior to the PTO.

Permission to Operate Letter (PTO): Document issued by City Light to the Applicant indicating that a proposed DER has met all City Light requirements, inclusive of receiving all required AHJ permits and authorizations, to be energized in Parallel Operation with the Electrical Distribution System.

Point of Common Coupling (PCC): The point where the DER's local electrical power system connects to the Electrical Distribution System, such as the electric power revenue meter or at the location of the equipment designated to interrupt, separate, or disconnect the connection between the DER and City Light. The PCC can be on either the load side or the supply side of the Applicant's disconnect from the Electrical Distribution System. The PCC must be identified on Applicant one-line drawings. The PCC may also be called the Point of Service Connection or the Point of Termination by City Light.

Point of Service Connection: See Point of Common Coupling.

Point of Termination: See Point of Common Coupling.

Power Control System (PCS): An electronic device that manages and controls the flow of electrical energy (power) between an IBR electrical energy source, such as a solar photovoltaic system or an energy storage system, and the Electrical Distribution System, to ensure safe and reliable operation.

Protective Functions: The equipment, hardware, and/or software in a DER (whether discrete or integrated with other functions) intended to protect against Unsafe Operating Conditions.

Queue Position: The order in which a proposed DER is reviewed by City Light at a Feeder and substation location on the Electrical Distribution System. The Queue Position is assigned by City Light based on when a DER interconnection application is Deemed Complete.

***Requirements for Electric Service Connection (RESC)*:** A handbook designed for use by City Light customers, contractors, and electricians to explain Utility requirements for a variety of electric service installations and available at: https://web8.seattle.gov/city-light-engineering-standards/RESC. This document is updated annually at the beginning of each year.

Shared Secondary: Any portion of the Electrical Distribution System that carries electricity from a low-voltage secondary transformer to multiple City Light Customers.

Short Circuit Contribution Ratio: The ratio of a DER's Fault Current contribution to the maximum Fault Current provided through the Electrical Distribution System at the PCC.

Spot Networks: Portions of the Electrical Distribution System that provide primary service from two or more inter-tied transformers to supply an electrical network Circuit. Utility facilities are located on the Customer's property.

Standalone PV: A solar photovoltaic system without another type of DER co-located and integrated with it. For example, a hybrid PV and battery energy storage system would not be a Standalone PV.

***Standards for Electric Service (SES)*:** A collection of electric service standards for use by City Light customers, contractors, and electricians to detail Utility requirements for a variety of electric service installations and available at: https://web8.seattle.gov/city-light-engineering-standards/StandardsforElectricService. This document is updated annually at the beginning of each year.

Supplemental Screens: Engineering pass/fail checks that City Light performs on interconnection applications under Level 2 or Level 3 review if the application fails one or more Technical Screens. Supplemental Screens determine if a proposed DER may cause adverse impacts on the Electrical Distribution System and tend to involve more detailed engineering analysis than Technical Screens.

System Upgrades: Additions, modifications, and upgrades to the Electrical Distribution System necessary to interconnect the DER. System Upgrades do not include Interconnection Facilities.

Technical Screens: Engineering pass/fail checks that City Light performs on interconnection applications under Level 1, 2, or 3 review by applying ratios and other straightforward metrics to determine if a proposed DER may cause adverse impacts on the Electrical Distribution System. Technical Screens may also be called fast-track screens.

Underwriters Laboratories (UL): A testing and certification organization that certifies equipment, including inverters. This organization is widely known by its "UL" acronym and allows certification marks such as "UL Listed" or "UL Recognized" to be placed by the manufacturer on equipment that the organization has certified.

Unintentional Islanding: A condition in which Islanding occurs on an unplanned, unapproved basis following disconnection from the Electrical Distribution System. An Unintentional Island is formed if this condition occurs.

Unsafe Operating Conditions: Electrical Distribution System conditions that can lead to damage to equipment, harm to people, or failure to meet industry standards for electrical grids.

Utility: The City Light Department of the City of Seattle, also known as Seattle City Light, City Light, or SCL, which owns and operates the Electrical Distribution System and the Electrical Transmission System.

Working Space: An area free of any obstructions in front of meters, service panels, and electric equipment for providing safe access to install, remove, or repair all electrical devices. A safe Working Space must meet the requirements of the National Electrical Code and the relevant local government electrical code (such as the Seattle Electrical Code for the City of Seattle).

3.2. Abbreviations and Acronyms

AC: Alternating Current.

AGIR: Authority Governing Interconnection Requirements.

AHJ: Authority Having Jurisdiction.

ANSI: American National Standards Institute.

BD: Business Day.

CT: Current Transformer.

DC: Direct Current.

DER: Distributed Energy Resources.

DPP: Seattle City Light Department, Department Policy & Procedure.

EPS: Electric Power System.

FERC: Federal Energy Regulatory Commission.

IA: Interconnection Agreement.

IBR: Inverter-Based Resource.

IEEE: Institute of Electrical and Electronics Engineers.

kV: Kilovolt.

kW: Kilowatt.

kWh: Kilowatt-hour.

MW: Megawatt.

NEC: National Electrical Code.

PCC: Point of Common Coupling.

PCS: Power Control System.

PTC: Permission to Construct Letter.

PTO: Permission to Operate Letter.

PV: Solar Photovoltaic.

RCW: Revised Code of Washington.

RESC: *Requirements for Electric Service Connection.*

SCADA: Supervisory Control and Data Acquisition.

SES: *Standards for Electric Service.*

SMC: Seattle Municipal Code.

UL: Underwriters Laboratories.

UL 1741 CRD for PCS: Underwriters Laboratories Standard 1741 Certification Requirement Decision (CRD) for PCS.

UL 1741 SB: Underwriters Laboratories Standard 1741 Supplement B (SB).

4. Overview of City Light Electrical Distribution System

4.1. Introduction

City Light has two portions (or categories) of its Electrical Distribution System: the Looped Radial System and the Network System.

4.2. Looped Radial System

The Looped Radial System comprises the entire Electrical Distribution System apart from the Network System. The Looped Radial System has underground service areas (such as certain business districts and residential areas), but the wires serving Looped Radial System Customers are primarily from overhead distribution poles.

For more information about electricity service requirements on the Looped Radial System, refer to Chapter 3 in the *RESC*.

4.3. Network System

City Light's Network System comprises both Area Networks and Spot Networks. City Light has four Network System service areas: Downtown Seattle, First Hill, South Lake Union, and parts of the University District near the University of Washington.

Network System service areas are designed with operational redundancy to maximize continuity of service despite single component outages and with protective devices to prevent back-feed onto the Electrical Distribution System. For this reason, there are special rules for DER on a Network System (see Chapter 17).

For more information about electricity service requirements on the Network System, refer to Chapter 4 in the *RESC*.

5. Applicable Standards and Codes

5.1. Industry Standards

The Applicant's DER must conform to all applicable industry standards for the safe and reliable operation of DER. Among these are the National Electrical Code (NEC) NFPA70®; National Electrical Safety Code® IEEE-C2; and standards of the Institute of Electrical and Electronics Engineers (IEEE), American National Standards Institute (ANSI), and Underwriters Laboratories (UL). Pertinent ANSI, IEEE, and UL standards for DER are identified throughout this *Handbook* and, depending on the type of DER, may include the following:

- ANSI C84.1
- ANSI/IEEE C37.90
- IEEE C62.92.6-2017
- IEEE 519-2022
- IEEE 1547-2018
- IEEE 1547.1-2020
- NEC 110
- NEC 705
- NFPA70®-2021
- UL 1741 CRD for PCS
- UL 1741 SB
- UL 9540
- UL 61730

5.2. City Light Standards

The Applicant must conform with the equipment, design, and construction requirements in this document and in City Light's *RESC* and the *Standards for Electric Service (SES)* to protect the Electrical Distribution System and ensure safe and reliable access to electricity service for all Customers.

City Light has no obligation to interconnect or to allow ongoing interconnection with the Electrical Distribution System when a DER is out of compliance in any manner.

5.3. Codes

The Applicant's DER must also conform to federal, state, and local government building and electrical codes (including the Seattle Electrical Code for Applicants located in the City of Seattle) and other relevant codes, statutes, regulations, and ordinances for the safe and reliable operation of DER.

6. Overview of Applicant Interconnection Cost Obligations

The Applicant must have cost responsibility for its DER up through the PCC, and City Light will bear no liability or responsibility for the DER.

The Applicant is also responsible for paying costs for City Light to perform engineering studies and for new Interconnection Facilities or System Upgrades (see Chapter 12) needed to accommodate its DER, as reflected in engineering study agreements and the Interconnection Agreement (IA) between the Applicant and City Light as well as any applicable interconnection application, inspection, metering, and service reconnection fees.

The Applicant is responsible for obtaining, paying the costs for, and staying in compliance with all necessary permits, licenses, approvals, and other agreements or requirements imposed by City Light or any Authority Having Jurisdiction (AHJ) for the Applicant-owned and -operated DER and is responsible for the actions of contractors or other agents hired by the Applicant for design, construction, operation, and maintenance of the DER.

After a DER is approved by City Light and energized, the Interconnection Customer may be responsible for paying ongoing operations, maintenance, repair, and replacement costs for any new Interconnection Facilities added and System Upgrades made to the Electrical Distribution System, irrespective of the fact that City Light is the owner and operator of such new Interconnection Facilities and System Upgrades.

7. Utility Programs for Distributed Energy Resources

7.1. Introduction

City Light offers two main programs that establish eligibility, participation, and compensation requirements for electricity produced by qualifying DER in excess of Interconnection Customer on-site electricity consumption (i.e., electricity that is exported to the Electrical Distribution System). These programs require that participants adhere to published program requirements, including those for metering. The programs require that each participant receives interconnection approval from City Light, enters into and adheres to an IA with City Light, and meets City Light's interconnection requirements necessary for public safety and Electrical Distribution System reliability.

The Applicant must comply with the rules of City Light's published rate schedules and other compensation mechanisms or programs in which the Applicant's DER participates. City Light's DER programs and compensation rates are subject to change.

7.2. Net Metering Program

Solar and other qualifying DER types may participate in the Net Metering program and receive Kilowatt-hour (kWh) credits on the Interconnection Customer's Utility bill for the energy produced by the DER per Revised Code of Washington (RCW) 80.60.030. These credits are generated between April 1 and March 31 and are valued at the Interconnection Customer's retail rate of electricity. Credit balances are cleared out on March 31 in accordance with RCW 80.60.030. The size restrictions on the Net Metering program per Seattle Municipal Code (SMC) Chapters 21.49.082 and 21.49.083 are:

- DER Nameplate Capacity cannot exceed 100 Kilowatts (kW), except under conditions applicable to Applicant type and DER Nameplate Capacity including:
  - Buildings participating in the City of Seattle Living Building Pilot may net meter up to 250 kW.
  - Buildings outside of the City of Seattle but within Seattle City Light service territory receiving International Living Future Institute's Living Building Challenge certification before December 31, 2025, may net meter up to 250 kW.
  - Affordable housing buildings meeting high efficiency standards as determined by City Light and as published in program requirements may net meter up to 500 kW.

More information on City Light's Net Metering program is available on the Utility's website (by clicking on "City Light Solar Programs") at https://seattle.gov/city-light/residential-services/home-energy-solutions/solar-power#citylightsolarprograms (for residential Customers) and https://seattle.gov/city-light/business-solutions/renewable-energy-services/solar-programs-for-businesses#citylightsolarprograms (for business Customers), and in SMC Chapter 21.49.082.

City Light also offers a net meter aggregation billing arrangement per RCW 80.60.030. That arrangement does not affect an individual DER's interconnection eligibility or requirements.

7.3. Large Customer Renewable Generation Program

Qualifying DER with Nameplate Capacity above 100 kW and not exceeding 5,000 kW (i.e., 5 MW) and not participating in the Net Metering program may participate in the Large Customer Renewable Generation program. In this program, Customers receive monetary credits for their excess generation each bill cycle; the export rate for the per-kWh credit varies over time and is defined in the SMC Chapter 21.49.083. The export rate represents the value of excess DER generation to City Light and incentivizes DER systems sized to meet on-site building demand.

More information on the Large Customer Renewable Generation program is available on the Utility's website (by clicking on "City Light Solar Programs") at https://seattle.gov/city-light/business-solutions/renewable-energy-services/solar-programs-for-businesses#citylightsolarprograms and in SMC Chapter 21.49.083.

There are currently no City Light programs to compensate for electricity exports from DER projects exceeding 5 MW in Nameplate Capacity.

8. Application Process

8.1. Introduction

This chapter describes the Applicant process, timelines, and fees for submitting a DER interconnection application and how City Light evaluates applications for completeness, assigns a Queue Position, and identifies their level for technical review. See Appendix A for a simplified flow chart describing the interconnection process.

Where City Light requires that the Applicant provide information or notice in writing, the Applicant must do so by e-mail to: SCL_serviceapplications@seattle.gov, unless otherwise directed by City Light.

8.2. Pre-Application Information and Reports

City Light does not currently issue pre-application reports on conditions at various PCC to potential Applicants or other entities. City Light is exploring holding optional pre-application information sessions with Customers seeking interconnection and developing pre-application reports in the future to improve the Customer experience.

8.3. Circumstances Requiring an Interconnection Application

All Applicants seeking interconnection of a new DER to the Electrical Distribution System within the scope of this document must submit an interconnection application.

If the Applicant's DER is a new, hybrid system consisting of an electrical generator and an energy storage system in an AC-coupled or direct current (DC)-coupled configuration, the Applicant can submit a single interconnection application for the hybrid system. However, if the Applicant seeks to add an energy storage system to a previously interconnected standalone electrical generator or to add an electrical generator to a previously interconnected standalone energy storage system, a new application must be submitted to incorporate the new device.

When a DER project is designed for physical installation in distinct sequential phases (e.g., a 30 kW project to be installed in June on the west side of a building and a 70 kW project to be installed in August on the south side of a building), the Applicant may choose to submit a single application for approval of the final project size or may choose to submit applications at multiple phases of the project. Each application will be evaluated based on the Nameplate Capacity and other characteristics within the application. If multiple applications are submitted for different phases of a project, a separate application fee calculation, as applicable, will be made for each phase. In all cases, the Applicant may only develop the DER to the Nameplate Capacity approved on its submitted and approved applications.

8.4. Online Submission

For each DER proposed for interconnection, the Applicant must complete and submit City Light's online Apply for New or Upgraded Electric Service form, available at: https://seattle.gov/city-light/construction-services/apply-for-new-or-upgraded-service. As needed, the Applicant must also provide supplementary data that will be identified by City Light and returned by the Applicant by e-mail.

8.5. Required Submission Materials

The Applicant must provide information required in City Light's online Apply for New or Upgraded Electric Service form (that covers applications for interconnection and many other types of service) together with supplementary, interconnection-specific data fields for proposed DER. This data may include:

- Service address.
- Characteristics of existing Utility electric service at the service address.
- The property owner and DER contractor (installer) point of contact data.
- Type of generation (solar photovoltaic, wind, or other).
- Generator capacity (in kW-DC), for standalone solar photovoltaic (PV) systems.
- Inverter capacity (in kW-AC), for standalone PV systems.
- Battery inverter power capacity (in kW-AC).
- Battery storage energy capacity (in kWh-DC).
- Generator capacity (in kW-AC), for other types of DER (beyond PV and battery storage systems).
- Data on equipment specifications (e.g., electrical generator(s), inverter(s) number of units, model numbers, and performance characteristics).
- Installed cost of the DER.
- Installation location within the property boundary.
- Identification of whether the entire DER or any portion of a hybrid (e.g., PV and battery storage system) DER will be exporting or non-exporting to the Electrical Distribution System.
- Identification of whether the DER is entirely new or is modifying an existing DER.

Depending on the proposed DER type, some of the above input fields may not be applicable. In addition to completing the application form itself, the Applicant must provide required supporting documentation as attachments including:

- One-line diagram.
- Site plan (with these required elements: Applicant name; address of proposed DER; date the site plan was prepared; property line; geographic markers such as buildings, roads and their names, pathways, fences, gates, and a north arrow; solar array or other generator sources; inverter (if applicable); main service panel; generation panel; meter; AC safety disconnect switch; distance between meter and AC safety disconnect switch; PCC).
- Generator, energy storage, and inverter equipment specification sheets, as applicable to the proposed DER technology(ies), with information beyond the limited data fields captured by the online application. The specification sheets must list the manufacturer names and model numbers for all equipment. As applicable, the specification sheets must also list equipment certifications (e.g., under IEEE and UL standards).

For a proposed DER to be installed on premises other than an end-use Applicant, City may also require a demonstration of site control by the Applicant. City Light may request further data and documents from any Applicant necessary to complete or validate application information.

8.6. Treatment of Applications: Confidentiality and Nondiscrimination

City Light will treat DER interconnection information provided by the Applicant in a confidential manner unless disclosure is required by applicable law or regulation. The City of Seattle is subject to Washington State's Public Records Act, Chapter 42.56 RCW.

All DER interconnection applications will be processed and evaluated by City Light in a nondiscriminatory manner, consistent with other electric service requests.

8.7. Application Fees

City Light does not currently charge a fee for the submission of Level 1 or Level 2 interconnection applications as those levels are defined in this *Handbook*. City Light does charge a fee for Level 3 and Level 4 interconnection applications as defined in this *Handbook*, and the fee amounts are listed in Sections 7.6.1 and 7.6.2 of DPP 500 P III-305. Please note that DPP 500 P III-305 defines interconnection levels differently than this *Handbook*.

When an application fee is required, the fee must be paid in full at the time of application submission or thereafter. This fee must be paid before the application can be Deemed Complete by City Light. Application fees are non-refundable. There is no additional application fee if an application fails a Technical Screen and moves to the Supplemental Screen process.

In addition, any application requiring Level 4 review may necessitate engineering studies by City Light, the costs of which are established through study agreements between the Applicant and City Light and paid by the Applicant per Section 10.

In addition, for applications at any level of review, interconnection costs for new Interconnection Facilities or System Upgrades required to safely and reliably interconnect the proposed DER must be paid by the Applicant, unless otherwise noted. See Chapters 11 and 12 for further information on these costs.

8.8. Levels of Review

City Light has four levels of interconnection review. These levels are assigned based on the proposed DER Nameplate Capacity, technology type, and interconnection location on the Electrical Distribution System. The four levels are defined below:

> **Level 1**: The proposed DER must be Standalone PV with a Nameplate Capacity less than 12 kW seeking to interconnect to the Looped Radial System.
>
> **Level 2**: The proposed DER must meet any of these three requirements: (i) Standalone PV with a Nameplate Capacity between 12 kW and 100 kW seeking to interconnect to the Looped Radial System, (ii) Standalone PV with a Nameplate Capacity of 100 kW or less seeking to interconnect to the Network System, or (iii) IBR other than Standalone PV with a Nameplate Capacity of 100 kW or less.
>
> **Level 3**: The proposed DER must be an IBR with a Nameplate Capacity above 100 kW but equal to or below 500 kW.
>
> **Level 4**: This level of review will be administered to proposed DER that are Machine-Based Resources, IBRs with a Nameplate Capacity above 500 kW, and any other IBRs that do not pass Supplemental Screens (defined in Chapter 9).

An application's level of review affects the steps and timelines in the interconnection process as well as the City Light technical or engineering analysis necessary to determine if the DER can interconnect safely and reliably to the Electrical Distribution System and any additional costs required to accommodate the interconnection.

8.9. Application Completeness Review

Within 10 business days of receiving an interconnection application, City Light will indicate via e-mail to the Applicant whether the application has been completed adequately (i.e., "Deemed Complete"). For DER under Level 3 or Level 4 review, receipt of the application fee by City Light is also required for the application to be Deemed Complete. If the application is Deemed Complete, it will receive a Queue Position and proceed to the appropriate level of review by the Utility.

If the application is not Deemed Complete, City Light will include a description of application deficiencies (e.g., missing, unclear, or invalid information) in its e-mail to the Applicant.

- The Applicant then has 30 business days to submit corrected and/or additional materials addressing the deficiencies or to request an extension of time to address the deficiencies.
- If the Applicant does not submit the required information within the allowable timeline while allowing for any extensions of time granted by City Light based on a showing of good cause by the Applicant, its interconnection application will be Deemed Withdrawn.
- Following receipt of updated information from the Applicant, City Light will indicate via e-mail to the Applicant if the application is Deemed Complete. If the application has remaining deficiencies, City Light will describe them to the Applicant, and the process described in this paragraph will be repeated.

Though there is no additional Utility fee to the Applicant for the re-submission of application materials for the completeness review, City Light reserves the right to cancel the application (i.e., make its status Deemed Withdrawn) if the interconnection process has not been completed within one year of application submission for Level 1, 2, or 3 applications or within two years of application submission for Level 4 applications.

8.10. Queue Position

An application receives its Queue Position based on the day and time-of-day at which it is Deemed Complete by City Light. The Utility will provide that date and time to the Applicant by e-mail upon written request.

Queue Positions are established in serial order across all DER interconnection applications. For example, if two applications are Deemed Complete by City Light in a day (one in the morning and the other in the afternoon) and the last Queue Position established the prior day was 900, then the application Deemed Complete in the morning would have Queue Position 901 and the application Deemed Complete in the afternoon would have Queue Position 902.

The Queue Position is used by City Light to determine the serial order in which the Utility evaluates the safety and reliability impacts of the proposed DER at the Feeder and/or substation associated with the Applicant's PCC. Assignment of interconnection costs to an application can be affected by its Queue Position because the Applicant whose DER triggers the need for Utility new Interconnection Facilities or System Upgrades must pay the costs for those facilities and upgrades to City Light. That is the case, except if Applicants elect to have a group study (see Section 10.7).

Once an application receives a Queue Position, any changes to the DER type, location, or Nameplate Capacity require the submission of a new application, thus relinquishing the current Queue Position.

If an application is rejected at a lower level of review (i.e., Level 1, 2 or 3), the application will be placed in Pending Status. The Applicant can then retain its original Queue Position if it submits all required information to be evaluated for Supplemental Screens (see Section 9.5) within 30 business days of the lower-level rejection. If the Applicant does not submit the required materials within that timeframe, the Applicant will be assigned a new Queue Position after City Light receives complete materials for the Supplemental Screens.

The Applicant may withdraw its application at any time by informing City Light in writing, immediately after which the application will be Deemed Withdrawn and the Applicant will permanently surrender its existing Queue Position.

If a separate application higher (i.e., ahead) in the queue at a Feeder or substation is Deemed Withdrawn, the Applicant's proposed DER may need to be re-evaluated by City Light in view of the new Aggregate Nameplate Capacity (including all DER higher in the queue at that location), and the interconnection costs for the Applicant's proposed DER may change.

9. Technical and Supplemental Screens

9.1. Introduction

This chapter describes Technical Screens and Supplemental Screens that City Light conducts for applications meeting the criteria for Level 1, 2, and 3 review.

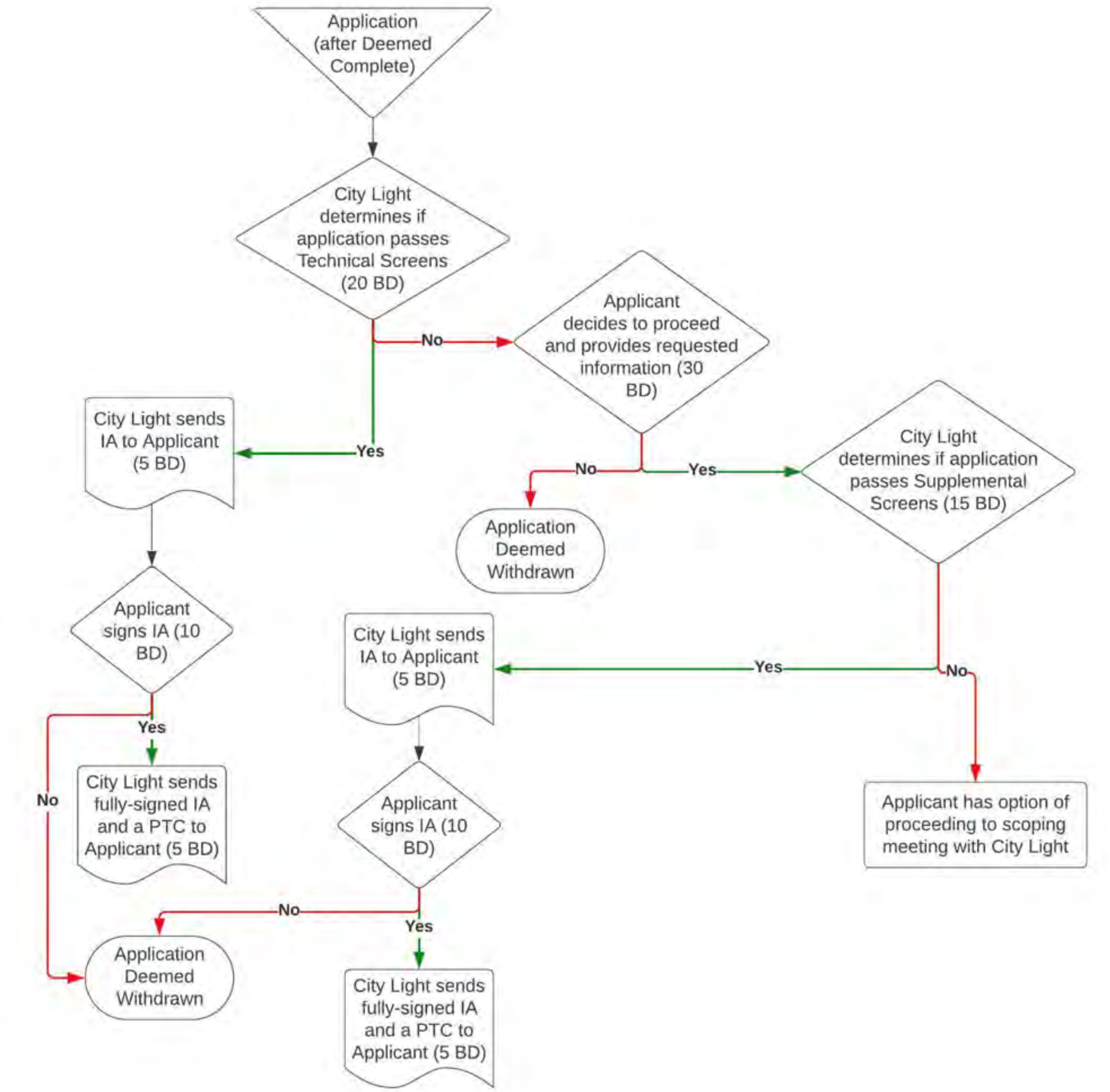
An application assigned to Level 1 must pass the associated Technical Screens (also called "fast-track screen") to proceed in the interconnection process.

If an application assigned to Level 2 or Level 3 review passes all required Technical Screens, then the application will not require Supplemental Screens (which are more advanced) or full engineering studies. However, if an application assigned to Level 2 or Level 3 review fails one or more Technical Screens, then it can proceed to Supplemental Screens (see Section 9.5) if the Applicant wishes. If the application then fails one or more Supplemental Screens, it can proceed to a scoping meeting and engineering studies (see Chapter 10) if the Applicant wishes.

Applications assigned to Level 4 review do not have any Technical Screens nor Supplemental Screens, but they proceed to a scoping meeting and, as needed, more detailed engineering studies to assess their potential effects on the Electrical Distribution System. Section 8.8 describes the assignment of proposed DER to Level 1, 2, 3, and 4 review.

Figure 9.1 describes the basic progression through Technical Screen and Supplemental Screen processes for applications under Level 2 or 3 review assuming that the application passes Screen A. In the figure, BD designates Business Day, IA designates Interconnection Agreement, and PTC designates Permission to Construct Letter. Timelines for City Light actions in the figure are best estimates and subject to change.

Figure 9.1. Overview of Technical and Supplemental Screen Processes for Level 2 and 3 Interconnection Applications



See Appendix A for a flow chart describing the overall interconnection process, including steps before and after those shown in the figure in this section. See Chapter 17 for a description of special requirements for proposed DER on the Network System, including that the DER must be non-exporting systems and install specific equipment.

9.2. Level 1 Technical Screens

Technical Screen A and B must be met for a Level 1 interconnection application to comply with City Light's requirements.

> **Screen A**: The proposed DER must use inverter equipment certified to meet UL 1741 SB (Standard for Safety Inverters, Converters, Controllers and Interconnection System Equipment for Use With Distributed Energy Resources, Supplement B) and IEEE 1547-2018 (Standard for Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces). UL 1741 SB is an equipment standard that allows conforming inverter manufacturers to convey that their inverters have been tested under recent IEEE standards (e.g., 1547.1-2020 edition) and can safely provide associated functionalities to support distribution grids of electric utilities.
>
> **Screen B**: If the proposed DER is located on a Shared Secondary, the Aggregate DER Nameplate Capacity on the Shared Secondary must not exceed the nameplate rating of the secondary transformer.

City Light will notify the Applicant whether its interconnection application has passed the Level 1 Technical Screens within 15 business days of the application being Deemed Complete. If the application passes the Level 1 Technical Screens, City Light will send an IA to the Applicant within five business days of notifying the Applicant that the screens were passed. The Applicant must return a signed IA to City Light within 10 business days if the Applicant wishes to proceed with its proposed DER. City Light will then counter-sign the IA and return the fully signed IA and a Permission to Construct Letter (PTC) to the Applicant within five business days.

If the application does not pass Screen A, the Applicant must address that deficiency before proceeding.

If the application does not pass Screen B, City Light will inform the Applicant in writing within 15 business days if that deficiency can be resolved in one of two ways: (i) whether the Utility can upgrade the secondary transformer and the anticipated Utility timing and any Applicant costs of such an upgrade, or (ii) in the absence of a transformer upgrade, power export restrictions or other requirements on the proposed DER necessary for the DER to advance in the interconnection process. For more information on power export restrictions, see Section 16.5.6.

In the former case involving a secondary transformer upgrade, City Light will send an IA to the Applicant within five business days of completing the secondary transformer upgrade. The Applicant must return a signed IA to City Light within 10 business days if the Applicant wishes to proceed with the interconnection. City Light will then counter-sign the IA and return the fully signed IA and a PTC to the Applicant within five business days.

In the latter case where the Applicant is notified that no transformer upgrade will be made, the Applicant will then have 30 business days to provide any requested information to City Light if the Applicant wishes to retain its Queue Position. City Light will notify the Applicant whether the information is sufficient within 15 business days. If the information is not sufficient, the Applicant must address that deficiency before proceeding. If the Applicant's information is sufficient, City Light will send an IA, and any other DER requirements, to the Applicant within five business days. The Applicant must return a signed IA to City Light within 10 business days if the Applicant wishes to proceed with the interconnection. City Light will then counter-sign the IA and return the fully signed IA and a PTC to the Applicant within five business days.

9.3. Level 2 Technical Screens

The proposed DER must pass three Technical Screens (Screen A described in Section 9.2; Screen C; and Screen D-1 or D-2, as applicable) for a Level 2 interconnection application to comply with City Light's requirements.

Screen C: If the proposed DER is located on a Shared Secondary, the Aggregate DER Nameplate Capacity on the Shared Secondary must not create a voltage rise level greater than 3% on the secondary wire or the secondary transformer.

Screen D-1: If the Applicant seeks for the proposed DER to export power across the PCC as indicated on the interconnection application and to be interconnected with a Feeder on the Looped Radial System and annual minimum load data are available to the Utility for that Feeder or the relevant Line Section, the Aggregate DER Nameplate Capacity on the Feeder or Line Section must be less than 100% of the anticipated minimum load for the Feeder or all Line Sections bounded by automatic sectionalizing devices upstream of the proposed DER.

- For this screen, City Light will not consider DER Nameplate Capacity known to be already reflected in the minimum load as part of the Aggregate DER Nameplate Capacity. This avoids potential double-counting of existing DER impacts.
- When determining Feeder or Line Section minimum load, the type of proposed DER will be taken into account. Standalone PV systems with no associated energy storage will use Daytime Minimum Load, while all other DER (including hybrid solar + battery storage systems) will use Absolute Minimum Load.
- When this screen is applied to a proposed DER serving some Host Facility consumption load, only the anticipated net power export from the DER to the Electrical Distribution System will be considered as part of the aggregate generation. The net power export will be calculated based on the Host Facility's Daytime Minimum Load if the DER is PV, or the Host Facility's Absolute Minimum Load for all other types of DER.

Screen D-2: If the Applicant seeks for the proposed DER to export across the PCC and be interconnected with a Feeder on the Looped Radial System and minimum load data covering all 12 months are not available to the Utility for that Feeder or the relevant Line Section, the Aggregate DER Nameplate Capacity on the Feeder or Line Section must not exceed 15% of the Feeder's or Line Section's annual peak load.

If the Applicant seeks for the proposed DER to be interconnected with a Feeder on the Network System, Screens D-1 and D-2 are not applicable, but the proposed DER must not be allowed to export power to the Network System at any time. See Chapter 17 for further information on DER requirements on the Network System.

City Light will notify the Applicant whether its interconnection application has passed the Level 2 Technical Screens within 20 business days of the application being Deemed Complete. If the application passes all of the Level 2 Technical Screens, City Light will send an IA to the Applicant for signature within an additional five business days. The Applicant must return a signed IA to City Light within 10 business days if the Applicant wishes to proceed with the interconnection. City Light will then counter-sign the IA and return the fully signed IA and a PTC to the Applicant within five business days.

If the application does not pass Screen A, the Applicant must address that deficiency before proceeding. If the application does not pass all of the other, pertinent Level 2 Technical Screens, City Light will inform the Applicant which screen(s) it did not pass and what, if any, additional information on the proposed DER is required to proceed to the Supplemental Screens. The Applicant will then have 30 business days to request that its application proceeds to the Supplemental Screens and provide any requested information if the Applicant wishes to retain its Queue Position. There is no additional Utility fee to the Applicant for proceeding to the Supplemental Screens.

9.4. Level 3 Technical Screens

As applicable to the Nameplate Capacity, location, and other characteristics of the proposed DER, Screen A plus all Level 2 Technical Screens plus Screen E through Screen H, collectively "Level 3 Technical Screens," must be passed for a Level 3 interconnection application to be judged compliant with City Light's requirements.

For a description of Screen A, see Section 9.2. For descriptions of Screens C and D and the non-export requirements for DER proposed to be interconnected with a Feeder on the Network System, see Section 9.3. The other Level 3 Technical Screens are described below.

Screen E: If the Applicant seeks for the proposed DER to be interconnected with a primary distribution line, the type of interconnection of the DER to be made to the primary distribution Circuit must be compatible with the primary distribution line type configuration per Table 9.4.

Screen F: The proposed DER must not interconnect with a Feeder or Line Section that already exceeds 87.5% of the Electrical Distribution System protective devices and equipment (including, but not limited to, substation breakers and fuse cutouts) short circuit interrupting capability. In cases where that level of short circuit interrupting capability is not already exceeded (based on in-service DER), the Aggregate DER maximum fault current on the Feeder or Line Section must not cause any Electrical Distribution System protective devices and equipment to exceed 87.5% of the protective devices and equipment short circuit interrupting capability.

Screen G: The sum of the Short Circuit Contribution Ratios of the Aggregate DER on the Feeder or Line Section, must be less than or equal to 0.1, measured at the primary side nearest the PCC.

Screen H: The Aggregate DER Nameplate Capacity on the low side of the substation transformer serving the Feeder or Line Section where the Applicant seeks to interconnect its proposed DER must not exceed 10 MW if there are known or posted transient/dynamic stability limitations on nearby Circuits to electrical generator units or Circuit regulating equipment (e.g., line-tap changers or line regulators). For this screen, nearby Circuits include the Feeder with the PCC for the proposed DER, other Feeders served from the same substation on the Electrical Distribution System as the Feeder with the proposed DER's PCC, or Feeders served from other substations on the Electrical Distribution System up to four transmission-level buses from the PCC. This screen addresses the possibility that high levels of PV penetration coupled with changing cloud cover can induce transients, which could adversely impact Circuit regulation equipment.

TABLE 9.4. COMPATIBILITY WITH PRIMARY DISTRIBUTION LINE TYPE CONFIGURATION

Primary Distribution Line Type Configuration	Type of Interconnection to Be Made with Primary Distribution Circuit	Compliance (or Compliance with Additional Criteria)
Three-phase, four-wire	Single-phase, line-to-neutral	Complies
Three-phase, four-wire	All other types besides single-phase, line-to-neutral	To comply, the proposed DER is required to pass the applicable Technical Screen D-1 or D-2

City Light will notify the Applicant whether its interconnection application has passed the Level 3 Technical Screens within 20 business days of the application being Deemed Complete. If the application passes all of the Level 3 Technical Screens, City Light will send an IA to the Applicant for signature within an additional five business days. The Applicant must return a signed IA to City Light within 10 business days if the Applicant wishes to proceed with the interconnection. City Light will then counter-sign the IA and return the fully signed IA and a PTC to the Applicant within five business days.

If the application does not pass Screen A, the Applicant must address that deficiency before proceeding. If the application does not pass all of the other, pertinent Level 3 Technical Screens, City Light will inform the Applicant which screen(s) it did not pass and what, if any, additional information on the proposed DER is required to proceed to the Supplemental Screens. The Applicant will then have 30 business days to request that its application proceeds to the Supplemental Screens and provide any requested information if the Applicant wishes to retain its Queue Position. There is no additional Utility fee to the Applicant for proceeding to the Supplemental Screens.

9.5. Supplemental Screens

City Light's Supplemental Screens assess voltage, power quality, safety, and reliability. Supplemental Screens are conducted only for an Applicant that meets all four of these conditions: (i) passes Screen A, (ii) fails one or more other Level 2 or 3 Technical Screens, (iii) chooses to proceed to the Supplemental Screen step, and (iv) provides required information. The Supplemental Screens (Screen I through Screen K) are listed below.

Screen I: The proposed DER's contributions to voltage variation as measured at the PCC are within acceptable levels based on City Light's modeling.

Screen J: The proposed DER's contributions to harmonics and flicker are within acceptable levels based on City Light's modeling.

Screen K: The proposed DER must not create impacts to safety and reliability that need to be addressed through engineering study(ies).

If a proposed DER passes all of City Light's applicable Supplemental Screens, then the DER's interconnection application will be judged compliant with City Light's requirements and will not need to go through a City Light scoping meeting or engineering study(ies). City Light will notify the Applicant whether its application has passed the Supplemental Screens within 15 business days of the Utility's receipt of the Applicant's decision to proceed to the Supplemental Screens and any additional information that the Applicant is required to provide.

If an application passes the Supplemental Screens, City Light will send an IA to the Applicant within five business days following completion of the Supplemental Screens. The Applicant must return a signed IA to City Light within 10 business days if the Applicant wishes to proceed with the interconnection. City Light will then counter-sign the IA and return the fully signed IA and a PTC to the Applicant within five business days.

If the application does not pass the Supplemental Screens, City Light will inform the Applicant regarding the screen(s) it did not pass. The Applicant will then have 30 business days to request that its application proceeds to the scoping meeting (described in Section 10.3) if the Applicant wishes to retain its Queue Position. There is no additional fee to the Applicant for proceeding to the scoping meeting.

10. Engineering Studies

10.1. Introduction

Applications being reviewed at Level 4 (or that fail Supplemental Screens) will go through a scoping meeting and, as needed, engineering study(ies) to ascertain if they can safely and reliably interconnect with the Electrical Distribution System and, if so, any new Interconnection Facilities and System Upgrades that are required to accommodate the proposed DER. Engineering studies involve more detailed and customized analyses than the Technical Screen or Supplemental Screen processes described in the prior chapter. Therefore, study processes are reserved for proposed DER that are at Level 4 (or that fail Supplemental Screens) and may have greater impacts on the Electrical Distribution System due to their large Nameplate Capacity, generator technology, or inability to meet Supplemental Screens.

The engineering study process is meant to be sequential, with progressively more detailed studies being conducted, as warranted, following an initial scoping meeting between City Light and the Applicant. The progression of studies from less to more detailed is: feasibility study (see Section 10.4), impact study (see Section 10.5), and facilities study (see Section 10.6).

All of these studies are governed by signed study agreements between City Light and the Applicant outlining the study scope and the estimated study cost to the Applicant. The estimated cost of each study is contained in a study agreement and is based on City Light's good faith estimate of the Utility hours and any other costs needed to complete the study. The calculation and billing of study costs is described in DPP 500 P III-305.

An Applicant wishing to withdraw its interconnection application can decline to sign a study agreement.

The end of this chapter describes a group study process (see Section 10.7) and circumstances warranting an affected system study (see Section 10.8).

10.2. Study Treatment of Queue Position

City Light's standard practice is to study each DER application serially (i.e., individually and in order of the DER's Queue Position). When studying a DER application, the engineering modeling assumption will be that DER ahead in queue will become interconnected. See the definition of Aggregate DER Nameplate Capacity for further information.

There is an option for a group study described later in this chapter.

10.3. Scoping Meeting

After an interconnection application under Level 4 review is Deemed Complete or after an application under Level 2 or Level 3 review fails to pass Supplemental Screens, City Light will contact the Applicant to schedule a scoping meeting. City Light will hold the scoping meeting within 10 business days of its Deemed Complete decision or Supplemental Screen completion, with the final timing of the scoping meeting determined by the meeting preferences and availability of relevant City Light and Applicant personnel. The scoping meeting can be conducted in person at a City Light office or virtually (by telephone or video conference), whichever is preferred by the Applicant.

At the scoping meeting, the Applicant will provide additional information on its proposed DER if requested by City Light, and City Light will discuss Electrical Distribution System conditions at and near the PCC, such as the available Fault Current, existing peak load and minimum load on distribution lines in the general vicinity, and configuration of the distribution lines.

The purpose of the scoping meeting is to determine which, if any, engineering studies will be required. There is no additional cost to the Applicant for the scoping meeting.

By mutual agreement of City Light and the Applicant, the feasibility study, impact study, and/or facilities study may be waived following the scoping meeting. The criteria for waiving one or more engineering studies are: (i) that the study is unnecessary to determine if the proposed DER poses safety risks to City Light equipment or personnel or reliability risks to the Electrical Distribution System, or (ii) to expedite the DER project development timeline and reduce study costs to the Applicant without compromising Utility safety or reliability (e.g., by waiving a feasibility study and proceeding directly to an impact study). In both cases, the rationale for waiving study(ies) will be clearly documented by City Light.

If City Light notifies the Applicant that its interconnection application meets the Utility's technical requirements and no studies are required, City Light will send an IA to the Applicant within five business days following the scoping meeting. The Applicant must return a signed IA to City Light within 40 business days if the Applicant wishes to proceed with the interconnection. City Light will then counter-sign the IA and return the fully signed IA and a PTC to the Applicant within five business days.

If an engineering study is required, City Light will provide an agreement for the pertinent study to the Applicant within five business days following the scoping meeting.

10.4. Feasibility Study

The feasibility study is a high-level review of potential adverse impacts of interconnecting the proposed DER on the Electrical Distribution System. Feasibility study methods may include, but are not limited to, power flow and short circuit analyses. The feasibility study also determines if additional engineering studies are needed.

After an Applicant signs a feasibility study agreement and makes payments required by the agreement, City Light will provide the written results of the feasibility study within 20 business days. However, the Utility may take longer to complete the study if there are DER with a higher Queue Position than the Applicant's DER and those Applicants with higher-queued DER do not have fully signed IAs with City Light.

Based on findings in the feasibility study, City Light may elect to waive the impact study and/or the facilities study. If those additional studies are waived, City Light will send an IA to the Applicant within five business days following completion of the feasibility study. The Applicant must return a signed IA to City Light within 40 business days if the Applicant wishes to proceed with the interconnection. City Light will then counter-sign the IA and return the fully signed IA and a PTC to the Applicant within five business days.

If an impact study or facilities study is required as the next step in City Light's review, the Utility will provide an agreement for the pertinent study to the Applicant within five business days following completion of the feasibility study.

10.5. Impact Study

The impact study is a detailed review of potential adverse impacts of interconnecting the proposed DER on the Electrical Distribution System. Impact study methods may include, but are not limited to, power flow, short circuit, stability, protection, grounding, and communications/telemetry analyses.

After an Applicant signs an impact study agreement and makes payments required by the agreement, City Light will provide the written results of the impact study within 40 business days. However, the Utility may take longer to complete the study if there are DER with a higher Queue Position than the Applicant's DER and those Applicants with higher-queued DER do not have fully signed IAs with City Light.

Based on findings in the impact study, City Light may elect to waive the facilities study. If that additional study is waived, City Light will send an IA to the Applicant within five business days following completion of the impact study. The Applicant must return a signed IA to City Light within 40 business days if the Applicant wishes to proceed with the interconnection. City Light will then counter-sign the IA and return the fully signed IA and a PTC to the Applicant within five business days.

If a facilities study is required as the next step in City Light's review, the Utility will provide a facilities study agreement to the Applicant within five business days following completion of the impact study.

10.6. Facilities Study

The facilities study contains an extensive review of the potential adverse impacts of interconnecting the proposed DER on the Electrical Distribution System and refines and extends any impact study analyses. The facilities study results in a detailed list of any new Interconnection Facilities or System Upgrades needed to accommodate the proposed DER and cost estimates for the facilities and upgrades.

After an Applicant signs a facilities study agreement and makes payments required by the agreement, City Light will provide the written results of the facilities study within 60 business days. However, the Utility may take longer to complete the study if there are DER with a higher Queue Position than the Applicant's DER and those Applicants with higher-queued DER do not have fully signed IAs with City Light.

City Light will send an IA to the Applicant within five business days following completion of the facilities study. The Applicant must return a signed IA to City Light within 40 business days if the Applicant wishes to proceed with the interconnection. City Light will then counter-sign the IA and return the fully signed IA and a PTC to the Applicant within five business days.

10.7. Group Study

If two or more DER proposing to be interconnected on the same City Light Feeder wish to be studied together and share potential engineering study and interconnection costs, all participating Applicants can submit a written request to City Light to be part of a "group study" whereby the impacts of the proposed DER on the Electrical Distribution System are evaluated together, rather than serially. This option applies to proposed DER that would otherwise be assessed at Level 1, 2, 3, or 4.

City Light will accept the request for a group study as long as all participating Applicants agree to the group study process and all required information is provided to City Light within 30 business days of the Utility's request for such information. If the group study request is rejected, the proposed DER will be evaluated at their respective level(s) according to City Light's serial processes. If the group study request is accepted, City Light will evaluate the impacts of the proposed DER on a combined basis and allocate any engineering study costs and interconnection costs in proportion to the Nameplate Capacity of the proposed DER in the group. City Light's timelines for completion of group studies depend on the number, Aggregate DER Nameplate Capacity, and complexity of the proposed DER and will be provided to the Applicants upon City Light's acceptance of the group study request.

Applicants should note that if any Applicant participating in a group study withdraws its interconnection application before energization, the group study may need to be revised at additional cost to all remaining participants. Further, all engineering study costs and estimated interconnection costs associated with a group study must be fully paid before City Light will issue a Permission to Operate Letter (PTO) to any group study participant.

In no circumstances will City Light mandate a group study of the proposed DER, since its standard practice is serial study.

10.8. Affected System Study

A DER proposed for interconnection with the Electrical Distribution System may also affect the operation of a third party's electrical distribution or transmission system ("affected system"). When City Light identifies such cases and notifies the Applicant of such, the third party (e.g., a utility other than City Light or a regional grid operator) may require its own study or other review (an "affected system study") of potential safety and reliability impacts of the proposed DER and payment of any costs necessary to mitigate such impacts. In such cases, the Applicant must contract directly with the affected system for any affected system study. City Light will coordinate with the affected system and provide required, utility-specific information, but City Light is not otherwise responsible for any affected system study. Where an affected system study is conducted, City Light requires that the Applicant demonstrate that it has resolved all issues identified in the affected system study to the satisfaction of the affected system before City Light completes its own Technical Screens, Supplemental Screens, and/or engineering study(ies) of the DER.

11. Interconnection Agreement

An Interconnection Agreement (IA) must be signed by both the Applicant and City Light before the Utility provides a PTC to the Applicant. A subsequent PTO from City Light is required for the Applicant to energize its DER on the Electrical Distribution System. The IA contains the terms and conditions governing the interconnection of the Applicant's DER with the Electrical Distribution System. The IA does not need to be renewed after it is signed. Applicant and City Light rights to terminate are described in the IA.

City Light currently maintains two IA forms. One IA form is for Level 1 and Level 2 interconnection applications if they require no Applicant payments for new Interconnection Facilities and System Upgrades. The other IA form is for all Level 3 and Level 4 interconnection applications as well as Level 1 and Level 2 applications if they require Applicant payment for new Interconnection Facilities and System Upgrades.

For the Level 3/Level 4 IA form, City Light will insert estimated interconnection costs along with an Applicant payment schedule as pertinent, following completion of the Technical Screens, Supplemental Screens, scoping meeting, or final required engineering study for the DER. To the extent that estimated interconnection costs are included in an IA, such costs must be paid in full to City Light by the Applicant before a PTO is issued and the DER is energized. In such cases, City Light will include in the IA an estimated schedule to design and construct any new Interconnection Facilities and System Upgrades required to accommodate the DER.

City Light may periodically modify its IA forms, and Applicants must use the IA editions presented by City Light during application processing.

12. Utility Design and Construction of New Interconnection Facilities and System Upgrades

12.1. Introduction

This chapter applies when City Light determines from an engineering study or otherwise during review of an interconnection application that (i) new Interconnection Facilities and/or System Upgrades to the Electrical Distribution System are required to safely and reliably interconnect a proposed DER, and (ii) the Applicant agrees to pay the costs of these facilities and upgrades in its IA. The chapter provides an overview of City Light's basic process, factors that may affect City Light's schedule, and how costs will be billed and reconciled to the Applicant. Nothing in this chapter contravenes the contents of an individual IA between City Light and an Applicant.

12.2. Process

Where design and construction of new Interconnection Facilities or System Upgrades are required, City Light will generally follow this six-step design, procurement, and construction process after the IA is signed by the Applicant and the Utility and the Applicant makes any required deposit or initial payment: (i) complete design; (ii) order long lead time equipment; (iii) order (externally or from inventory) shorter lead time equipment; (iv) finish obtaining any necessary permits that are the Utility's responsibility; (v) construct Interconnection Facilities and/or System Upgrades; and (vi) test Interconnection Facilities and/or System Upgrades. There are many intermediate steps in this process. The process depends on the Applicant providing necessary information; coordinating promptly with City Light and potentially AHJs; making timely payments to City Light as specified in the IA; and constructing its DER in parallel.

12.3. Schedule

City Light will include an estimated schedule in the IA if the design and construction of new Interconnection Facilities and/or System Upgrades are required. City Light will notify the Applicant of any changes in the IA schedule and the reason for those changes. The reasons for schedule changes can include: Force Majeure Events; delays in obtaining necessary equipment; delays in AHJ permitting; interconnection progress of DER in a higher Queue Position than the Applicant's DER; Applicant delays in responding to information or coordination requests from City Light; and Applicant delays in making required payments to City Light.

12.4. Billing and Reconciliation of Costs

City Light will bill costs for any new Interconnection Facilities and System Upgrades required for interconnection of a DER according to DPP 500 P III-417: *Service Installations*. That DPP establishes the respective levels at which costs are billed as fixed charges or as time and materials charges for DER installations on the Looped Radial System and the Network System.

13. Commissioning, Inspecting, and Testing

13.1. Introduction

This chapter describes the steps that occur after (i) the Applicant receives a fully-signed IA and a PTC from City Light, (ii) the Applicant completes construction of its DER, and (iii) City Light completes construction of any required new Interconnection Facilities and System Upgrades and until City Light provides a PTO to the Applicant approving the DER for energization.

13.2. Authority Having Jurisdiction Permits and Authorizations

The Applicant, at its sole responsibility and own expense, must obtain and possess all permits and authorizations (including electrical permits in all instances and, as pertinent, building, civil, mechanical, environmental, wildlife/habitat protection, or other permits or authorizations) necessary from the AHJ(s) for the design, construction, operation, and maintenance of the DER. It is the Applicant's sole responsibility to ensure that the DER remains in compliance with AHJ requirements, even as such requirements (which are outside of Utility control) may change over time.

By providing a signed Commissioning and Attestation Form (see Section 13.3 and Appendix B), the Applicant must represent in writing to City Light that it has obtained all pertinent AHJ permits and authorizations for its DER. All necessary AHJ permits and authorizations, together with a PTO from City Light, are required before an Applicant can energize its DER. Upon request, the Applicant must promptly provide City Light with copies of all pertinent AHJ permits and authorizations.

13.3. DER Commissioning, Inspecting, and Witness Testing

The commissioning, inspecting, and witness testing process is intended to provide assurance that (i) the as-built and as-operated characteristics of the DER meet Utility requirements, (ii) the DER will not adversely affect the Electrical Distribution System, and (iii) the DER will cease providing electricity to the Electrical Distribution System under Abnormal Operating Conditions.

To allow for the possibility of Utility inspection and witnessing, the Applicant must inform City Light in writing at SCL_SolarRequest@seattle.gov after the DER has been constructed and at least 15 business days before the Applicant intends to commission the DER. City Light will then inform the Applicant at least 10 business days before the intended commissioning date whether City Light intends to have a Utility staff member or contractor present to witness commissioning tests. If so, the Applicant and Utility will coordinate on a mutually agreeable time-of-day for the tests. At the time of the commissioning tests, or at another time at City Light's sole discretion, the Utility may check that bi-directional metering and meter data monitoring systems associated with the DER are correctly installed and configured according to Utility requirements.

Following Applicant performance of the commissioning tests, whether or not City Light witnesses the tests, the Applicant must submit a completed Commissioning and Testing Attestation Form to the City Light Electrical Service Representative or Electrical Service Engineer assigned to the proposed DER. A downloadable pdf of the form can be found HERE. For reference, a blank copy of the form is provided in Appendix B.

If, upon City Light review of the Commissioning and Testing Attestation Form, witnessing of DER tests, and/or inspection of the proposed DER including its metering, the Utility determines that there are any deficiencies, the Utility will send a written list of deficiencies to the Applicant within five business days. The Applicant must then correct the deficiencies, notify City Light after the deficiencies have been corrected, and schedule a further commissioning test at a mutually convenient time for the Applicant and Utility, as needed. The Applicant is responsible for all expenses associated with additional commissioning tests, including any re-inspection and trip fees for City Light personnel or Utility contractors consistent with DPP 500 P III-417.

13.4. Permission to Operate Letter and Energization

Upon satisfactory submission of the Commissioning and Testing Attestation Form by the Applicant, including further documentation of all necessary AHJ permits and authorizations if required by City Light; completion of any City Light documentation reviews, witnessing of commissioning tests, inspections, and metering updates; and payment by the Applicant of all required fees and interconnection costs to City Light, the Utility will issue a PTO to the Applicant within five business days. The Applicant can energize its DER for Parallel Operation on the Electrical Distribution System any time after it receives the PTO.

Receipt of a PTO does not relieve the Applicant of any obligations for maintaining its DER in a manner consistent with its IA and other City Light requirements.

14. Operations and Maintenance Requirements

14.1. Introduction

The Applicant’s interconnection responsibilities to City Light do not end when the DER is energized, after which the Applicant will be referred to as an Interconnection Customer in this *Handbook*. The Interconnection Customer must adhere to interconnection requirements for the full duration of the IA, whether or not the DER ceases producing electricity. Sale of the DER itself and/or premises or property hosting the DER does not relieve the Interconnection Customer of interconnection obligations unless the Interconnection Customer has legally assigned those obligations to a successor party.

Some key operations and maintenance requirements are summarized below. The Utility may verify the Interconnection Customer’s compliance with operations and maintenance requirements at any time, with reasonable notice.

14.2. Continuity in DER Configuration and Settings

The Interconnection Customer must receive written authorization from City Light before making any change to the DER configuration or settings that may have an impact on the safety or reliability of the Electrical Distribution System. Such authorization will not be unreasonably withheld by City Light. If City Light requires changes in DER configuration or settings to adhere to those established at commissioning or to otherwise conform with IA requirements, the Utility will issue a written notice to the Interconnection Customer.

Changes in the size or location of an interconnected DER are not allowed without the submission of a new interconnection application (see Section 8.10).

14.3. Ongoing DER Operations and Maintenance Requirements

To ensure the safety and reliability of the Electrical Distribution System, all interconnected DER must be constructed, operated, and maintained by the Interconnection Customer in accordance with these rules, with the IA, with the applicable manufacturer's recommended maintenance schedule and operating requirements, and with all other applicable federal, state, and local laws and regulations. The Interconnection Customer bears the sole responsibility for maintaining its DER equipment.

14.4. Ongoing Utility Access to the DER

City Light must have 24-hour access to the premises and/or property where the DER is located, including the metering, safety disconnect switch, and data acquisition equipment. City Light will provide reasonable notice to the Interconnection Customer when possible, prior to using City Light’s right of access.

14.5. Insurance

The Interconnection Customer is not required to provide insurance coverage for damages to the Electrical Distribution System if the Interconnection Customer's DER has a Nameplate Capacity of 100 kW or below, nor is any Interconnection Customer required to carry general liability insurance. It is, however, recommended that the Interconnection Customer protect itself with liability insurance.

For DER with a Nameplate Capacity above 100 kW, City Light will require an Interconnection Customer to purchase insurance covering damages to the Electrical Distribution System of at least the following amounts:

100 kW < Nameplate Capacity ≤ 2 MW:	$1,000,000
2 MW < Nameplate Capacity ≤ 5 MW:	$2,000,000
5 MW < Nameplate Capacity ≤ 20 MW:	$3,000,000

14.6. Record-Keeping

City Light reserves the right to review the maintenance and repair records of all interconnected DER for reasons that may include determining if DER configurations or settings have been modified compared to those in the interconnection application or ensuring that the DER can perform grid support functions as intended. Such DER equipment records pertinent to interconnected operations must be made promptly available to City Light upon reasonable request. While City Light reserves the right to inspect the records, the Utility has no responsibilities for DER operations and maintenance, either actual or implied.

14.7. Disconnection of DER by Utility

City Light may disconnect a DER as described below. The Utility will inform the Interconnection Customer in advance of any scheduled disconnection, or as is reasonable after an unscheduled disconnection, and will in all cases provide information to the Interconnection Customer on the reason(s) for the disconnection.

14.7.1. Temporary Disconnection of DER by Utility

City Light may temporarily disconnect the DER from the Electrical Distribution System for so long as reasonably necessary in the event one or more of the following six conditions or events:

- **Unapproved interconnection**: For the purposes of safety and reliability, any unapproved DER as reasonably determined by City Light will be immediately disconnected from the Electrical Distribution System.

- **Unapproved operation or equipment modification**: If a DER does not operate in a manner consistent with its IA, this document and the associated DPP 500 P III-305 (including adherence to IEEE 1547-2018 and successor standards), or an approved Utility rate schedule, City Light may disconnect the DER. If the Interconnection Customer modifies its DER without City Light's prior written authorization, City Light may disconnect the DER.

- **Emergency condition**: City Light will immediately disconnect a DER if the Utility determines or is notified by a local fire department that a condition or situation is imminently likely to endanger life or property or to cause a material adverse effect on the security of the Utility's Interconnection Facilities or damage to the Electrical Distribution System. To the extent information is known, City Light will notify the Interconnection Customer to describe the emergency condition, the extent of the damage or deficiency, the expected effect on the operation of City Light's and the Interconnection Customer's facilities and operations, the anticipated duration of the emergency condition, and any necessary corrective action.
- **Forced outage**: During any forced outage, City Light may disconnect interconnection service to the DER to perform immediate repairs on the Electrical Distribution System.
- **Adverse operating effects**: If, based on good utility practice, City Light determines that operation of the DER will likely cause unreasonable damage, disruption, or deterioration of service to the Electrical Distribution System or to other Utility Customers, City Light may disconnect the DER. City Light will promptly reconnect the DER upon the Interconnection Customer's remedy of the adverse operating effect.
- **Routine maintenance, construction, and repairs**: City Light may disconnect interconnection service or curtail the output of a DER when necessary for routine maintenance, construction, and repairs on the Electrical Distribution System. City Light must use reasonable efforts to coordinate with the Interconnection Customer in conducting related Utility work.

14.7.2. Interconnection Customer Rights to Disconnect DER

The Interconnection Customer may disconnect its DER at any time.

If the Interconnection Customer initiates a disconnect due to an emergency condition, they must immediately describe that condition to City Light by sending an e-mail to: SCL_SolarRequest@seattle.gov. If the Interconnection Customer will be permanently disconnecting the DER, they must notify City Light at the e-mail address above so that the Utility can incorporate that information into its planning and analysis of future DER on the Interconnection Customer's Line Section and Feeder.

14.7.3. Reconnection of DER after Temporary Disconnection

City Light and the Interconnection Customer must cooperate with each other to restore the DER, Interconnection Facilities, and the Electrical Distribution System to their normal operating states as soon as reasonably practicable following a temporary disconnection. If the disconnection is due to an unauthorized equipment modification by the Interconnection Customer, the DER will not be reconnected by City Light until the unauthorized modification is authorized or removed.

14.7.4. Permanent Disconnection of DER by Utility

In the event the IA is terminated, the Utility will have the right to permanently disconnect the DER or direct the Interconnection Customer to disconnect the DER.

14.8. Islanding Conditions

This section addresses conditions under which Islanding is and is not allowable. For information on Anti-Islanding detection equipment requirements for DER, see Section 16.7.

14.8.1. When Intentional Islanding is Permitted Behind a PCC

An Interconnection Customer requesting the interconnection of energy storage (standalone or paired with a generator) may form an intentional island behind its PCC in accordance with IEEE 1547-2018 (subclause 8.2 and related subparagraphs) and must be certified under UL 1741 SB. The Interconnection Customer must specify its DER plans to form an intentional island when submitting its interconnection application. Further, the Interconnection Customer's inverter and Islanding switch must be tested and certified under UL 1741 SB as interoperable by a nationally recognized testing laboratory. Interoperable in this context means that the switching device and the inverter have been certified together. The Interconnection Customer must provide additional information on the interlocking scheme or transfer switch that makes up the Islanding switch.

Additional Islanding-related requirements apply to the interconnection of energy storage (standalone or paired with a generator) of these sizes and interconnection locations:

- If the DER has a Nameplate Capacity of 500 kW or less and is proposed to be interconnected with a secondary distribution line, the certified inverter's internal Protective Functions and Islanding switch are the only required protection unless otherwise determined during City Light's review of the Islanding switch.
- If the DER has a Nameplate Capacity above 500 kW, City Light may require a Direct Transfer Trip, reclose-blocking on some of the automatic reclosing devices, PCC recloser, or equivalent Protective Function. Direct Transfer Trip must be implemented via external protection equipment.
- If the DER is a battery storage project with Nameplate Capacity above 100 kW or a Microgrid of any size, City Light may require communications for status and control.

Other City Light requirements, such as those for standby generators, may apply to intentional Islanding.

14.8.2. Islanding is not Permitted Beyond the PCC

Under no circumstances will an Interconnection Customer's DER be allowed to sustain an Islanding condition with any part of the Electrical Distribution System beyond (i.e., on the Utility side of) the PCC, due primarily to safety considerations.

15. Dispute Resolution

15.1. Establishing Informal Meeting to Seek Resolution

For a dispute related to DER interconnection, the Applicant (or Interconnection Customer) or City Light (each a "Party" and collectively "the Parties") must first (i) submit a written request to the other Party describing the relevant facts, the nature of the dispute, and the relief sought, and (ii) request an informal meeting by phone, by electronic media (such as a video conference), or in-person to attempt to resolve the dispute. Following such a request, each Party must make available a person with authority to resolve the dispute to attend the meeting. The meeting must be scheduled for at least one hour, but it may be shorter at the option of the Party requesting the meeting. The meeting must be scheduled at a time and in a manner agreeable to the Party receiving the request within three business days of the Party's receipt of the request for a meeting and shall occur within 10 business days of that Party's receipt of the request for a meeting. If a dispute involves technical issues, persons with sufficient technical expertise and familiarity with the issues in dispute from each Party must also attend the informal meeting.

15.2. Additional Mechanisms for Resolution

If an informal meeting between the Parties does not resolve the dispute, the Parties may mutually agree to further discussions, or mediation. If the Parties decide to mediate the dispute, the Parties must mutually agree upon a mediator to assist them in resolving their differences. Any reasonable expenses incidental to mediation must be borne equally by the Parties. If the Parties fail to resolve their dispute through mediation, either Party may pursue a remedy by way of formal legal action brought in King County Superior Court. Each Party will be responsible for the payment of their own attorneys' fees.

16. Distributed Energy Resources Equipment Requirements

16.1. Introduction

Applicants must comply with relevant codes and industry standards as listed in Chapter 5 and cited throughout this Handbook. In addition, specific equipment requirements for inverter settings, safety disconnect switches, effective grounding, protection devices, metering, Anti-Islanding detection, and other aspects of equipment performance are described below.

16.2. Adoption of IEEE 1547-2018 and City Light Inverter and Other Settings

Any proposed DER that is an IBR must comply with IEEE 1547-2018 Category B for reactive power and voltage regulation capabilities and IEEE 1547-2018 Category III for response to Abnormal Operating Conditions. Any proposed DER that is a Machine-Based Resource must comply with IEEE 1547-2018 Category A for reactive power and voltage regulation capabilities and IEEE 1547-2018 Category I for response to Abnormal Operating Conditions. **Table 16.2** summarizes required settings for different types of DER pertinent to this section.

TABLE 16.2. SELECTED DER SETTINGS REQUIREMENTS UNDER IEEE 1547-2018

DER Type	Normal Operating Conditions: Performance Category	Abnormal Operating Conditions: Performance Category
IBR	Category B	Category III
Machine-Based Resource	Category A	Category I

Any proposed DER that is an IBR must adopt City Light's default inverter settings, unless otherwise determined by City Light's engineering review and included in the Applicant's IA. For reference, City Light's default inverter settings, which follow IEEE 1547-2018 default settings, are summarized in Appendix C.

16.3. Safety Disconnect Switches

To assure compliance with State of Washington worker safety laws, for all proposed DER the Applicant must include a safety disconnect switch capable of fully disconnecting the DER from the City Light electrical grid. The safety disconnect switch must meet the requirements specified in City Light Construction Standard 0097.03 *(Installation of Solar Generation Facilities)* in the *Standards for Electric Service*.

The location of the safety disconnect switch must be shown on the site plan for the proposed DER. For an example one-line diagram showing the safety disconnect switch, see City Light Construction Standard 0097.03.

16.4. Effective Grounding

Any proposed DER that is an IBR must use equipment listed to UL 1741 SB and comply with the effective grounding requirements in IEEE 1547-2018. These IEEE requirements (with IEEE 1547-2018 subclause references in parentheses) include that: (i) the DER grounding scheme must not impact City Light's existing ground fault protection system (subclause 4.12), (ii) the DER must limit its contribution to over-voltage over one fundamental frequency period (subclause 7.4.1), and (iii) the DER must limit its contribution to cumulative instantaneous over-voltages within the fundamental frequency periods (subclause 7.4.2).

Any proposed DER that is an IBR and further subject to an impact study or facilities study (per Chapter 10) may also be studied by City Light and expected to adhere to the effective grounding requirements in IEEE C62.92.6-2017 (Guide for Application of Neutral Grounding in Electrical Utility Systems, Part VI--Systems Supplied by Current-Regulated Sources). That standard's criteria may be used by City Light to determine if the DER, as configured, would be effectively grounded once the proposed DER is interconnected or will require additional measures to achieve effective grounding. As needed, City Light will specify the additional effective grounding measures required based on IEEE C62.92.6-2017 and other applicable standards or guidelines.

16.5. Protective Function and Equipment Requirements

Machine-Based Resources must meet ANSI/IEEE C37.90 *(Standard for Relays and Relay Systems Associated with Electric Power Apparatus)*.

The remainder of the requirements in this section, except those in Section 16.5.6, are applicable to all Applicants proposing the interconnection of IBRs. These requirements are in addition to those specified earlier in this document that any proposed IBR must use an UL 1741 SB certified inverter.

Closed transition transfer switches between a single Utility source and a DER are generally not allowed on the Looped Radial System and are not allowed on the Network System (see Chapter 17). Such switches can be allowed on the Looped Radial System only upon written permission from City Light.

AHJ requirements may further specify actual installation components.

16.5.1. Overcurrent Protection

The DER is required to protect the Electrical Distribution System from overcurrent caused by a short circuit fault behind the DER's PCC (on the Applicant's side of the PCC).

For all IBRs, certified utility-grade overcurrent protection device(s) are required. The overcurrent protection device(s) (ANSI Device Numbers 50/51) must be capable of interrupting the maximum available Fault Current expected at the PCC and coordinate with City Light's protection system.

In accordance with *IEEE 1547-2018* (subclause 6.2.1), the DER must cease to energize and must trip for short circuit faults on the Electrical Distribution System.

16.5.2. Ground Fault Protection

The DER is required to detect and protect the Electrical Distribution System from a ground fault behind the DER's PCC.

For all IBRs, certified utility-grade ground fault device(s) are required. The ground fault protection device(s) (ANSI Device Number 51N) must be capable of interrupting the maximum available ground Fault Current expected at the PCC and coordinate with City Light's protection system.

In accordance with *IEEE 1547-2018* (subclause 6.4), the DER must cease to energize and must trip for ground faults on the Electrical Distribution System.

16.5.3. Open-Phase Protection

The DER is required to detect and protect the Electrical Distribution System from an open-phase fault behind the DER's PCC. Depending on the relationship of the DER to the PCC, the following additional requirements apply:

- If the IBR's inverter terminals represent the PCC, the certified inverter's internal open-phase protection functions are the only required protection.
- If the IBR's inverter terminals do not represent the PCC, the DER must use certified utility-grade open-phase protection functions.

In accordance with *IEEE 1547-2018* (subclause 6.2.2), the DER must cease to energize and trip for any open-phase condition at the PCC.

16.5.4. Under-Voltage and Over-Voltage Protection and Ride-Through Requirements

The DER must provide under- and over-voltage protection in accordance with IEEE 1547-2018 (subclause 6.4.1). The default voltage tripping thresholds and clearing times must comply with the default settings specified in IEEE 1547-2018 (Table 13 for Category III). The DER must also comply with the voltage disturbance ride-through requirements specified in IEEE 1547-2018 (subclause 6.4.2 Table 16 for Category III). In addition, the following requirements apply to DER of different Nameplate Capacity:

- If the IBR has a Nameplate Capacity of 500 kW or less, the certified inverter's internal under- and over-voltage relays are the only required protection unless City Light identifies additional protective requirements during engineering reviews.
- If the IBR has a Nameplate Capacity above 500 kW, the DER must use certified utility-grade relays to provide under- and over-voltage protection and meet ride-through requirements.

16.5.5. Under-Frequency and Over-Frequency Protection and Ride-Through Requirements

The DER must provide under- and over-frequency protection in accordance with IEEE 1547-2018 (subclause 6.5.1). The default frequency tripping thresholds and clearing times shall comply with the default settings specified in IEEE 1547-2018 (Table 18). The DER must also comply with the frequency disturbance ride-through requirements specified in IEEE 1547-2018 (subclause 6.5.2 Table 19). In addition, the following requirements apply to DER of different Nameplate Capacity:

- If the IBR has a Nameplate Capacity of 500 kW or less, the certified inverter’s internal under- and over-frequency relays are the only required protection unless City Light identifies additional protective requirements during engineering reviews.
- If the IBR has a Nameplate Capacity above 500 kW, the DER must use certified utility-grade relays to provide under- and over-frequency protection and meet ride-through requirements.

16.5.6. Non-Export Protection in the Looped Radial System

If the Applicant seeks for the proposed DER to be interconnected with a Feeder on the Looped Radial System but does not seek for the DER to export power across the PCC, the DER must implement at least one of the following three Protective Function schemes:

- The first Protective Function scheme is for the DER to use a Power Control System (PCS) certified to meet UL 1741 CRD for PCS that has been tested within that UL 1741 standard to limit power export from all sources. The proposed DER’s PCS must be set to an operating mode to restrict power export from all sources across the PCC.
- The second Protective Function scheme addresses the need for Nameplate Capacity to be small compared to its Host Facility's anticipated minimum load, so additional Protective Functions are not required. Specifically, this scheme requires that the Nameplate Capacity does not exceed 50% of the Host Facility's minimum load (i.e., Daytime Minimum Load if the proposed DER is standalone solar PV, or Absolute Minimum Load for all other types of DER) over the past 12 months. If historical Host Facility minimum load data are not available, 5% of the Host Facility's maximum load of the previous year or a good faith estimate of the Host Facility minimum load must be used.
- The third Protective Function scheme is for the Applicant to install a reverse power flow relay to protect City Light from inadvertent export and to ensure the DER must not export power to the Electrical Distribution System.

16.6. Metering

16.6.1. Compliance with Utility Metering Requirements

All aspects of DER metering must meet City Light requirements as defined in this *Handbook*, the Applicant's IA, and the rules of any Utility rates and programs under which the Applicant is served.

In all cases, installation of DER equipment must meet clearance and Working Space requirements for Utility meters as specified in Seattle City Light Construction Standard Numbers 1554.33 *(Meter Mounting Configurations, Height, Working Space, and Clearances, Exterior (Outdoor))* and 1554.42 *(Meter Height, Dedicated Equipment Space, Working Space, and Clearances, Equipment Rooms)* in the *Standards for Electric Service*.

In addition, certain modifications made to the Applicant's electric service at an existing service location will require the Applicant to bring its entire electric service up to current City Light construction standards. Refer to Chapter 3 in the *RESC* for a list of such modifications.

16.6.2. Meter Labeling

The Applicant must post common, permanent labeling, furnished or approved by City Light and in accordance with the NEC and local electrical code requirements, on the meter base, disconnects, and transformers informing working personnel that a DER is located on the premises. In particular, the labeling must comply with NEC 110.21 (B), and any production meter that is required by City Light must be labeled as "PRODUCTION METER."

16.6.3. Line Side Taps

Line side taps are not allowed in meter sockets or current transformer (CT) cabinets or other enclosures.

16.6.4. Net Metering and Large Customer Renewable Generation Programs

For Applicants to the Net Metering and Large Customer Renewable Generation programs, City Light will install, own, and maintain a kWh meter or meters capable of registering the bi-directional flow of electricity at the PCC. The meter(s) will meet or exceed all applicable accuracy standards. The meter(s) may measure parameters, including the time of delivery, power factor, and voltage. The Applicant must provide space for the associated metering equipment. The Applicant must also provide the CT enclosure (if required), meter socket(s), and junction box after City Light approves the Applicant's DER drawings and equipment specifications, as reflected or incorporated by reference in a fully signed IA.

For more information on City Light's Net Metering and Large Customer Renewable Generation programs, click on "City Light Solar Programs" at https://seattle.gov/city-light/residential-services/home-energy-solutions/solar-power#citylightsolarprograms and https://seattle.gov/city-light/business-solutions/renewable-energy-services/solar-programs-for-businesses#citylightsolarprograms for residential and business Customers, respectively.

16.6.5. Utility-Owned Production Metering

If production metering is required by City Light for participation in a Utility program, the Applicant must provide space for Utility-owned production metering equipment. The Applicant must also provide the CT enclosure (if required), meter socket(s), and junction box after City Light approves the Applicant's DER drawings and equipment specifications, as reflected or incorporated by reference in a fully signed IA.

Any production meter must be installed between the AC output of the DER electricity generation source and any Applicant electricity consumption loads or energy storage systems. When connected behind a production meter, any energy storage system (whether in an AC-coupled or DC-coupled design) must be configured to only charge from the DER electricity generation source.

16.6.6. Metering Costs

To the extent identified in the IA or in the requirements of a Utility program in which the Applicant participates, the Applicant must be responsible for metering costs per the most recent edition of DPP 500 P III-305.

16.7. Anti-Islanding Detection

IBRs without any form of energy storage are intrinsically Anti-Islanding and must comply with requirements for detecting Unintentional Islanding. Specifically, IBRs without any form of energy storage and of any size and location must:

- Be certified under UL 1741 SB.
- Comply with the Unintentional Islanding requirements in IEEE 1547-2018 (subclause 8.1), including the following requirement for an Unintentional Island: the Interconnection Customer's DER must detect the island, cease to energize, and trip within two seconds of island formation.
- Set the default activation status of the UL 1741 SB Anti-Islanding function as "activated."

Additional Islanding-related requirements apply to IBRs without any form of energy storage of these sizes and interconnection locations:

- If the DER has a Nameplate Capacity of 500 kW or less and is proposed to be interconnected with a secondary distribution line, the certified inverter's internal Protective Functions are the only required protection unless City Light identifies additional protective requirements during engineering reviews.
- If the DER has a Nameplate Capacity above 500 kW, City Light may require a Direct Transfer Trip, reclose-blocking on some of the automatic reclosing devices, PCC recloser, or equivalent Protective Function. Direct Transfer Trip must be implemented via external protection equipment.

16.8. Additional Equipment Performance Requirements

DER performance requirements on six additional topics are described below.

16.8.1. Electrical Connection of DER on a Split-Phase Power System

DER interconnected with a single-phase, three-wire system (i.e., 120/240-volt electric service on the secondary side of the transformer) must be rated for 240-volt and connected line-to-line.

16.8.2. Enter and Return to Service Parameters

The DER must not enter service or return to service after a trip until the Electrical Distribution System voltage and frequency at the PCC are within the default enter service criteria settings specified in IEEE 1547-2018 (subclause 4.10.2 Table 4). The DER must be configured to delay enter service for 300 seconds.

DER performance during the enter service and return to service periods must comply with IEEE 1547-2018 (subclause 4.10.3) to prevent all DER from exporting maximum power instantaneously at initial start-up or after grid voltage and frequency recovers after a grid outage. The DER must be configured for a 300-second linear ramp period to avoid instantaneous injection.

16.8.3. Voltage Regulation

The DER must not cause voltages as measured at the PCC to go outside the requirements of the latest version of ANSI C84.1 (American National Standard for Electric Power Systems and Equipment-Voltage Ratings), Range A.

The DER must be capable of the voltage and reactive/active power control functions in accordance with *IEEE 1547-2018* (Table 6 Category B: constant power factor mode, voltage-reactive power mode, active power-reactive power mode, constant-reactive power mode, and voltage-active power mode). The default voltage and reactive power control function must be constant power factor mode set to unity power factor, unless otherwise specified by City Light. Since only one voltage and reactive power control function can be enabled at a time, the other three voltage and reactive power control functions (voltage-reactive power mode, active power-reactive power mode, and constant-reactive power mode) must be disabled, and selectable settings shall be set to the *IEEE 1547-2018* default settings. Also, the voltage and active power control function, voltage-active power mode, must be disabled, and selectable settings must be set to the *IEEE 1547-2018* default settings. In addition, the DER must be capable of the reactive power injection and absorption specified in *IEEE 1547-2018* (subclause 5.2 Table 7 Category B).

Inverter-based energy storage systems must be capable of operating the voltage and reactive/active power control functions in 4-quadrants.

16.8.4. Flicker

The DER's contribution to flicker must adhere to Utility-established voltage flicker limits as specified in City Light Construction Standard Number 0041.05 *(Voltage Flicker Limits)* in the *Standards for Electric Service.*

16.8.5. Harmonics

The harmonic control of the DER must comply with IEEE 519-2022 *(Standard for Harmonic Control in Electric Power Systems)*.

16.8.6. Frequency Droop

The DER must operate with frequency-droop for low-frequency and high-frequency conditions in accordance with *IEEE 1547-2018* (Table 22 Category III) and comply with the default frequency-droop operating settings in *IEEE 1547-2018* (Table 24 Category III).

17. Additional Equipment Requirements for Parallel Operation on the Network System

In addition to the requirements described throughout this document for DER interconnection with the Looped Radial System, there are additional requirements in this chapter governing DER interconnection with the Network System. These additional requirements help ensure electric power quality and reliability as well as the safety of City Light employees and contractors who maintain the Network System.

Only IBRs are eligible to interconnect with the Network System. While an Applicant's proposed DER may generate power to offset on-site consumption load, the proposed DER is not allowed to export power to the Network System at any time. Moreover, an Applicant seeking interconnection with the Network System must also provide evidence to the satisfaction of City Light that its DER will never result in reverse current flow (i.e., export of power) through the Utility's network protectors and must not create adverse operational scenarios on the Electrical Distribution System.

The Applicant must install a reverse power flow relay to protect City Light from inadvertent power export from the DER to the Electrical Distribution System. All DER must follow the requirements for protective relays in City Light Construction Standard 0097.03 *(Installation of Solar Generation Facilities)* in the *Standards for Electric Service*.

Additional or alternative Protective Function schemes or other equipment to prevent power export to the Electrical Distribution System may be installed on a case-by-case basis only upon review and approval by City Light's Network Engineering Group. All protection relays or other equipment required by City Light for interconnection of DER on the Network System must be installed at the Applicant's expense.

Closed transition transfer switches are not allowed on the Network System. A proposed DER associated with Applicant electrical loads must "break" existing connection to the Electrical Distribution System before the DER can "make" connection with the Applicant's consumption load.

18. Additional Technology-Specific Requirements

18.1. Introduction

Requirements beyond those addressed earlier in this document and specific to certain DER equipment types are listed below.

18.2. PV Panels

PV panels must be certified compliant with *UL 61730 (Standard for Photovoltaic (PV) Module Safety Qualification, Part 1 and Part 2)*.

18.3. Plug-In Inverter-Based Resources

In all instances, plug-in inverter electrical generators that connect to the Applicant's electrical system through an electrical outlet (e.g., a wall outlet) are not approved by City Light to Operate in Parallel with the Electrical Distribution System. That is because interconnecting such devices would pose a safety and reliability concern to the public and City Light employees due to the ability of the Customer to move the plug-in generator to any electrical outlet at its premises, thereby violating *NEC 705.12(A) (Load-Side Source Connections: Dedicated Overcurrent and Disconnect)*.

18.4. Energy Storage Systems

Because energy storage systems are both electricity production sources and loads to the Electrical Distribution System when they are respectively discharging and charging, the meter enclosure and service entrance conductors for DER with a supply-side PCC must be sized to accommodate the sum of the main service disconnect(s) and the DER service disconnect.

All energy storage systems must also be certified compliant with *UL 9540 (Standard for Energy Storage Systems and Equipment)*.

18.5. Microgrids

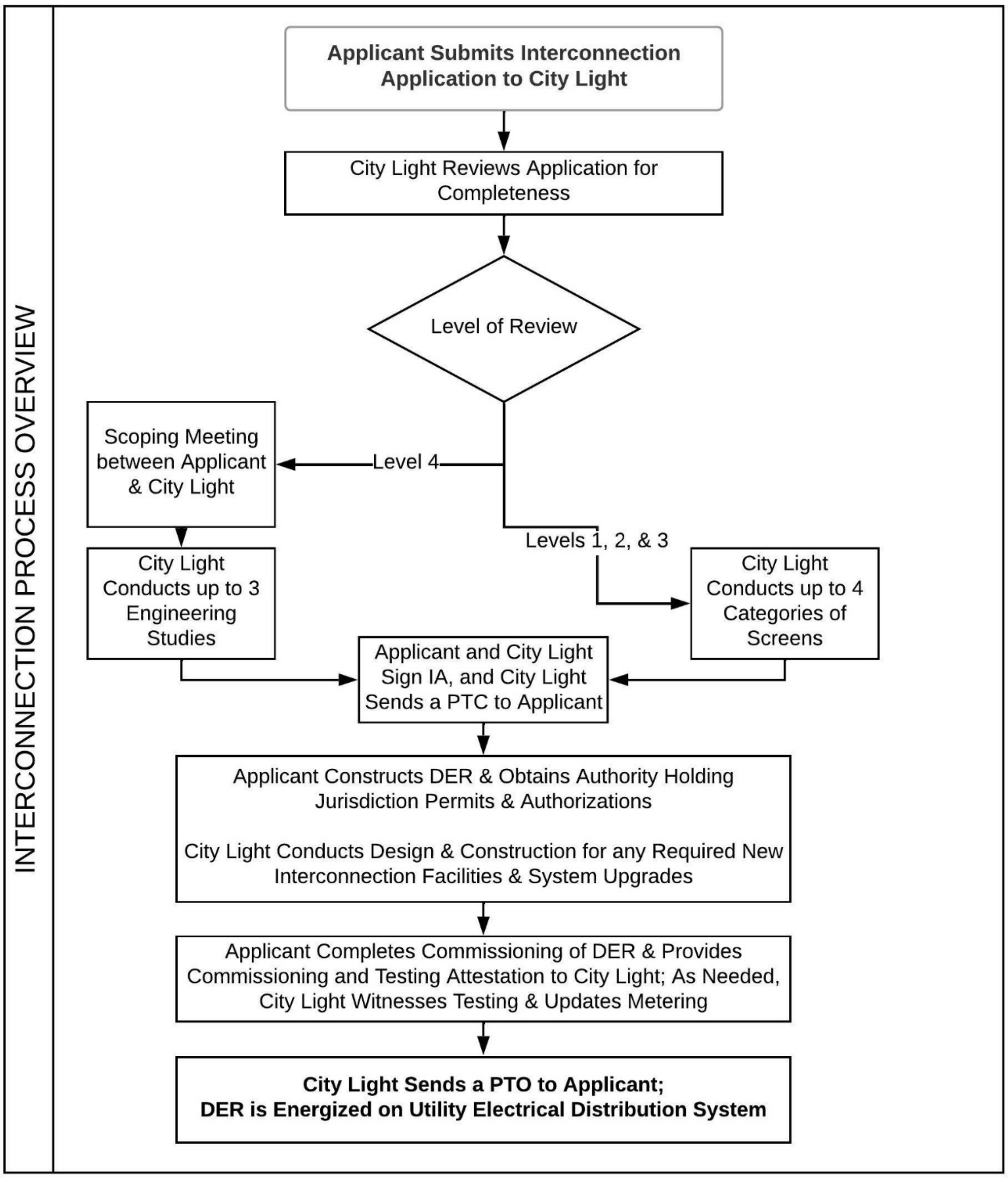
Each DER application for a Microgrid will be reviewed by City Light on a case-by-case basis to ensure safe and reliable operation of the Electrical Distribution System. City Light may review factors including but not limited to the proposed Microgrid's: configuration and DER(s) and electrical load(s) therein, operating characteristics, Protective Function and control schemes, Supervisory Control and Data Acquisition (SCADA) system, and metering.

This case-by-case approach is warranted because each Microgrid may be technically distinct, and even similarly designed Microgrids connected at different locations on the Electrical Distribution System and/or with different operating scenarios may have different technical requirements. Due to this case-by-case approach, the timelines recorded elsewhere in this Handbook for the review of DER are not applicable to proposed Microgrids.

Appendix A: Interconnection Process Flow Chart

Figure A provides a simplified, high-level overview of the City Light interconnection process for DER, with the process beginning at the top and concluding at the bottom of the chart. Because the chart is simplified and timelines vary for interconnection steps based on whether the application is assigned to Level 1, 2, 3, or 4 review, no timelines are included. “IA” denotes Interconnection Agreement, “PTC” denotes Permission to Construct Letter, and “PTO” denotes Permission to Operate Letter.

Figure A. High-Level Overview of City Light Interconnection Process for DER



Appendix B: Commissioning and Testing Attestation Form: Example

Seattle City Light

Distributed Energy Resources (DER) Commissioning & Testing Attestation

Satisfactory completion and signature of this attestation form by the Customer is required before Seattle City Light (City Light) will issue a Permission to Operate Letter (PTO) for the Customer's proposed DER. Receipt of a PTO by the Customer is required before the referenced distributed energy resource can be energized to Operate in Parallel with the City Light Electrical Distribution System.

Capitalized terms in this form are defined in City Light's DER Interconnection Handbook.

Section 1: DER Information

Customer Name (as it appears on City Light bill):________________________________

DER Address:____

Type of DER (standalone PV, PV + battery storage, or standalone battery storage):

____

Nameplate Capacity (kW-AC): ____

Installer Company Name (leave blank if Customer self-installed DER):______________

Installer Company Phone #(leave blank if Customer self-installed DER):_____________

Installer Company E-mail (leave blank if Customer self-installed DER):_____________

Section 2: Attestations

To complete the attestation, carefully review each item on the checklist and mark the checkbox if your proposed DER meets the stated requirement and the requirement is applicable to your DER. Once all applicable items are addressed, please read the attestation statement at the bottom then sign and date in the designated area. Return the signed attestation to the Electrical Service Representative (ESR) or Electrical Service Engineer (ESE) assigned to your proposed DER.

Addendum A: DER Commissioning & Testing Attestation Page 1

1. **DER Configuration**

    - ☐ The DER has been configured, sited, and installed exactly as indicated in the original interconnection application; or

    - ☐ Changes to the original configuration were made and updated documentation (e.g., one-line diagram) was provided to City Light prior to City Light's issuance of a Permission to Construct Letter. The DER has been configured, sited, and installed exactly as indicated by the updated documentation that I submitted.

2. **Installer Licensure & Permits**

    - ☐ The DER installer is licensed or otherwise approved to perform DER installations by the City of Seattle or other pertinent Authority Having Jurisdiction (AHJ).

    - ☐ The DER installation possesses all necessary electrical and other, as required, permits and authorizations from the pertinent AHJ.

3. **Safety**

    - ☐ The DER has appropriate signage and labeling, including emergency contact information and safety warnings. For PV systems, signage shall adhere to the National Electrical Code (NEC) Article 690.
    - ☐ I possess standard manuals describing the configuration, installation, and operation of all DER equipment in paper or electronic form.

Section 3: Commissioning & Testing

Before energizing the DER to Operate in Parallel with the Electrical Distribution System, the Customer or the DER installer on behalf of the Customer shall perform the following tests and/or validations as applicable to your DER type:

- ☐ Safety Disconnect Switch meets all applicable Utility requirements (see City Light Construction Standard 0097.03, available at: https://web8.seattle.gov/city-light-engineering-standards/StandardsforElectricService).

- ☐ Inverter start-up and shutdown (for Inverter Based Resources).

- ☐ Full DER start-up and shutdown (for Machine-Based Resources).

- ☐ Inverter Anti-Islanding protection (for Inverter Based Resources).

- ☐ Voltage and frequency ride-through settings.
- ☐ DER electricity output and consumption data can be accurately reported.
- ☐ City Light DER inverter settings applied (for Inverter-Based Resources; see Appendix C in *DER Interconnection Handbook*).
- Limits on DER Export of Power to the Electrical Distribution System (if applicable):
    - ☐ The DER has been configured to not export in excess of ___kW-AC (Please enter export limit in the preceding blank. DER to be interconnected to the Network System are not allowed to export power and should enter "0" in the blank. DER to be interconnected to the Looped Radial System typically do not have export limits, but those with limits must enter them).
    - ☐ The export limiting method has been tested to verify correct operation.
    - ☐ The export limiting configuration has been locked or otherwise made inaccessible to the Customer to prevent tampering or changes.
    - ☐ I acknowledge that altering or disabling export limiting without Utility approval may result in disconnection, revocation of interconnection approval, and/or liability for impacts to the Electrical Distribution System.
- ☐ All protection systems and associated devices required by the approved DER interconnection design have been properly installed, configured, and tested. The required protection relays are properly connected to the instrument transformers and operate the proper interrupting devices. These protection systems and associated devices include where applicable:
    - Current transformers
    - Potential transformers
    - Surge arresters
    - Protection relays (overload current, short circuit, ground fault, over/under voltage, over/under frequency)

City Light reserves the right, but does not have the obligation, to witness DER testing. City Light shall not be responsible for performing DER tests in any circumstance. The Applicant must provide qualified personnel to execute all tests.

Section 4: Interconnection Applicant Certification

I, the undersigned, certify that this form is accurate and complete in all respects. I also understand that I may not energize my proposed DER until I receive a PTO from City Light. If I energize the DER before receipt of a PTO, City Light may disconnect the DER until it is fully in compliance with Utility interconnection requirements and take other remedial actions as called for in my Interconnection Agreement.

Name of Customer Signer (printed): ____

Customer Signature: ______________________________

Date of Signature: _________________________

Appendix C: Default Inverter Settings

Table C lists City Light's default inverter settings that are applicable to interconnection applications of IBRs. See Chapter 16 for more information. This list applies only to inverter settings, not other types of settings or Utility or industry standards identified in this *Handbook*.

TABLE C. CITY LIGHT DEFAULT INVERTER SETTINGS

Inverter Type	Setting	Corresponding Section of This Handbook
Abnormal Operating Conditions: Performance Category	IEEE 1547-2018 Category III	16.2
Normal Operating Conditions: Voltage Support Performance Category	IEEE 1547-2018 Category B	16.2
Voltage Trip	IEEE 1547-2018 Defaults in Table 13	16.5.4
Frequency Trip	IEEE 1547-2018 Defaults in Table 18	16.5.5
Enter Service Criteria	IEEE 1547-2018 Defaults in Table 4	16.8.2
Enter Service Delay	300 seconds per IEEE 1547-2018 Default	16.8.2
Enter Service Ramp Time	300 seconds per IEEE 1547-2018 Default	16.8.2
Enter Service Ramp Characteristics	Linear	16.8.2
Constant Power Factor Mode	Enabled per IEEE 1547-2018 Default	16.8.3
Constant Power Factor	1 per IEEE 1547-2018 Default	16.8.3
Voltage-Reactive Power Mode	Disabled	16.8.3
Voltage-Reactive Power	IEEE 1547-2018 Defaults in Table 8	16.8.3
Active Power-Reactive Power Mode	Disabled	16.8.3
Active Power-Reactive Power	IEEE 1547-2018 Defaults in Table 9	16.8.3
Constant-Reactive Power Mode	Disabled	16.8.3
Constant-Reactive Power	Constant reactive power set to 0% of nameplate apparent power	16.8.3
Voltage-Active Power Mode	Disabled	16.8.3
Voltage-Active Power	IEEE 1547-2018 Defaults in Table 10	16.8.3
Frequency Droop	IEEE 1547-2018 Defaults in Table 24	16.8.6