

Generator Information Package

Revision List

Rev #	Date	Changes By	Comments
0	June 1, 2011	Joe McVety, P.Eng	Initial Release
1	July 30, 2012	Joe McVety, P.Eng	Various formatting corrections
2	June 19, 2013	Joe McVety, P.Eng	Updated Technical Requirements
3	May 22, 2015	Joe McVety, P.Eng	Updated content with latest available information
4	November 5, 2024	Daniel Dillon, P. Eng	Updated content with latest available information

Table of Contents

1. Process and capacity tables
2. DERCP
3. PCIR
4. Micro-generation Connection Request Form
5. Micro-generation Connection Agreement
6. CIA Application
7. CIA Application Instructions
8. CIA Study Agreement and Fee Schedule
9. Connection Agreement (small to large)
10. Synergy North Parallel Generator Technical Requirements
11. Sample Protections Philosophy
12. Connection Request Form
13. COVER

a)

Connection Process					
Step	Description	micro	small	mid-sized	large
1	Request information from SYNERGY NORTH	generator.connections@synergynorth.ca			
2	Request information from ESA	www.esasafe.com 1.877.ESA.SAFE			
3	Obtain contracts for any IESO programs (if applicable)	http://www.ieso.ca			
4	Complete a Preliminary Consultation Information Request (PCIR)	SYNERGY NORTH PCIR Form.pdf			
5	Submit application including preliminary design to SYNERGY NORTH	Micro-Generation Connection Request Form.pdf	SYNERGY NORTH CIA Form.pdf SYNERGY NORTH CIA Instructions.pdf CIA Study Agreement with Fee Schedule.pdf		
6	SYNERGY NORTH responds with connection requirements and Estimate to Connect	•	•		
7	Apply for CCA	CCA Application Form.pdf			
8	Execute CCA / Sign ETC and provide deposit	•	•	•	•
9	Submit Detailed Design for review	Detailed Design Submission Form.doc			
10	Project Construction	•			
11	Execute DCA	Micro Gen Connection Agreement.pdf	Connection Agreement - small.pdf	OEB Connection Agreement	
12	Request ESA Inspection	•			
13	Submit Commissioning Plan		•	•	•
14	Submit Generator Licence and Regulatory Approvals				•
15	SYNERGY NORTH Receives ESA Certificate	•			
16	Pre-Energization Commissioning Activies and COVER		COVER Document.docx		
17	Submit Connection Request to SYNERGY NORTH	•	Generation Connection Request Form.pdf		
18	SYNERGY NORTH Inspection	•			
19	Energization	•			
20	Post-Energization Commissioning Activies and COVER		COVER Document.docx		
21	Apply for COD for any IESO/OPA programs (if applicable)	•			
22	SYNERGY NORTH provides confirmation to IESO/OPA on its ability to settle accounts	•			

b)

Required Approvals					
	Description	micro	small	mid-sized	large
1	SYNERGY NORTH Preliminary Assessment	•			
2	IESO Contract (required if settlement is part of an IESO/OPA program)	•			
3	Connection Impact Assessment		•		
4	Customer Impact Assessment & System Impact Assessment				•
5	OEB Generator license (> 500kW)		•		
5	IESO Registration			•	
6	Renewable Energy Approval (rooftop installations are exluded)		•		

c)

Technical Requirements					
	Description	micro	small	mid-sized	large
1	Metering Requirements (Power Export)	Parallel Generation Requirements			
2	Metering Requirements (Load Displacement)	Parallel Generation Requirements			
3	OEB DERCP	DERCP			
4	Sample Protections Philosopohy	Protection Philosophy for DER Connections			

Stations - Available Capacity		Thermal Capacity		SC Cap.
Stn	Description	MVA		MVA *
2	Port Arthur TS #1 (25kV)	31.0		8.4
4	Vickers St SS (4kV)	2.1		39.2
5	Donald St SS (4kV)	1.9		32.9
10	Fort William TS (25kV)	69.7		266.4
11	High St SS (4kV)	3.7		111.4
12	Camelot St SS (4kV)	4.5		100.6
14	Algoma St SS (4kV)	1.8		99.3
16	MacDonnel St SS (4kV)	3.0		53.6
17	Birch TS (25kV)	65.1		200.7
18	Balsam St T2 (12kV)	67.3		333.8
19	Broadway Ave SS (12kV)	3.5		163.8
21	Windemere Ave SS (4kV)	2.7		62.0
23	Alice Ave SS (12kV)	3.8		158.6
36	Mapleward Rd SS (12kV)	1.3		152.2
1501	Kenora MTS (12kV)	30.5		105.9

NOTE: contact Synergy North to determine the feeder designation which applies to your projec

Feeders - Available Capacity		Thermal Capacity (kVA)	
Feeder	Additional Dependants	micro & small	mid-sided & large **
02M1	Port Arthur TS	324	16,847
02M2	Port Arthur TS	1,994	16,789
02M3	Port Arthur TS	346	16,847
02M4	Port Arthur TS	1,457	16,641
02M5	Port Arthur TS	813	16,839
04F4	Vickers St SS, 10M1, Fort William TS	142	1,422
05F4	Donald St SS, 10M7, Fort William TS	31	2,023
10M1	Fort William TS	1,611	16,428
10M2	Fort William TS	281	16,847
10M3	Fort William TS	2,961	16,163
10M4	Fort William TS	990	16,692
10M5	Fort William TS	1,404	7,947
10M6	Fort William TS	1,185	16,671
10M7	Fort William TS	1,742	16,796
10M8	Fort William TS	1,018	9,569
10M9	Fort William TS	1,800	16,703
10M10	Fort William TS	1,124	14,631
11F1	High St SS, 2M4, Port Arthur TS #1	126	1,916
11F2	High St SS, 2M4, Port Arthur TS #1	43	2,404
11F4	High St SS, 2M4, Port Arthur TS #1	174	1,910
12F2	Camelot St SS, 2M2, Port Arthur TS #1	141	2,394
12F3	Camelot St SS, 2M2, Port Arthur TS #1	162	2,810
12F4	Camelot St SS, 2M2, Port Arthur TS #1	172	2,374
12F5	Camelot St SS, 2M2, Port Arthur TS #1	234	2,810
16F2	MacDonnel St SS, 17M7, Birch TS	193	1,485
16F5	MacDonnel St SS, 17M7, Birch TS	26	1,496
17M1	Birch TS	1,304	16,337
17M2	Birch TS	807	16,185
17M3	Birch TS	1,104	14,763
17M4	Birch TS	2,011	16,784
17M5	Birch TS	2,791	16,679
17M6	Birch TS	1,938	16,668
17M7	Birch TS	615	16,728
17M8	Birch TS	2,108	14,833
18F7	Balsam St SS, 2M5, Port Arthur TS #1	237	4,402
19F1	Broadway Ave SS, 10M8, Fort William TS	222	8,392
21F1	Windemere Ave SS, 17M4, Birch TS	140	1,920
21F4	Windemere Ave SS, 17M4, Birch TS	111	1,920
21F6	Windemere Ave SS, 17M4, Birch TS	186	1,910
23F1	Alice Ave SS, 17M8, Birch SS	175	8,337
23F2	Alice Ave SS, 17M8, Birch SS	136	8,368
36F1	Mapleward Rd SS, 10M10, Fort William TS	143	8,324
36F2	Mapleward Rd SS, 10M10, Fort William TS	192	5,070
KFA	Kenora MTS	654	6,538
KFB	Kenora MTS	921	6,575
KFC	Kenora MTS	459	6,609
KFD	Kenora MTS	847	6,535
KFE	Kenora MTS	387	6,582
KFF	Kenora MTS	354	6,372

d)

Standard Contractual Terms and Conditions of Service	micro	small	mid-sized	large
Link to standard Terms and Conditions	Synergy North Conditions of Service			

e)

Embedded Generation Inquiries

Dan Dillon, P.Eng
Distribution Engineer
(807) 343-1037
ddillon@synergynorth.ca

List of Acronyms used on this page

CCA	Connection Cost Agreement
COD	Commercial Operation Declaration
COVER	Confirmation Of Verification Evidence Report
DCA	Distribution Connection Agreement
DERCP	Distributed Energy Resources Connections Procedures
DSC	Distribution System Code
ESA	Electrical Safety Authority
ETC	Estimate to Connect
IESO	Independent Electricity System Operator
OEB	Ontario Energy Board
OPA	Ontario Power Authority (Consolidated with the IESO as of Jan 1, 2015)
PCC	Point of Common Coupling
PCIR	Preliminary Consultation Information Request
REA	Renewable Energy Approval
SNC	Synergy North Corporation
*	Estimated based on the use of inverter connected generation
**	Requires implementation of transfer-trip technology

Generator Classification

Micro	less than or equal to 10kW
Small	a) less than or equal to 500kW (PCC voltage < 15kV) b) less than or equal to 1MW (PCC voltage > 15kV)
Mid-Sized	a) greater than 500kW, but less than 10MW (PCC voltage < 15kV) b) greater than 1MW, but less than 10MW (PCC voltage > 15kV)
Large	greater than 10MW



**Distributed Energy Resources
Connections Procedures
Version 1.0**

Release Date: December 20, 2021

Distributed Energy Resources Connections Procedures

Table of Contents

1. Purpose.....	4
2. Definitions	4
3. Distributed Energy Resources Connection Procedures Overview	5
4. Preliminary Consultation	6
4.1. Description	6
4.2. Restricted Feeder Lists	6
4.3. Preliminary Consultation Information Request.....	6
4.4. Preliminary Consultation Report	6
5. Connection Impact Assessment	8
5.1. Description	8
5.2. Application forms	9
5.3. Processes	11
5.3.1. Micro Embedded Generation Facilities	11
5.4. Processes for Small, Mid-Sized, and Large Embedded Generation Facility Projects	16
5.5. Screening Process for Small, Mid-sized, and Large Embedded Generation Facility Projects.....	16
5.6. Small Embedded Generation Facility	21
5.5. Mid-sized / Large Embedded Generation Facility	25
6. Agreements	29
6.1. Connection Agreement	29
6.2. Connection Cost Agreement	29
6.3. Connection Cost Responsibility (CCR)	32
6.4. Option to Request a More Detailed Cost Estimate	32
6.5. Build and Energization Process.....	32
7. Glossary	36
8. Appendices	38

Table of Figures

Figure 1: Distributed Energy Resources Connection Process.....	5
Figure 2: Flowchart of Timelines and Responsibilities for Micro Embedded Generation Facility Connection ...	12
Figure 3: Flowchart for Screening Process to Check that an Application is Substantially Complete	18
Figure 4: Flowchart of Timelines and Responsibilities for Small Embedded Generation Facility Connections ..	22
Figure 5: Flowchart for CIA process for Mid-sized and Large Embedded Generation Facility Connections.....	26
Figure 6: Flowchart Outlining Interactions Between Parties (Multiple Connection Agreements)	30
Figure 7: Flowchart for Build Process	33
Figure 8: PCC vs PODC (No New Distributor-Owned Line Expansion).....	36
Figure 9: PCC vs PODC (With New Distributor-Owned Line Expansion)	37

1. Purpose

The Distributed Energy Resources Connections Procedures (DERCP) document is a consolidation of the procedures, timing, workflows, and template forms issued by the Ontario Energy Board (OEB) to facilitate the communication and implementation of a standardized procedure for the connection of distributed energy resources (DERs) to distribution systems. The DERCP sets out minimum templated forms with minimum information requirements to be used by all distributors.

These requirements are given force by requirements of Chapters 3 and 6 of the Distribution System Code (DSC) as noted throughout. Compliance with the DSC is a condition of the OEB's Electricity Distributor Licence. Pursuant to the *Ontario Energy Board Act, 1998*, OEB codes, including the DSC, may incorporate by reference, in whole or in part, any standard, procedure or guideline. In case of any conflict between the DERCP and the Code, the provisions of the Code shall govern.

2. Definitions

All definitions in DSC Section 1.2 are adopted and apply in the DERCP. The most relevant definitions in the context of the DERCP are: Emergency Backup Generation Facility, exporting connection, non-exporting connection, restricted feeder, and system power.

For the purposes of the DERCP the following definitions also apply:

Applicant

An applicant means a person who approaches a distributor and requests to connect or information to connect a DER to a distributor's system.

Connection Impact Assessment (CIA)

A connection impact assessment means a study performed by or on behalf of the distribution company to assess the impact of a proposed DER connection on its system. The CIA will specify technical requirements for the connection.

Distributed Energy Resource (DER)

Distributed Energy Resource (DER) means, for the purposes of the DERCP, an electricity source or load that is connected to a distribution system, typically through a connection on the customer-side of an ownership demarcation point. Sources generate electricity (e.g. a generation facility, including an energy storage facility when discharging), while loads do not generate electricity (e.g. an energy storage facility when charging).

3. Distributed Energy Resources Connection Procedures Overview

The DERCP applies to the connection of DERs with a generating facility (including DERs with a storage facility) to a distribution system. Throughout the DERCP the term “generating facility” includes energy storage facilities. When an energy storage facility is in discharge mode, it is treated the same as a generating facility. When an energy storage facility is in charging mode, it is treated the same as a load. The DERCP applies regardless of whether the connection is expected to be exporting energy to the grid or non-exporting as both types of generation facilities contribute to short circuit current through the connection under fault conditions. For emergency backup generation facilities, customers are referred to their respective distributor’s websites for information on connection requirements.

From the distributor’s perspective, the connection process can be broken into 4 main stages once an applicant approaches the distributor for a connection. The DERCP provide process flowcharts, information requirements and template forms regarding interaction between applicants and distributors for the 4 stages.

- a. Preliminary consultation, exchange of information and capacity check
 - Planning, information exchange, capacity check
- b. Connection Impact Assessment
 - Capacity allocation
- c. Project Development
 - Project scope and cost
 - Connection Cost Agreement
- d. Build and energization
 - ESA Review and Inspections.
 - Build and Commissioning
 - Connection Agreements



Figure 1: Distributed Energy Resources Connection Process

A distributor is required by Section 6.2.3 of the DSC to maintain a location on its website that serves as a centralized repository for all the information, forms and instructions, including information on applicable fees, necessary for an applicant to apply for connection to the distributor’s system.

4. Preliminary Consultation

4.1. Description

During the initial planning phase of a project, an applicant needs to know if there are any limitations that would prevent connecting a project at a specific location on a distributor's distribution system. The DERCP provides template forms in Appendix C that a distributor must make available to an applicant pursuant to section 6.2.9 of the DSC. The applicant completes and submits a Preliminary Consultation Information Request form to the distributor. The distributor in turn responds with a Preliminary Consultation Report. A Preliminary Consultation Report is not required in order to apply for a Connection Impact Assessment. However, applicants will be expected to submit a complete Connection Impact Assessment application form, including connection information as would otherwise be provided in the Preliminary Consultation Report.

4.2. Restricted Feeder Lists

A distributor will, in accordance with the requirements of the DSC:

- a) Maintain a list¹ of feeders that it owns that have no additional short circuit capacity to accommodate a DER connection.
- b) A feeder should be included on the list whether the constraint is within the distributor's system or caused by limitations upstream in the host utility or transmitter's system.
- c) The distributor will update the list if the system changes or at least every 3 months.

4.3. Preliminary Consultation Information Request

The Preliminary Consultation Information Request (PCIR) form gathers basic information on the proposed project: contact information; project intent, size, type, and location. Through the DERCP, the OEB is providing templated forms to standardize the means by which this information is to be collected. The template form is included in Appendix A to the DERCP.

4.3.1. Where the distributor needs to add to the template PCIR form in response to unique characteristics of its system or operational needs, the distributor will advise the OEB of the changes.

4.3.2. A distributor may establish a web-based interface for the purpose of collecting this information, provided the web-based interface is consistent with Appendix A or is amended as per section 4.3.1.

4.4. Preliminary Consultation Report

The Preliminary Consultation Report (PCR) is provided by the distributor to the applicant and identifies the feasibility of a connection based on the information provided in the PCIR and the distributor's knowledge of available capacity at the proposed point of connection. The Preliminary Consultation Report will identify:

- i. If there is no possibility of connecting the project due to short circuit limitations

¹ A distributor may use an interactive tool to allow applicants to check feeder capacity for a restricted feeder.

- a. at the distribution level or
- b. at the transmission level.
- ii. That there may be connection capacity at the location subject to the completion of a CIA.

The distributor must respond to a PCIR within 15 days of receipt of a PCIR as per Section 6.2.9.1 of the DSC.

If the PCR identifies the response as (ii) above, (i.e. there may be connection capacity), it will provide information that the applicant will need to prepare for a CIA application. Any other information that the distributor considers helpful to the applicant in deciding whether to proceed to the next stage of planning (e.g., any conditions on capacity or configuration and the likelihood that the project will require transfer trip), is to be included in the notes section of the PCR. The PCR will also identify what connection studies will be required at the CIA application stage. Depending on the size and location of the project, these may include multiple CIAs (e.g. the distributor and the host distributor), as well as a connection study from the transmitter, and possibly a System Impact Assessment from the IESO.

It is important to remember that the PCR is a snapshot in time and does not reserve capacity for a project.

5. Connection Impact Assessment

5.1. Description

The next stage for the connection of a DER is the CIA. This is a study prepared by the distributor that assesses the steady state and transient reliability and stability impacts of the project at the specific location on the distribution system. The information requirements at this stage are more substantial than the preliminary consultation phase; nonetheless, applicants are cautioned that completion of a CIA does not constitute approval of the protection philosophy and SLD by the distributor. The protection philosophy and SLD will be subject to distributor review after the CIA has been issued.

Depending on the size of the project and its location within the distribution system, an additional CIA by a host distributor and/or transmitter, and/or a System Impact Assessment by the IESO may also be necessary to assess upstream system impacts. The PCR will identify for the location specified in the Preliminary Consultation Information Request the number of additional studies required. Table 1 outlines an anticipated number of additional studies required based on DER classification.

Table 1: Connection Classifications for Processing

DER Classification	Rating	Sample List of Studies
Micro	≤ 10 kW	None
Small	(a) ≤ 500 kW connected on distribution system voltage < 15 kV (b) ≤ 1 MW connected on distribution system voltage ≥ 15 kV	1. Distributor (or Embedded Distributor) 2. Host Distributor (if applicable)
Mid-Sized	(a) ≤ 10 MW but > 500 kW connected on distribution system voltage < 15 kV (b) > 1 MW but ≤ 10 MW connected on distribution system voltage ≥ 15 kV	1. Distributor (or Embedded Distributor) 2. Host Distributor (if applicable) 3. Transmitter (if applicable)
Large	> 10 MW	1. Distributor (or Embedded Distributor) 2. Host Distributor (if applicable) 3. Transmitter 4. IESO System Impact Assessment

In response to a successful CIA application (where the connection is deemed possible),

- 5.1.1. The distributor will provide the applicant with the technical requirements for connection to the distributor's system

5.1.2. The distributor will provide an estimate of the cost to facilitate the connection

5.1.3. The distributor will reserve capacity on its own system for a minimum of 180 days² pending a decision by the applicant on moving forward.

Detailed Cost Estimate

A more detailed cost estimate based on the location and size of the project is prepared at the applicant's expense as part of the Connection Cost Agreement outlined below. The applicant has the option of paying for the detailed cost estimate that would reduce the level of uncertainty before deciding on the project and before signing a connection agreement. As noted earlier, the outcome of a CIA includes: the technical requirements of the connection and an estimate of costs.

5.1.4. Upon written request by an applicant, and at the applicant's cost, the distributor shall prepare a more detailed cost estimate for the project before the applicant signs the Connection Cost Agreement.

5.2. Application forms

In accordance with DSC sections 6.2.5 and 6.2.11, the distributor must make the connection agreement for micro-embedded generation facilities and the CIA application form for all other generation facilities available on its website and in hard copy at its offices. It is preferable for applicants to be able to fill in and submit these forms electronically through email or the distributor's website. To facilitate timely and near concurrent processing of the application, applicants are encouraged to provide payment for all required studies with the application (i.e. study payments for distributor, host distributor/transmitter and IESO if required). Distributors will require payment before commencing studies. The distributor will identify on its website and in the application package the relevant study fee charges.

Micro Embedded Generation Facility

In order to apply for a connection of a micro-embedded generation facility, an applicant will submit to the distributor a copy of the Micro-Embedded Generation Facility Agreement, of the form provided in Appendix E of the DSC, with the customer portions of the Agreement completed. The applicant will provide the relevant information on the connection agreement and submit it to the distributor. If requested by the distributor, the applicant shall also provide a single line diagram and generator specification and connection information as required. The distributor will assess the project, sign the connection agreement, and proceed with the connection.

Small / Mid-sized / Large Embedded Generation Facility

For all other categories of projects, distributors must use the CIA Application template form provided by the OEB in Appendix B of this DERCP. The expectation of the OEB is that the distributor will only need to add contact information to the template prior to deploying the form. If unique

² DSC section 6.2.4.1 provides durations for capacity allocations to be reserved.

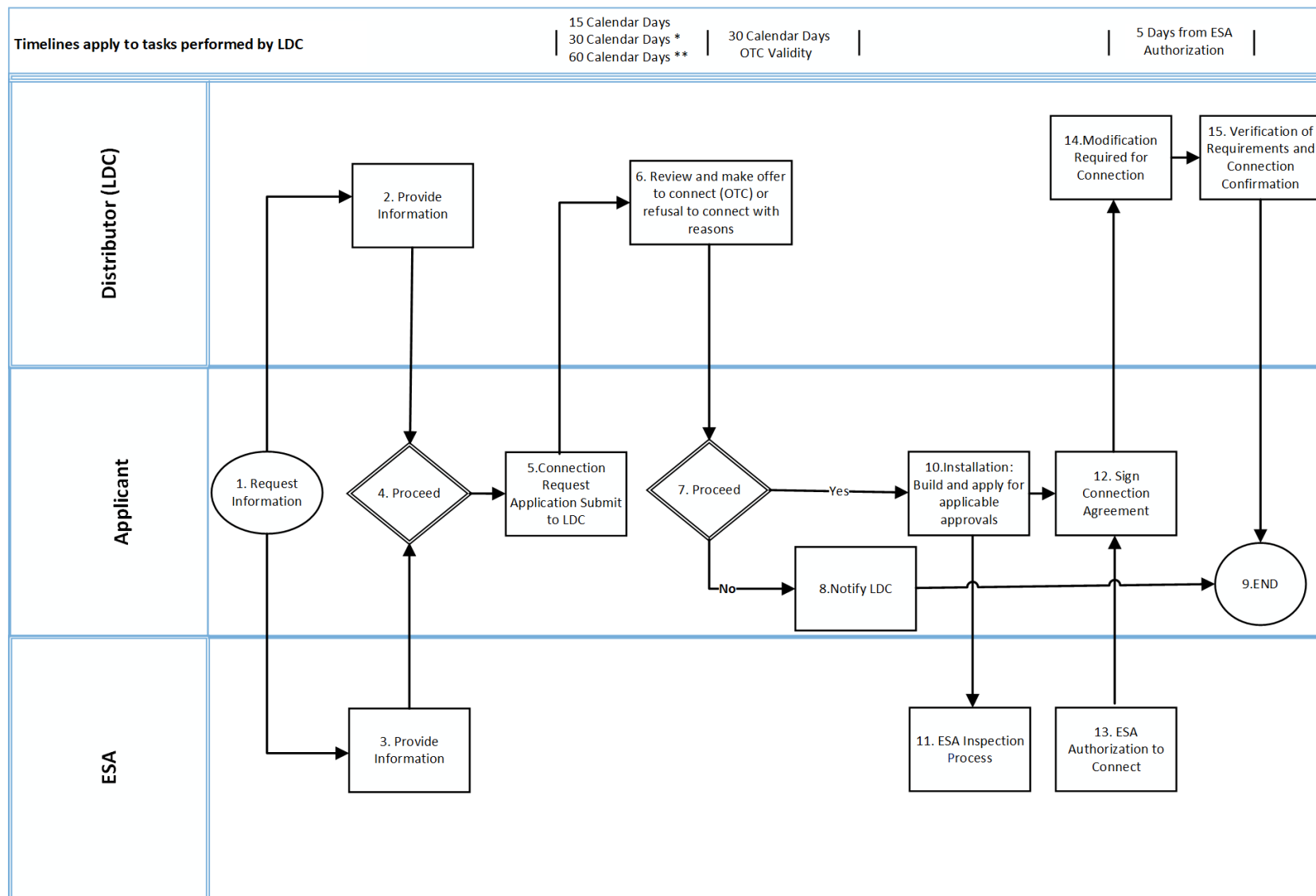
characteristics of a distributor's system require the distributor to make additions to the template form, then the revised form must be filed with the OEB.

5.3. Processes

5.3.1. Micro Embedded Generation Facilities

Micro-embedded generation facilities are equal to or less than 10 kW and are considered to pose a relatively low connection risk to the distribution system compared to larger generation facilities. The process flowchart is outlined below in *Figure 2: Flowchart of Timelines and Responsibilities for Micro Embedded Generation Facility Connection*. The distributor as per Section 6.2.6 of the DSC and applicant are expected to follow the process steps outlined below.

DER Connections: Micro-embedded Generation Facility≤10kW



* If at existing connection and site assessment needed

**If not located at existing customer connection

Figure 2: Flowchart of Timelines and Responsibilities for Micro Embedded Generation Facility Connection

Step 1 The applicant proposing the installation of a micro-embedded generation facility with a non-exporting connection contacts the distributor and the Electrical Safety Authority (ESA) to gather connection and process information.

Step 2 The distributor makes the information available to the applicant in a timely manner. The information package will include the description of the connection process approvals needed by the distributor for connection; technical requirements including metering; contractual requirements (Micro-Embedded Generation Facility Connection Agreement); and application forms.

Step 3 ESA provides information on Electrical Safety Requirements

Step 4 The applicant reviews relevant information from the distributor and the ESA on the project, and prepares:

- an installation plan, including the size/type of generation facility (i. e. load displacement/net metering/isolated from distribution system/grid connection); and
- a project plan.

Step 5 The applicant submits application to the distributor to review

Step 6 The distributor makes an offer to connect the approved DER or provides its refusal to connect with reasons within 15 calendar days

The distributor's review of an Application submitted for the connection of a micro-embedded generation facility at the existing customer connection will include:

- typical requirement for new meter only;
- check for service upgrade requirement;
- check for significant amount of other generation on feeder;
- response to the applicant with an offer to connect or refusal
- response to applicant with requirements specific to the connection (typically requirements for metering) and costs, timing to implement, etc.

Step 7 The applicant decides whether to proceed with the connection process.

Step 8. The applicant notifies the distributor that it has decided not to proceed with the connection application.

Step 9. The applicant ends the process.

Step 10 The applicant must indicate its intention to connect within the 30-day validity period of the offer to connect. The applicant must work closely with the distributor, the ESA and any other organizations from which work, inspections, approvals, or licenses are required to prevent delays.

The activities will be planned in coordination with project milestones, and it is up to the applicant to initiate actions at the required times.

Step 11 Where required by the ESA, the applicant must file a notification to receive an ESA Authorization to Connect

Step 12 The applicant reviews and signs the Connection Agreement

Step 13 ESA provides an Authorization to Connect when the installation meets all the applicable requirements of the Ontario Electrical Safety Code as determined by ESA.

Step 14 The distributor completes any work required to facilitate the connection to the distribution system

Step 15 The distributor works with the applicant to complete the connection including any testing and verification requirements

5.3.2. For an existing customer connection where a site assessment is not required, the distributor will make an offer to connect within 15 days of receiving a completed application or provide reasons for refusing to connect.

5.3.3. The distributor will not charge to prepare the offer to connect outlined in section 5.3.2 above.

5.3.4. For new projects where a site assessment is required, the distributor will make the offer to connect within 60 days of receiving a completed application or provide reasons for its refusal.

5.3.5. In all cases, the offer will be open for 30 days after it is provided after which it may be revoked by the distributor.

5.3.6. If a site assessment is needed, the distributor may charge a \$500 connection deposit for preparing the offer to connect, which shall be payable in the form of cash, cheque, electronic funds transfer, letter of credit from a bank, or surety bond.

5.3.7. If the distributor refuses the connection after a site visit, it will return the deposit within 30 days.

5.3.8. If the DER applicant does not accept the offer or withdraws its application, the distributor will keep the deposit.

5.3.9. If actual connection costs are less than the deposit, the distributor will refund the difference when the connection is completed and in service.

5.3.10. Interest shall accrue monthly on connection deposits made by way of cash or cash equivalents commencing on receipt of the total deposit required by the distributor. The interest rate shall be at the Prime Business Rate as published on the Bank of Canada website less 2 percent, updated quarterly. Refunds, in whole or part, of deposits made in cash or cash equivalents will include interest on the refunded amount from the date of receipt.

- 5.3.11. A DER applicant must notify the distributor that it has satisfied all applicable service conditions and received all necessary approvals including confirmation of issuance of the authorization to connect from the ESA.
- 5.3.12. The applicant must enter into a Connection Agreement and pay the required connection costs, including costs for any necessary new or modified metering.
- 5.3.13. Once these conditions have been satisfied, the distributor shall connect the DER applicant's micro-embedded generation facility to its distribution system within 5 business days, or at such later date as agreed to by the DER applicant and the distributor.
- 5.3.14. The distributor must meet the five-day requirement for connection 90 percent of the time on a yearly basis.

5.4. Processes for Small, Mid-Sized, and Large Embedded Generation Facility Projects

The processes for small, mid-sized, and large embedded generation facilities are similar with the difference primarily being the number of impact assessments that may be applicable. Unlike the micro-embedded generation facility process, the connection process for small, mid-sized, and large embedded generation facilities includes a common screening process on application intake.

5.5. Screening Process for Small, Mid-sized, and Large Embedded Generation Facility Projects

CIA applications are subject to a review for completeness, i.e. a screening process. The screening process is intended to provide feedback to the applicant early in the process on any deficiencies in their submission that would prevent a distributor from proceeding with a review. Upon submission of an application, the distributor confirms if the application is substantially complete. A substantially complete application is a submission in which there is sufficient information provided for the distributor to process the application and complete the CIA. To aid an applicant in determining the information requirements that a distributor would typically deem as being sufficient information, a sample application package has been provided in the Appendix C(vii).

The sample application package includes:

- Completed application
- Single line diagram sample
- Protection philosophy sample
- Submission checklist

In order to facilitate timely processing of applications, payment³ for the applicable studies should be included with the submission when possible. The fees for required studies and assessments should be identified on the distributor's website and in the Preliminary Consultation Report.

If the application is incomplete, the distributor will return the incomplete part of the application package to the applicant with a deficiency notification identifying the error and omissions in the application. Upon receipt of a deficiency notification, an applicant should review and correct the application and resubmit the revised application within 14 days. If the application is not returned in 14 days, the application may lose its position in the processing queue.

Upon receipt of a revised CIA application, the distributor must review the application within 7 days to determine if there is sufficient information for the distributor to process the application. If there is sufficient information, the submission is deemed substantially complete and the distributor will reconfirm that the distribution and transmission capacity that was available at the PCR stage is still available. Please note that capacity is not reserved until the CIA is completed. If capacity is available, the application is added to the processing queue and the distributor will proceed with a CIA. This begins the 60-day window for the distributor to return the completed CIA to the DER applicant.

The process flowchart for determining the status of an application using the screening process is outlined in *Figure 3: Flowchart for Screening Process to Check that an Application is Substantially*

³ Distributors are to identify required study cost in the Preliminary Consultation Report.

Complete. The corresponding procedure steps for the distributor and applicant to follow are outlined below the flowchart.

Connection Impact Assessment: Screening Process

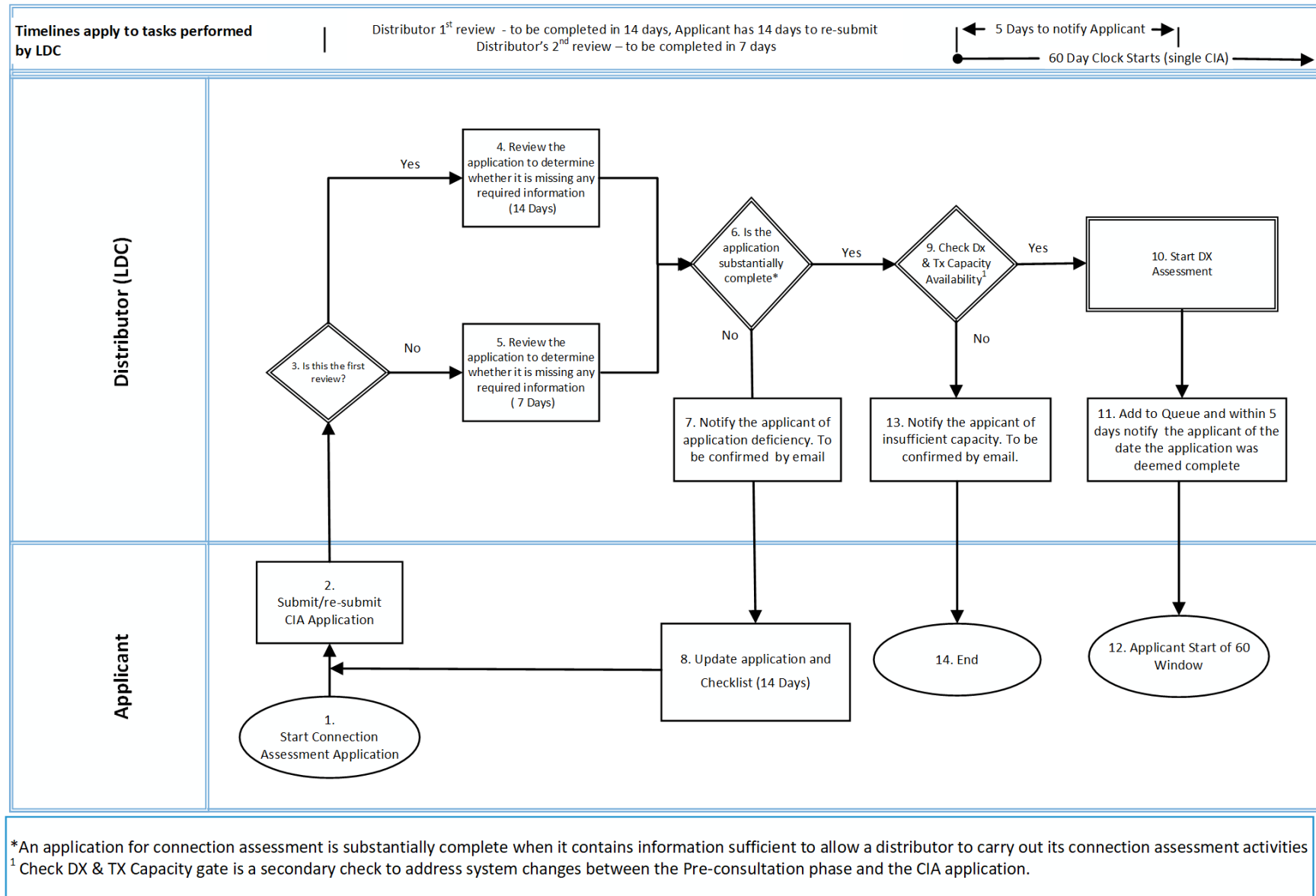


Figure 3: Flowchart for Screening Process to Check that an Application is Substantially Complete

Step 1. The applicant initiates the CIA Application and gathers the current application form and Distributor's application requirements.

Step 2. The applicant submits the completed CIA Application package, including completed application form, payment for required studies, attachments, and application checklist.

Step 3. The distributor determines if this is the initial submission or a revised application submission.

Step 4. For initial submissions, the Distributor reviews the application for completeness within 14 calendar days.

Step 5. For revised application submissions, the Distributor reviews the application for completeness within 7 calendar days.

Step 6. For the completeness check outlined in steps 4 and 5 above, the distributor will review the application to determine if there is sufficient information provided by the applicant to process the submission. Once the distributor determines that the submission provides the necessary information to commence a CIA study, the application is deemed substantially completed.

Step 7. For submissions that are not substantially complete, the distributor will notify the applicant of the application deficiencies via email or letter if the applicant's email is not provided. The deficiency notification shall identify any errors and omissions in the application that would prevent the distributor from proceeding with the CIA. The notification shall outline the available remedies required to have the application deemed substantially complete.

Step 8. On receipt of a deficiency notification, an applicant should review and revise the application to address the deficiencies and resubmit the application. The process allows 14 days for the applicant to resubmit a revised application. If the applicant does not return the revised application within 14 days, the distributor may remove the application from the processing queue. If the application is removed from the queue, it may be treated as a new application once it is resubmitted.

Step 9. For submissions that are deemed substantially complete, the distributor will reconfirm⁴ transmission and distribution capacity availability.

Step 10. If capacity is confirmed to be available, the distributor proceeds with the assessment.

Step 11. The distributor will add the application to the processing queue in the order in which they are deemed substantially complete and within 5 days notify the applicant of the date the application was deemed substantially complete.

⁴ This is a secondary check to address the possibility of system changes between the Preliminary Consultation phase and the CIA application.

Step 12. The date the submission is deemed substantially complete starts the 60-day or 90⁵-day window for the distributor to send the completed connection impact assessment to the applicant and proceed with the connection agreement.

Step 13. If available capacity is not confirmed, the distributor will notify the applicant via email that capacity is not available to support the connection

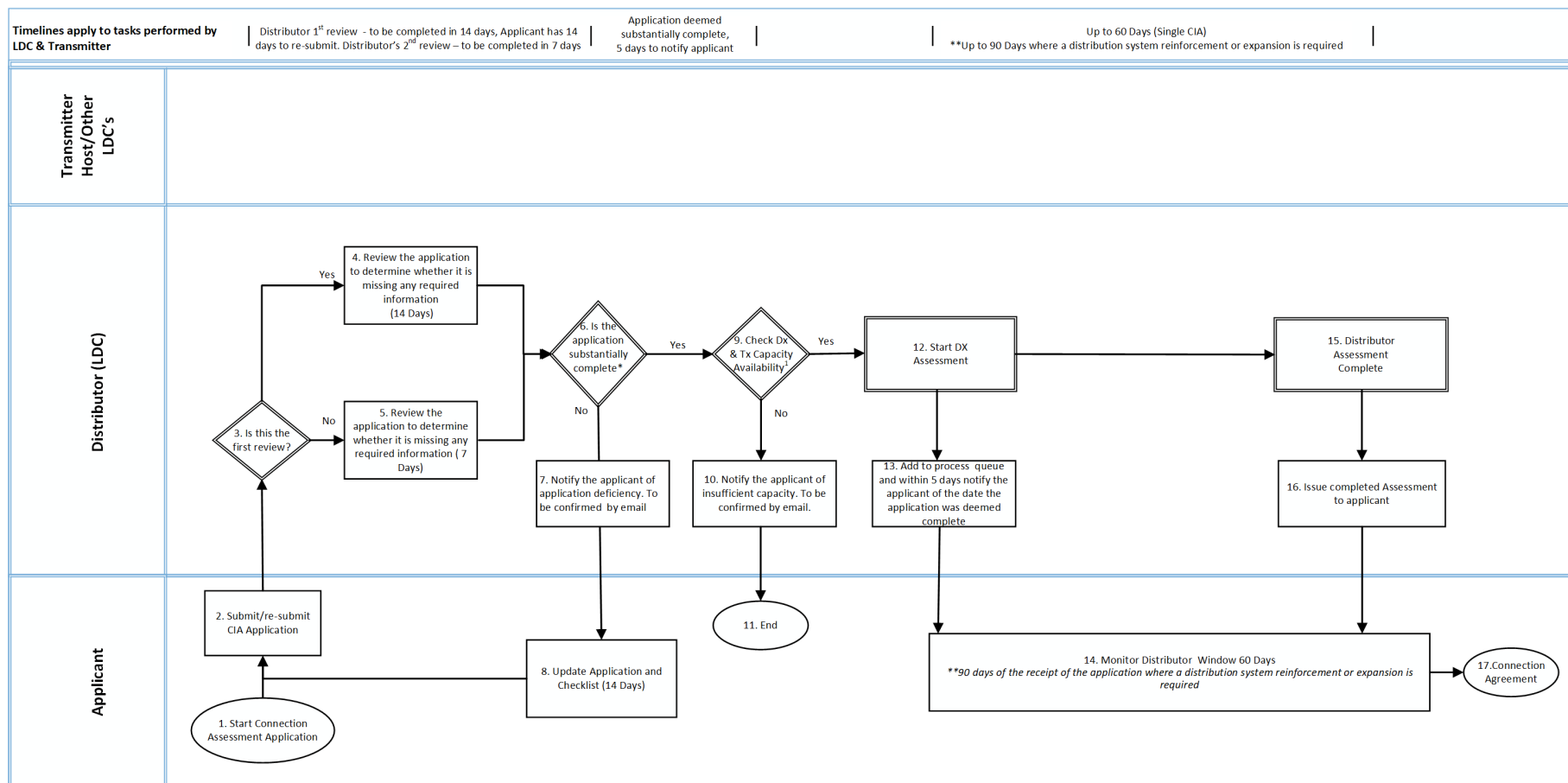
Step 14. If there is no capacity available, the process concludes.

⁵ 60 days of the receipt of the substantially complete application where no distribution system reinforcement or expansion is required, and 90 days of the receipt of the substantially complete application where a distribution system reinforcement or expansion is required

5.6. Small Embedded Generation Facility

The screening process ends when the application is deemed to be substantially complete. i.e., there is enough information to begin processing the CIA. The process flowchart is outlined in Figure 4: Flowchart of Timelines and Responsibilities for Small Embedded Generation Facility Connection. The corresponding procedure steps for the distributor and applicant are outlined below the flowchart.

Connection Impact Assessment Process for Small Embedded Generation Facility



*An application for connection assessment is substantially complete when it contains information sufficient to allow a distributor to carry out its connection assessment activities

1. Check DX & TX Capacity gate is a secondary check to address system changes between the Pre-consultation phase and the CIA application.

Figure 4: Flowchart of Timelines and Responsibilities for Small Embedded Generation Facility Connections

Step 1. The applicant initiates the CIA process and gathers the current CIA application form and distributor's application requirements from the distributor.

Step 2. The applicant submits the completed CIA Application package, including completed application form, payment for required studies, attachments, and application checklist.

Step 3. The distributor determines if this is the initial submission or a revised application submission.

Step 4. For initial submissions, the distributor reviews the application for completeness within 14 calendar days.

Step 5. For revised application submissions, the distributor reviews the application for completeness within 7 calendar days.

Step 6. For the completeness check outlined in steps 4 and 5 above, the distributor will review the application to determine if there is sufficient information provided by the applicant to process the submission. Once the distributor determines that the submission provides the necessary information to commence a CIA study, the application is deemed substantially completed.

Step 7. For submissions that are not substantially complete, the distributor will notify the applicant of the application deficiencies via email or letter if the applicant's email is not provided. The deficiency notification shall identify any errors and omissions in the application that would prevent the distributor from proceeding with the CIA. The notification shall outline the available remedies required to have the application deemed substantially complete.

Step 8. On receipt of a deficiency notification, the applicant should review and revise the application to address the deficiencies and resubmit the application. The process allows 14 days for the applicant to resubmit a revised application. If the applicant does not return the revised application within 14 days, the distributor may remove the application from the processing queue. If the application is removed from the queue, it may be treated as a new application once it is resubmitted.

Step 9. For submissions that are deemed substantially complete, the distributor will reconfirm⁶ transmission and distribution capacity availability.

Step 10. The distributor will notify the DER applicant via email if there is no capacity available to support the connection.

Step 11. If there is no capacity available, the process concludes. .

Step 12. If capacity is confirmed to be available, the distributor proceeds with the assessment

⁶ This is a secondary check to address the possibility of system changes between the Preliminary Consultation phase and the CIA application.

Step 13. The distributor will add applications to the processing queue in the order in which they are deemed substantially complete and within 5 days will notify the DER applicant of the date the application was deemed substantially complete.

Step 14. The date the submission is deemed substantially complete starts the 60-day or 90-day window set out in Step 16, below.

Step 15. The distributor completes the CIA

Step 16. The distributor will provide with its CIA assessment a detailed cost estimate of the proposed connection and an offer to connect within:

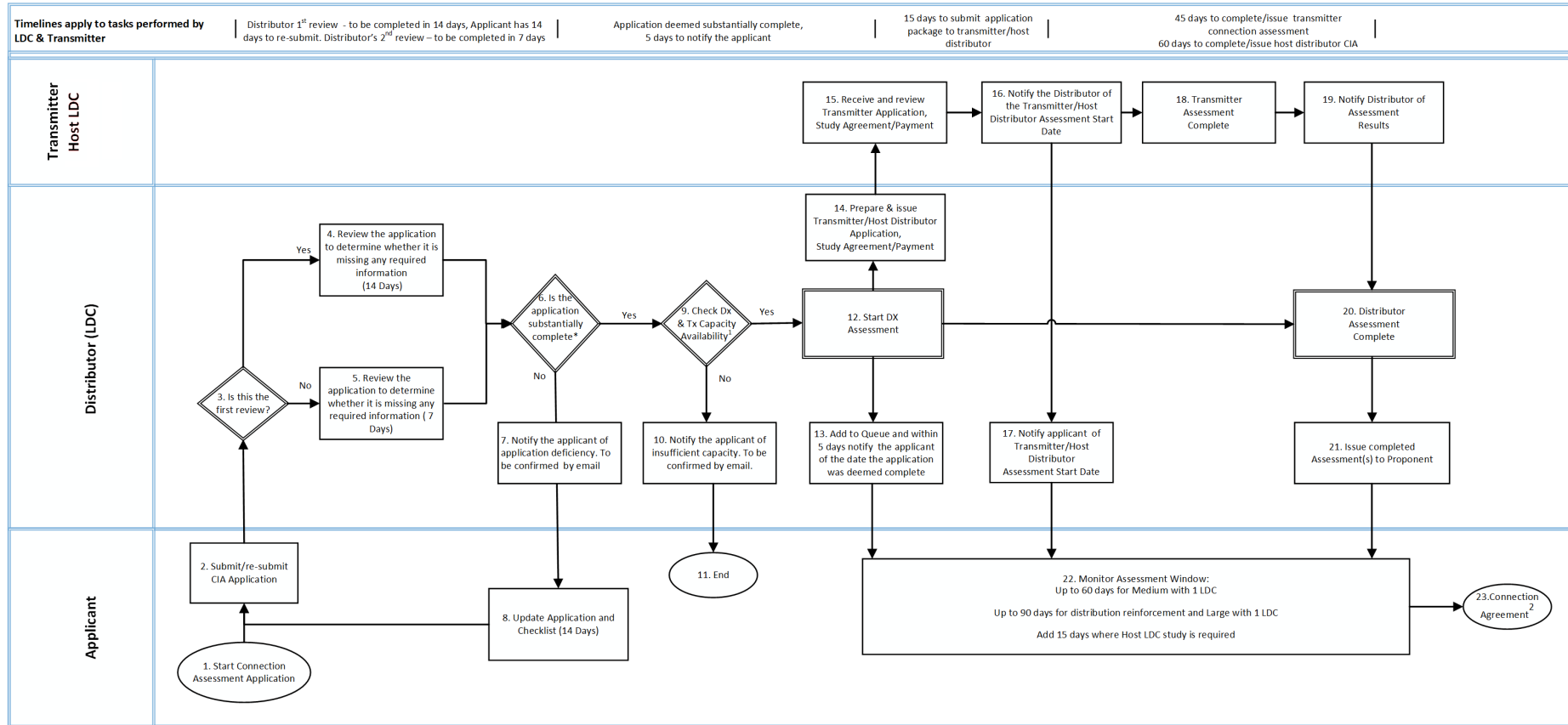
- i. 60 days of the receipt of the substantially complete application where no distribution system reinforcement or expansion is required; or
- ii. 90 days of the receipt of the substantially complete application where a distribution system reinforcement or expansion is required distributor provides the study results to the applicant

Step 17 The process moves onto the connection agreement phase.

5.7. Mid-sized / Large Embedded Generation Facility

Mid-sized and Large embedded generation facilities as classified in Table 1, are also subject to the screening process. Once they are deemed substantially complete, they will be assessed. The CIA process for the connecting distributor is essentially the same as for the small projects. If the connecting distributor is embedded in a host distributor, Mid-sized and Large embedded generation facilities must also have an assessment from the host distributor and a study from the upstream transmitter to assess the impact on the transmitter's system. Large projects also require a System Impact Study from the IESO to assess their impact on the IESO-administered grid. The flowchart in Figure 5 below shows the responsibilities of the various stakeholders and the expected task completion timeline. The distributor has responsibility for providing information to the upstream reviewers to ensure that the reviews occur as near to concurrently as is possible. In any case, the distributor is responsible for finishing its review within 60 days of the application being substantially complete for mid-sized embedded generation facilities and within 90 days of the application being substantially complete for large embedded generation facilities or facilities requiring a distribution system reinforcement or expansion. Where a host distributor CIA is also required, these timelines will be increased by a further 15 days.

Connection Impact Assessment Process for Mid-sized or Large Embedded Generation Facility



*An application for connection assessment is substantially complete when it contains information sufficient to allow a distributor to carry out its connection assessment activities

1. Check DX & TX Capacity gate is a secondary check to address system changes between the Pre-consultation phase and the CIA application.
2. After receiving capacity allocation CCA signed within (i) 17 months for large embedded generation facility if transmission upgrades are required, (ii) 9 months for large embedded generation facility if transmission system impact assessment required (iii) 6 months for all other embedded generation facilities (reference DSC 6.2.4.1)

Figure 5: Flowchart for CIA process for Mid-sized and Large Embedded Generation Facility Connections

Step 1. The applicant initiates the CIA process and gathers the current CIA application form and distributor's application requirements from the distributor.

Step 2. The applicant submits the completed CIA Application package, including completed application form, payment for required studies, attachments, and application checklist.

Step 3. The distributor determines if this is the first submission or a revised application submission.

Step 4. For initial submissions, the distributor reviews the application for completeness within 14 calendar days.

Step 5. For revised application submissions, the distributor reviews the application for completeness within 7 calendar days.

Step 6. For the completeness check outlined in Steps 4 and Steps 5 above, the distributor will review the application to determine if there is sufficient information provided by the applicant to process the submission. Once the distributor determines that the submission provides the necessary information to commence a CIA study, the application is deemed substantially completed.

Step 7. For submissions that are not substantially complete, the distributor will notify the applicant of the application deficiencies via email or letter if the applicant's email is not provided. The deficiency notification shall identify any errors and omissions in the application that would prevent the distributor from proceeding with the CIA. The notification shall outline the available remedies required to have the application deemed substantially complete.

Step 8. On receipt of a deficiency notification, the applicant should review and revise the application to address the deficiencies and resubmit the application. The process allows 14 days for the applicant to resubmit a revised application. If the applicant does not return the revised application within 14 days, the distributor may remove the application from the processing queue. If the application is removed from the queue, it may be treated as a new application once it is resubmitted.

Step 9. For submissions that are deemed substantially complete, the distributor reconfirms⁷ transmission and distribution capacity availability. Capacity is not reserved for the project until the CIA has been completed.

Step 10. The distributor notifies the applicant via email if there is no capacity availability to support the connection.

Step 11. If there is no capacity available, the process concludes.

Step 12. If capacity is confirmed to be available, the distributor proceeds with the assessment.

Step 13. The distributor adds the application to the processing queue and within 5 days notifies the DER applicant of the date the application was deemed substantially complete. The date the submission is deemed substantially complete starts the timed window for the distributor to return the completed CIA.

⁷ This is a secondary check to address the possibility of system changes between the Preliminary Consultation phase and the CIA application.

Step 14. The distributor prepares and issues an application to the transmitter for a CIA, a Study Agreement, and payment within 15 days of starting the assessment.

Step 15. The transmitter receives the application from the distributor along with the Study Agreement and payment. The Transmitter has 15 days to review the submission and notify the distributor

Step 16. The transmitter notifies the distributor of the Transmitter Assessment start date

Step 17. Distributor notifies the applicant of the Transmitter Assessment start date.

Step 18. The transmitter executes and completes the assessment within 45 days. Where possible the transmitter completes this study concurrently with the distributor Assessment.

Step 19. The transmitter notifies the distributor on the results of the assessment

Step 20. The distributor also completes its CIA

Step 21. The distributor will provide the completed CIA to the applicant within:

- i. 60 days of the receipt of the substantially complete application in the case of a proposal to connect a mid-sized DER; and
- ii. 90 days of the receipt of the substantially complete application in the case of a large DER or a DER requiring distribution system reinforcement or expansion.

The applicant can use the assessment start date notification to monitor the distributor's and transmitter's assessment progress against the applicable 60-day or 90-day assessment window. The assessment period is increased by 15 days where a host distributor assessment is also required.

Step 22. The process moves on to the connection agreement phase.

6. Agreements

Once the distributor and transmitter or host distributor have completed their respective CIAs, the process moves to the connection agreement phase. The DERCP provides process flowcharts and process steps for the connections of DERs to the distribution system. Please refer to Appendix E of the DSC for the Requirements for Connection Agreements. The OEB does not specify requirements for the form of Connection Cost Agreements and Connection Cost Recovery Agreements.

6.1. Connection Agreement

A Connection Agreement between a distributor and a generator contains specific terms and conditions relating to connection and access to the distributor's distribution system. Appendix E of the DSC contains the standard connection agreements for micro-embedded generation facilities. It sets terms and conditions for small embedded generation facilities, mid-sized embedded generation facilities and large embedded generation facilities.

6.2. Connection Cost Agreement

Description

The Connection Cost Agreement (CCA) sets out the scope of work and the associated cost the distributor will seek to recover from the Applicant to connect the project to the distribution system. Because the connection may also impact a host distributor or the transmission system, the host distributor will also require a CIA and CCA and the transmitter will require a transmitter study and its equivalent to a CCA in response to the proposed DER project. The transmitter equivalent to a CCA is a Transmitter Capital Cost Recovery Agreement (CCRA). Where there is a CCRA the distributor will include the costs of any transmission work in its CCA as it is the responsibility of the distributor to contract for and pay the transmitter then collect from the customer.

Figure 6 outlines the interaction between the applicant, distributor, and host distributor/transmitter when multiple assessments and agreements are involved. The process steps for the scenario outlined in Figure 6 are provided below.

Connection Impact Assessment: Dual CIA and CCRA/CCA

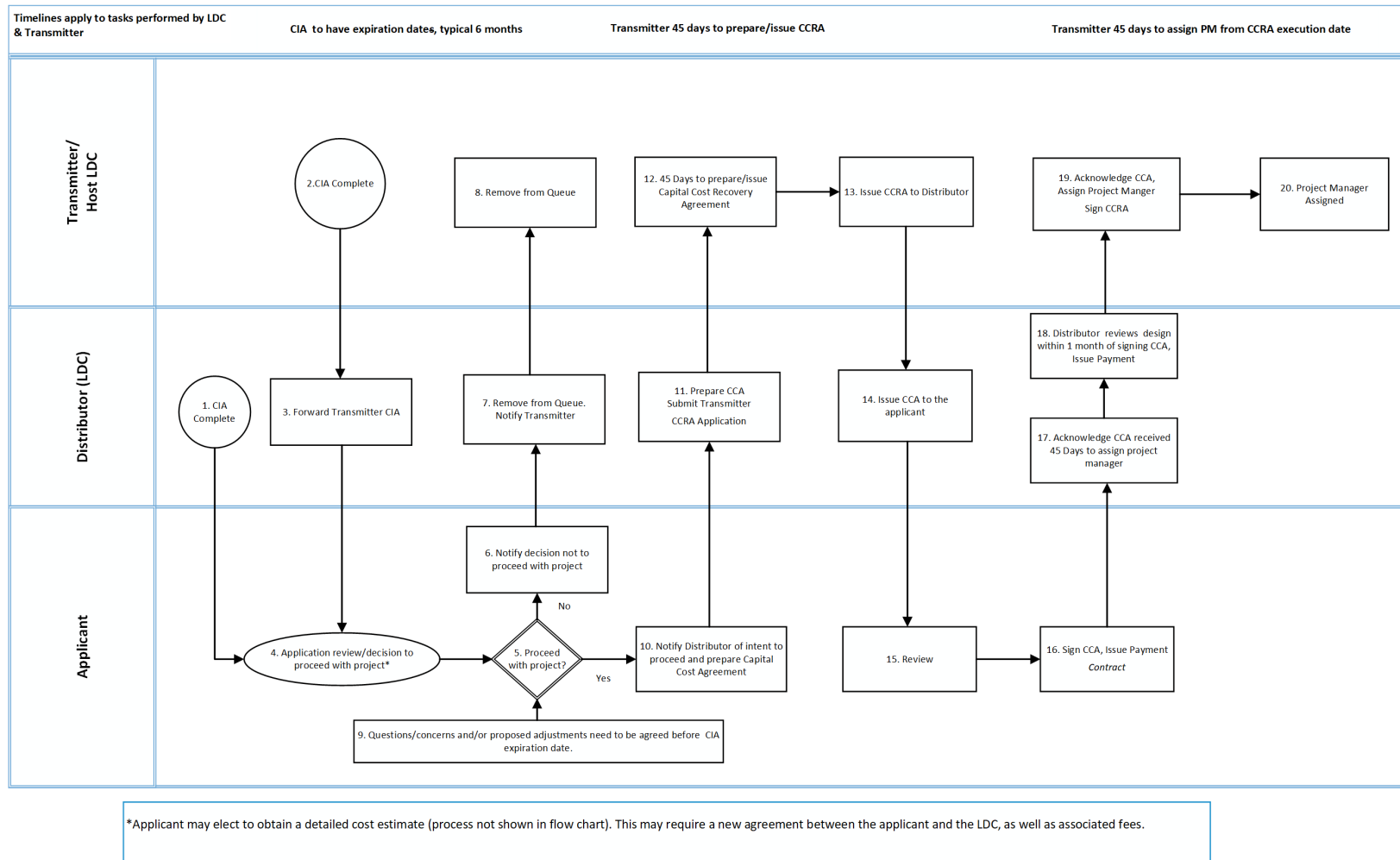


Figure 6: Flowchart Outlining Interactions Between Parties (Multiple Connection Agreements)

Steps 1-3. The process starts with the applicant reviewing the completed CIA (s) from the distributor, the host distributor and if applicable, the transmitter.

Step 4. The applicant decides whether to cancel or proceed with the connection of the project

Step 6. The applicant notifies the distributor in the case of a decision not to proceed with the project.

Step 7. The distributor notifies the host distributor/transmitter that the applicant is not proceeding with the project. The distributor removes the project from the application processing queue and the process concludes for the distributor.

Step 8. The host distributor/transmitter removes the project from the application processing queue and the process concludes for the host distributor/transmitter.

Step 9. The applicant should discuss with the distributor any concerns, questions and/or proposed adjustments that need to be agreed upon before the Connection Assessments expiration date(s). An extension may be granted by distributor if deemed necessary.

Step 10. The applicant must notify the distributor of its intent to proceed with the Project.

Step 11. The distributor prepares the Capital Cost Agreement (CCA) and submits a Transmitter Capital Cost Recovery Agreement (CCRA) Application to the transmitter.

Step 12. The transmitter prepares the CCRA within 45 days.

Step 13. The transmitter issues this CCRA to the distributor.

Step 14. The distributor reviews the CCRA and issues the distributor's CCA to the applicant.

Step 15. The applicant is expected to review the CCA and seek any clarification from the distributor if required.

Step 16. If the applicant agrees with the terms of the CCA, the applicant sign and issues payment to the distributor.

Step 17. The distributor acknowledges receipt of the CCA, assigns a Project Manager within 45 days, issues payment to the transmitter, and executes the CCRA and any other required agreements.

Step 18. The distributor shall review the detailed design within 1 month of signing the CCA

Step 19. The transmitter acknowledges receipt of the CCRA and assigns a project manager within 45 days.

Step 20. The process moves onto the build phase after assignment of the Project Manager for the distributor and transmitter.

6.3. Connection Cost Responsibility (CCR)

Connection cost responsibility is covered in Chapter 3 and Appendix B of the DSC.

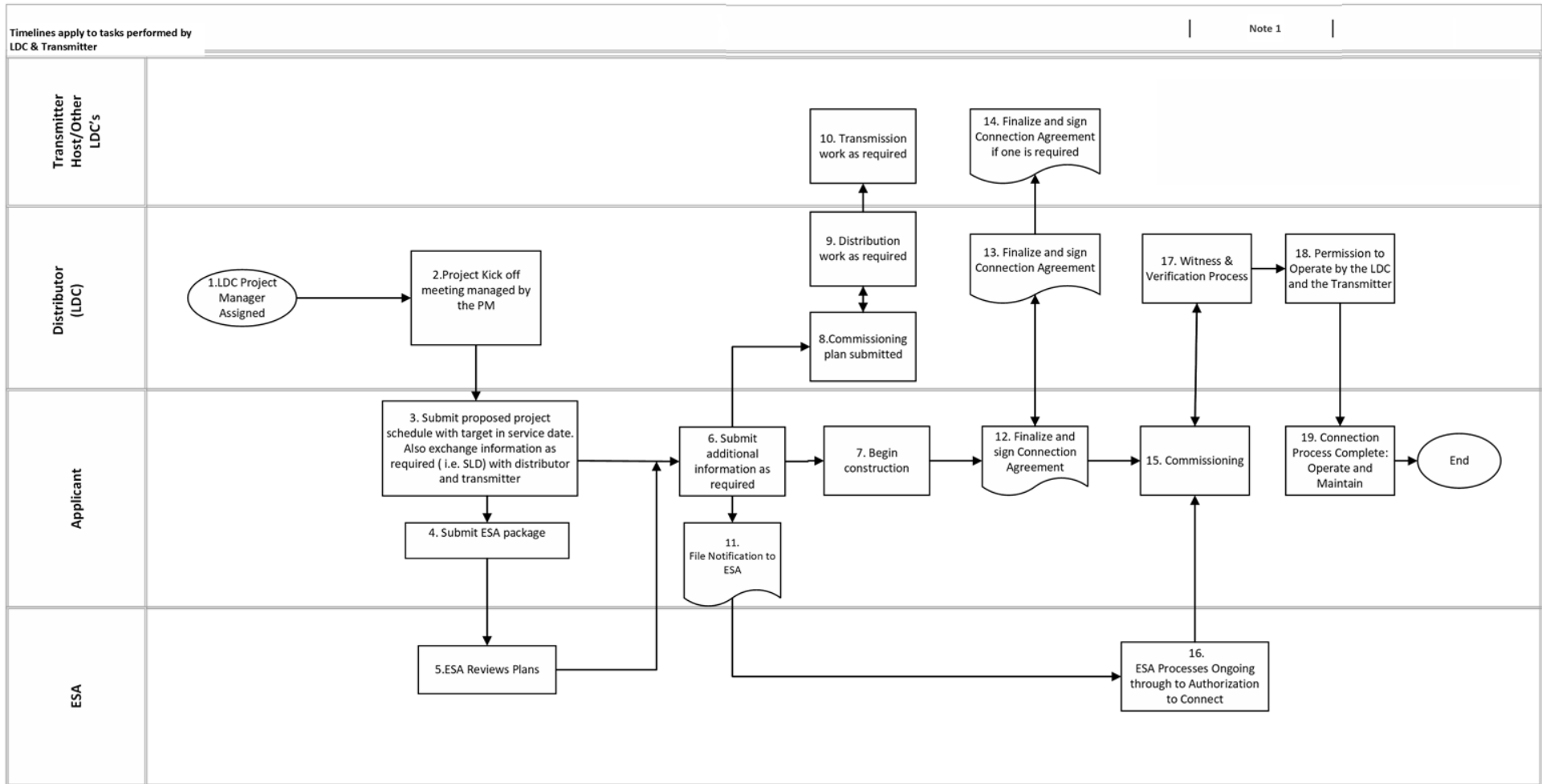
6.4. Option to Request a More Detailed Cost Estimate

As noted earlier, the outcome of a CIA includes: the technical requirements of the connection; and an estimate of costs. The cost estimate at this point is usually based on typical pricing and the distributor will indicate the level of uncertainty for the estimate. A detailed cost estimate based on the location and size of the project is prepared at the applicant's expense as part of the Connection Cost Agreement. The applicant has the option of paying for the detailed cost estimate that would reduce the level of uncertainty to a lower amount before deciding on the project and before signing a connection agreement.

6.5. Build and Energization Process

After the CCA is executed, the construction drawings are finalized, and the applicant can proceed to construction. A kick-off meeting is scheduled with an assigned project manager within 45 days of the CCA being signed. The Build and Energization process flowchart starts with the assignment of the distributor project manager at the end of the CCA phase. The full process flowchart is outlined in **Error! Reference source not found.** The corresponding process steps for the distributor, transmitter and Applicant follow thereafter.

Distributed Energy Resources Connection Build Process



NOTE 1: Small (a) – up to 60 days when there is no distribution system reinforcement or expansion required to facilitate generator connection.
 Small (b) – up to 180 days when a distribution system reinforcement or expansion is required to facilitate connection
 Medium and Large - Negotiated during plan commitment

Figure 7: Flowchart for Build Process

- Step 1. The distributor assigns a project manager who will coordinate a project kick-off meeting with the applicant and the host distributor/transmitter.
- Step 2. The distributor's Project Manager will complete a project kick off meeting with all parties involved to discuss facility design, SLD, protections and controls, cost estimates and the project schedule including target in-service date.
- Step 3. Applicant is to provide project design details including single line diagrams (SLDs) and the proposed project schedule including targeted in-service date.
- Step 4. The DER Applicant must provide information to the ESA for the Plan Review process.
- Step 5. ESA reviews the Plan and provides feedback.
- Step 6. The Applicant shall, at transmitter's and distributor's request, provide a summary of testing results, including any certificates of inspection or other applicable authorizations or approvals certifying that any of the applicant's new, modified or replacement facilities have passed the relevant tests and comply with all applicable instruments and CSA C22.3 No 9.
- Step 7. The Applicant begins construction of the project.
- Step 8. The Applicant submits the Commissioning Plan to the distributor and the transmitter via the distributor.
- Step 9. The distributor completes any additional work required.
- Step 10. The transmitter completes any additional work required
- Step 11. The applicant files a notification with ESA.
- Step 12. The Applicant finalizes the terms of the Connection Agreement with the distributor and signs the agreement
- Step 13. The distributor finalizes the terms of the Connection Agreement with host distributor/transmitter if required and signs the agreement(s)
- Step 14. The host distributor/transmitter finalizes the terms of the Connection Agreement with the distributor and signs the agreement(s)
- Step 15. The applicant proceeds with commissioning and testing of the generation facility.
- Step 16. The ESA inspections through the construction process up to and including the issuance of an Authorization to Connect.⁸
- Step 17. The distributor witnesses and verifies the applicant's commissioning process related to the connection facilities.

⁸ ESA may issue a temporary Authorization to Connect according to its own processes.

Step 18. The distributor (and transmitter where and when applicable) will grant the applicant permission to operator once all the distributor connection requirements have been satisfied and ESA Authorization to Connect have been received by the distributor.

Step 19. The connection process concludes when the DER is fully connected and operational.

Table 2: Other Potential Agreements

Agreement Name	Parties	Purpose
Construction Agreement (e.g. Connection Cost Agreement)	Distributor, Generator	Describes obligations of the distributor and generator to complete connection, including terms of cost recovery.
Construction Agreement (e.g. Connection Cost Recovery Agreement)	Distributor, Transmitter	<u>As specified in the Transmission System Code:</u> In the event a transmission system requires modifications to connect the generator, this document describes the obligations of distributor and transmitter to complete the connection, including terms of cost recovery.
Conditions of Service	Distributor, Generator	In the event that the generator is a load customer of distributor, this document describes terms and applicable rates.
Additional Operations Agreement (if required) ⁹	Distributor, Generator	<u>Within limits of permission under of the DSC</u> Modifications as necessary to existing Connection Agreement to include provisions for safe and effective operation in presence of the generator on the distribution system.

⁹ Additional Operations Agreement(s) or Construction Agreement(s) may be required where other parties are affected by generation connection, e.g.: embedded distributors.

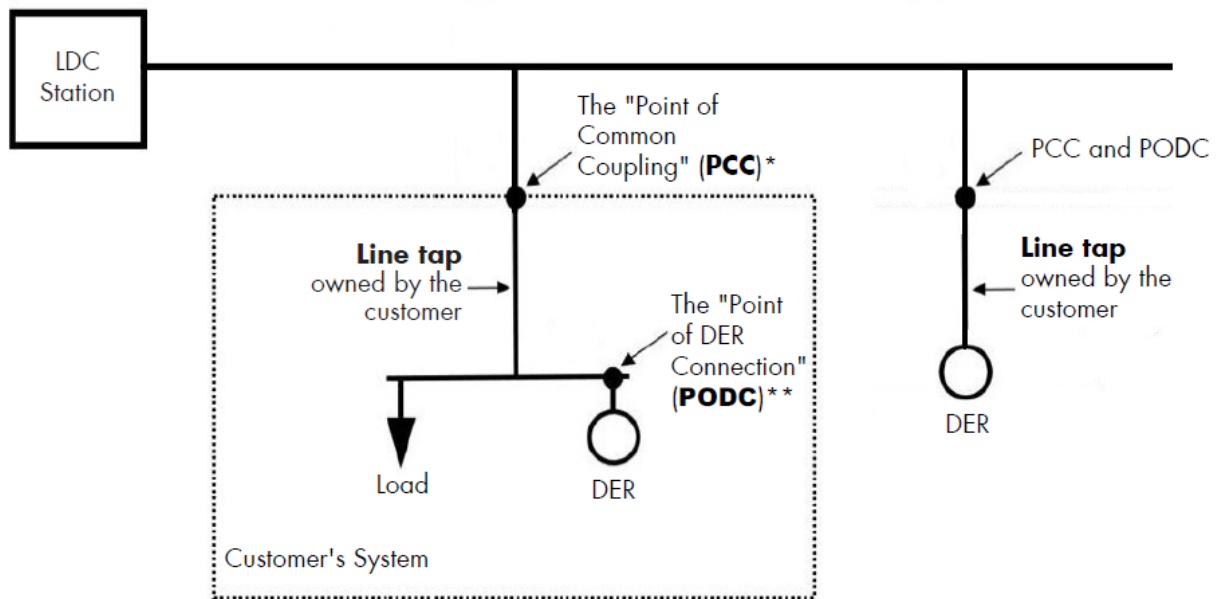
7. Glossary

Point of Common Coupling (PCC)

The point where the distributor's distribution system ends, and the new DER's connection assets or the existing load customer's connection assets begin. This is equivalent to the DSC definition for Point of Supply. The PCC is shown in Figure 8 and Figure 9, in relation to assets owned by the distributor (Local Distribution Company, LDC) and the customer.

Point of DER Connection (PODC)

The point where the DER connects with the DER's connection assets as outlined in Figure 8 and Figure 9.



*PCC: the point where the customer facility connects to the LDC owned system

**PODC: the point where the DER unit(s)'s interconnection system connects the DER unit(s) to the DER facility.

Figure 8: PCC vs PODC (No New Distributor-Owned Line Expansion)

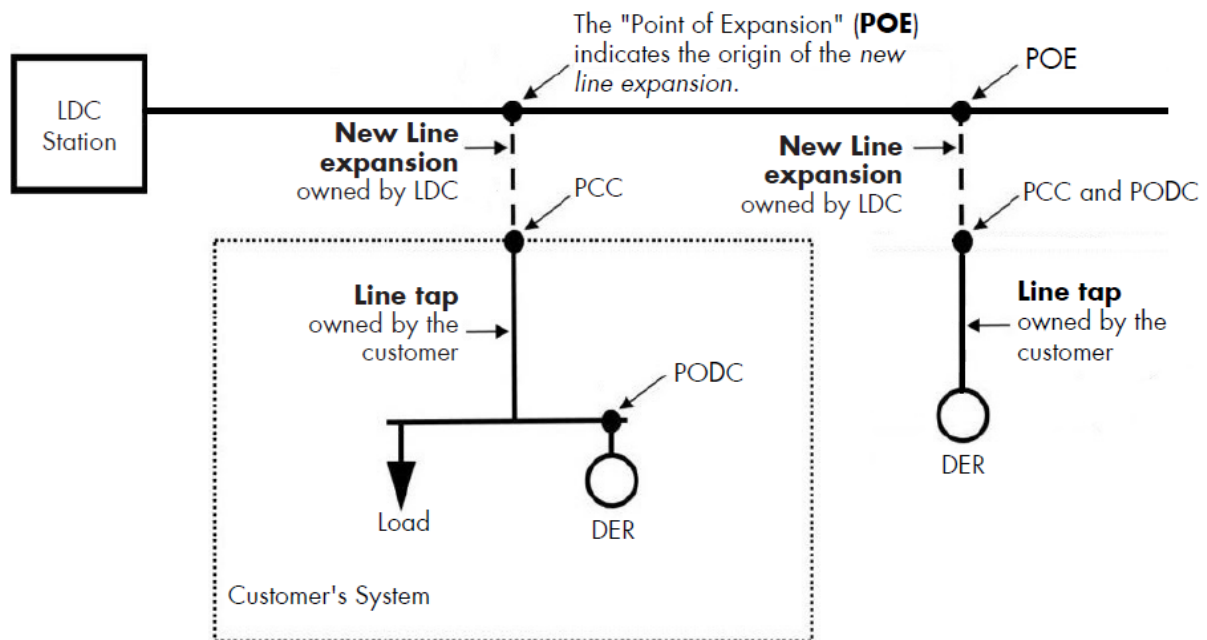


Figure 9: PCC vs PODC (With New Distributor-Owned Line Expansion)

8. Appendices

A. Sample Protection Philosophy

B. Single Line Diagrams

C. Standardized Form Templates

- I. Preliminary Consultation Information Request Template
- II. Preliminary Consultation Information Request Sample
- III. Preliminary Consultation Report Template
- IV. Preliminary Consultation Report Sample
- V. Connection Impact Assessment Application Template
- VI. Connection Impact Assessment Application Instructions
- VII. Connection Impact Assessment Application Sample

DRAFT

Sample Protection Philosophy for Distributed Energy Resource Proponents Applying for Connection

This document is a summary of a sample protection philosophy for non-exporting, inverter-based (NE/I) connections including storage, solar, and wind. The OEB intends it as a guide for applicants regarding the kinds of protections, and particularly the categories of protections, that distributors will require for connection.

This is one example of a protection philosophy that would meet the requirements for a complete protection philosophy for the purpose of a CIA application¹⁰. Other philosophies may also meet the standards. It provides guidance to a distributed energy resource (DER) proponent on good utility practice as it relates to protection requirements of non-exporting, inverter-based (NE/I) DERs. To form a protection scheme, all the elements for each category within any given protection philosophy are requirements.

This document is not an approval for connection. This information should help applicants file better and more complete applications for connection. An applicant will need to submit detailed protection settings after the utility has completed the impact assessment of the submitted connection application.

The standards and certification testing referenced in this document should be read as referring to the current versions of these standards at time of reading.

Sample Protection Philosophy for Non-exporting Inverter-based Sources

Project Name:

Project ID#:

Project Type:

Capacity:

Connection feeder (optional):

In compliance with the technical interconnection requirements of the local distribution company for which this project will interconnect, the protection system of the connection will be designed to:

- Detect internal faults with the generator facility, downstream of the Point of Common Coupling (PCC), and automatically disconnect the NE/I source
- Detect external faults on the utility feeder and automatically disconnect the NE/I source
- Detect islanding conditions and disconnect the NE/I source
- Detect export of power from the NE/I source to the utility feeder and automatically disconnect the NE/I source

¹⁰ The contents of this document, although intended as guidance, conform to the interconnection and approval requirements prevalent at the time of its issuance. At all times, the current versions of relevant codes and standards govern.

Internal Faults Within the Generator Facility

The following protections are in place to protect against internal faults resulting from the NE/I source:

- **Multi-Function Relay**-At the PCC, a multi-function relay will be installed to monitor internal faults resulting from the NE/I source. The 52 Trip Breaker will trip if it detects the following:
 - 25 - Synchronization Check
 - 27 - Undervoltage
 - 59 - Overvoltage
 - 81O/U - Under and Over Frequency
 - ID -Active Anti-Islanding
- **Inverter Breakers** - Each inverter is equipped with an AC breaker at the output of the inverter providing additional overcurrent protection
- **Facility Overcurrent Protection**-All circuits within the facility are protected from both phase-to-phase and phase-to-ground faults by appropriate overcurrent protection devices. Fuses are sized to clear under fault conditions within the generator facility

External Phase and Ground Faults in the Distribution System

The following protections are in place to protect against external faults resulting from the utility feeder:

- **Multi-Function Relay** - At the main utility service, prior to the first facility load, a multi-function relay will be installed to monitor faults from the utility feeder. The 52 Trip Breaker at the NE/I source PCC will trip under the following faults:
 - 27 - Undervoltage
 - 32R- Reverse Power
 - 50/51- Overcurrent
 - 59 - Overvoltage
 - 81O/U - Under and Over Frequency
 - 67 - Directional
- **Inverter Protection:** The inverters proposed for this project are certified to UL 1741, IEEE 1547, CSA C22.2 107.1-01 standards¹¹ and will behave accordingly.

Anti-Islanding

- The Energy Resource Facility will operate in a grid following mode and will not operate islanded.
- **Anti-Islanding Inverters** -The NE/I source inverters contain both passive and active anti- islanding protection as required by IEEE 1547 and UL1741 SA. If the

¹¹ All references to standards or testing certifications should be read as the most current version.

utility normal power supply is interrupted, the inverters detect the loss of power and disconnect.

Reverse Power

- **Reverse Power Protection** - In addition to the multi-function relay at the utility supply monitoring reverse power (32R), the load is continually monitored to ensure the NE/I source discharge is below the consumption of the facility. This additionally protects against power injection to the utility grid.

Directional Overcurrent

- **Directional overcurrent protection** - Directional overcurrent relays are normally used on incoming line circuit breakers on buses which have two or more sources. They are connected to trip an incoming line breaker for fault current flow back into the source, so that a fault on one source is not fed by the other sources.

Special Comment Regarding Inverter Based Generation

The inverters specified for this project have a limited fault current contribution.

- Because inverters are current-limited devices, unlike rotating generators, the fault current is very close to the maximum output current, limiting the fault current in the system to 120% -140% of FLA.

Breaker Failure Scheme (Facilities with an aggregate output > 500kW)

In the event that 52-A fails to open when intertie protection relay calls for a trip, 52-B will instantaneously trip and lock out.

Reconnection

Manual reconnection: There is no automatic reconnection scheme at this facility. A manual reconnection will only be executed when given permission by the respective controlling authority.

OR

Automatic reconnection scheme: Intertie protection relay will initiate automatic reconnection of DER only after a fault event has occurred on the utility feeder and not after a fault event within the DER facility. Stable voltage and frequency measurement within ranges and for time period stipulated in the technical interconnection requirements will be met prior to automatic reconnection. Internal faults will be distinguished from external faults by pickup of directional overcurrent 67/67N protection element looking into DER facility. This will ensure reconnection into facility fault is prohibited by blocking of automatic reconnection scheme for facility faults.

Open Phase Protection

This project consists of multiple 1-phase inverters connecting to a 3-phase service or multiple 3-phase inverters connecting to a 3-phase service; therefore, open phase protection will be provided by 46 and/or 47 element(s) in the intertie protection relay to ensure the BESS maintains a balanced 3-phase output and detects loss of voltage in one or more phases and will trip the entire generating facility upon detection of such.

OR

Attached is a signed letter from the inverter manufacturer stating that a facility comprising of multiple inverters is capable of maintaining a balanced 3-phase output and will detect loss of voltage in one or more phases and will trip the entire generating facility upon detection of such.

Communications and Transfer Trip/DGEO (if applicable)

Summarize communication systems and transfer trip/DGEO timing (if applicable).

Table 1: Protection Summary Matrix

Description	IEEE Device	Internal Faults	External Faults	Anti-Islanding	Reverse Power	Trips 52-A	Trips 52-B	Disables Inverters
Over-Voltage	59	X	X	X		X		X
Under-Voltage	27	X	X	X		X		X
Over-Frequency	81O	X	X	X		X		X
Under-Frequency	81U	X	X	X		X		X
Instantaneous Over-Current Phase	50	X	X			X		X
Timed Over-Current Phase	51	X	X			X		X
Reverse Power	32R			X	X	X		
Breaker Fail	50BF						X	
Active Anti-Islanding	IEEE 1547			X				X

Table 2: Protection Elements

Protection Element Function	Device#	FeederProtection Relay/Shunt Trip	IEEE 1741 SA Inverter
Over-Voltage	59	X	Y
Under-Voltage	27	X	Y
Over-Frequency	81O	X	Y
Under-Frequency	81U	X	Y
Synchronization Check	25	X	Y
Reverse Power	32R	X	
Overcurrent	50/51	X	Y
Directional	67	X	
Active Anti-islanding	ID		X

X = Primary

Y = Secondary

Appendix B - Sample Single Line Diagram



Item Number	Information to Include
1	<p>The title block should include:</p> <ul style="list-style-type: none"> • The legal name of the facility owner • Facility address/location • Project purpose • LDC assigned project ID • Revision history
2	<ul style="list-style-type: none"> • State utility's distribution and transmission facility (station) name(s) • State the name of utility's station feeder to which the generator is connected • State the nominal distribution supply voltage (eg. 44kV) • State the information for the upstream and downstream switches closest to the PCC (nomenclature, type, etc.)
3	<ul style="list-style-type: none"> • LDC to assign nomenclature for this switch. <p>Note: initial submission can have the consultant/customer assigned nomenclature if a LDC designation is not yet available. Later, the customer is assigned a LDC designation, which should be added to the SLD and resubmitted to LDC before the SLD is considered finalized. The consultant/customer then has the option to replace the initial designation with LDC designation or keep both. Ensure the LDC designation is clearly marked to differentiate it from the consultant/customer designation (bolded, in brackets, etc). Item 3 has an example showing only LDC designation, while item 17 shows an alternate method that shows both designations. LDC only refers to the LDC designation when dealing with the customer. Example, when witnessing the switch used for work protection as per the LDC TIR. When submitting the new SLD with the changes, a higher revision number of the SLD should be used to track the changes. See SLD example.</p>
4	<ul style="list-style-type: none"> • The Point of Common Coupling (PCC) is the point of demarcation between LDC and the DER. It is the point where the DER is to connect to LDC's Distribution System. PCC demarcation point • LDC designated facility operating designation (NCXXXX) • If the nomenclature is not included, the SLD is considered incomplete.
5	<ul style="list-style-type: none"> • Fault indicators with directional functionality are required for each phase between the PCC and the first pole on the customer owned new line and should be visible from the PCC location.
6	<ul style="list-style-type: none"> • Provide the length(s), ownership, and size(s) of line(s) from PCC to the meter. This data is used for SSLA determination. The metering point is at the location of the CT's and not the physical meter. • To comply with LDC TIR
8	<ul style="list-style-type: none"> • State the number of CTs being used • State the CT ratios including both ratios if they are dual ratio • State the in-use CT ratio if dual ratio • State the ANSI/CSA CT accuracy class information (provide example on SLD after)

9	<ul style="list-style-type: none"> Clearly identify existing and new facility if applicable
	<ul style="list-style-type: none"> If a new equipment (ex. transformer) is being replaced in an existing facility, it should be indicated Ensure all existing generators or backup generators are shown
10	<ul style="list-style-type: none"> LDC designation must be shown Voltage rating Current rating Type of switch Single/3 phase Physically accessible to LDC <p>Alternatively, switch information can be shown on SLD as per item number 14</p>
11	<p>Fuse information to include:</p> <ul style="list-style-type: none"> Fuse rating Manufacturer make/model Fuse type on the SLD Example: S&C SMD-1A 50E TCC153
12	<p>Transformer Information to include:</p> <ul style="list-style-type: none"> Winding configuration LDC designation Manufacturer make/model Rating Ratio Transformer ownership
13	<ul style="list-style-type: none"> Please detail where the existing FIT/micro-FIT generator/meter are connected. Include LDC ID Show existing load Capacity Type <p>For new generators:</p> <ul style="list-style-type: none"> Show the generator(s) connection(s) to the power transformer(s) Show the operating nomenclature of the generator(s) (e.g. G1, G2, etc.) State the nameplate capacity of the generator or individual generators, where there is more than one, in kVA / MVA. or kW / MW For solar, state the size(s) and number of inverter(s) State the operating power factor (PF) State connection type (Wye, Delta, etc.) and indicate grounding State whether the generator is induction or synchronous type.
14	<p>This is an alternate way to item number 10 to show the information for a switch</p> <ul style="list-style-type: none"> LDC designation Voltage rating Current rating Indicate which device is compliant with isolation device requirements
15	<ul style="list-style-type: none"> To comply with LDC TIR
16	See item number 12

17	<ul style="list-style-type: none"> • LDC designation • Manufacturer make/model
	<ul style="list-style-type: none"> • Current rating • Single/3 phase <p>Note: initial submission can have the consultant/customer assigned nomenclature if a LDC designation is not yet available. Later, the customer is assigned a LDC designation, which should be added to the SLD and resubmitted to LDC before the SLD is considered finalized. The consultant/customer then has the option to replace the initial designation with LDC designation or keep both. Ensure the LDC designation is clearly marked to differentiate it from the consultant/customer designation (bolded, in brackets, etc). Item 3 has an example showing only LDC designation, while item 17 shows an alternate method that shows both designations. LDC only refers to the LDC designation when dealing with the customer. Example, when witnessing the switch used for work protection as per the LDC TIR. When submitting the new SLD with the changes, a higher revision number of the SLD should be used to track the changes. See SLD example.</p>
18	<ul style="list-style-type: none"> • The Point of DER Connection (POC) is the point where DER unit(s)'s interconnection system connects the DER unit(s) to the DER facility. • Depending on the facility, it can be the same as the PCC
19	<ul style="list-style-type: none"> • Include LDC Project ID # • Inverter manufacturer make/model • MW rating • IEEE/ANSI protection elements need to be noted for the customer's inverters • Include CSA Certification
20	<ul style="list-style-type: none"> • Manufacture make/model • MWh rating • Include information for gross load billing where required
21	<ul style="list-style-type: none"> • Teleportation equipment make/model • Flow of information/signals
22	<ul style="list-style-type: none"> • Relay manufacturer make/model • ANSI Device numbers used • Flow of information signals
23	Flow of signals between devices
24	<p>Other general information required:</p> <ul style="list-style-type: none"> • SLD must be stamped and signed by a Registered Professional Engineer in the Province of Ontario • All information on the SLD must be legible, and of a reasonably sized font for ease of reading • The Connection Impact Assessment provides details regarding the type and configuration of isolation devices required. • The DER facility must comply with all applicable interconnection requirements specified in the "Distributed Generation Technical Interconnection

	Requirements Interconnections at Voltages 50kV and Below" (TIR).
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Appendix C - Standardized Form Templates

- Preliminary Consultation Information Request Template
- Preliminary Consultation Information Request Sample
- Preliminary Consultation Report Template
- Preliminary Consultation Report Sample
- Connection Impact Assessment Application Template
- Connection Impact Assessment Application Instructions
- Connection Impact Assessment Application Sample

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1. Instruction

The Applicant should only proceed with this form if the proposed DER project meets the following conditions:

- a) Has a capacity larger than 10kW (AC).
- b) Not a sole emergency backup generator during a power interruption to the distribution system.

For a micro DER project with a capacity size of 10kW or less, please review the Local Distribution Company (Distributor)'s website for application process.

The Applicant should complete the latest version of the PCIR form, and submit the form per the instruction provided on the Distributor's website. All fields are required, unless otherwise noted, to enable the preliminary connection assessment. The Applicant does not need to commit to any information provided in the PCIR. Changes can be made when applying for a Connection Impact Assessment (CIA). Please note that the preliminary consultation process does not consider the full range of technical evaluations that would be performed through a CIA. The PCR provides additional information on the potential complexity of the connection of the proposed DER. Capacity is not reserved upon completion of a Preliminary Consultation Report (PCR).

Please check the Independent Electricity System Operator (IESO)'s website for information on the System Impact Assessment if the Applicant plans to provide ancillary services.

All kW capacity information in this form should be in AC.

2. Distributor Contact Information

2.01 Contact Information			
A. Distributor Name	-	Synergy North Corporation	
B. Department Name	-	Asset Management and Engineering	
C. Department Address	-	37 Front St.	
D. Department City & Postal Code	-	Thunder Bay, ON P7A 8B2	
E. Department Fax	-	807-343-1192	
F. Department Phone	-	807-343-1037	
G. Department Email	-	generator.connections@synergynorth.ca	

3. General

3.01 Application Information			
A. Project Name	-		-
B. Application Submission Date	Date		Format: YYYY-MM-DD
3.02 Applicant Information			
A. Applicant (Company Name)	-		-
B. Applicant Type	Select		-
C. Applicant Representative (Individual Name)	-		-
D. Applicant Address	-		Corporate Address (if applicable)
E. Applicant City	-		-
F. Applicant Postal Code	-		Format: A0A 0A0
G. Applicant Fax	-		Optional
H. Applicant Phone	-		Format: XXX-YYY-ZZZZ
I. Applicant Email	-		-

4. Project Information

4.01 Project Nameplate & Type			
A. Proposed Capacity (Aggregate)	kW		AC capacity
B. Exporting/Non-Exporting	Select		Indicate if capable of exporting to grid
C. Proposed Export Capacity (Aggregate)	kW		If capacity is different from Proposed Capacity

	D. Connection Type (Single/Three-Phase)	Select		-
	E. Inverter-Based/Non-Inverter-Based	Select		-
4.02	Proposed DER Fuel/Energy Type			
	Please use the selection below to identify the proposed DER fuel/energy type.			
	A. Solar	kW		-
	B. Wind	kW		-
	C. Water (Hydroelectric)	kW		-
	D. Biofuel/Biogas	kW		-
	E. Thermal	kW		Other than biofuel
	F. Energy Storage (including bi-directional EV)	kW		-
	G. Other	Specify		Enter specific technology type and kW information

5. Site Information

5.01 Existing Account Holder

	A. Existing Account Number (if Applicable)	-		Required if applicable
	B. Existing Account Holder Name (if Applicable)	-		Required if applicable

5.02 Site Information

	A. Site Address	-		Location of proposed facility
	B. Site City/Town/Township	-		-
	C. Site Postal Code	-		-
	D. Site GPS Co-ordinates	-		Required for rural locations

5.03 Existing DERs at Site

If the Applicant has existing DER(s) at the same project site, please provide information required below to ensure proper preliminary connection assessment. If there is a variety of fuel/energy types, please explain in section "6.01 Other Information" below.

	A. Existing DER Capacity (Aggregate)	kW		Required if existing DER(s) installed
	B. Existing DER Connection (Single/Three-Phase)	Select		Required if existing DER(s) installed
	C. Existing DER Type (Inverter/Non-Inverter)	Select		Required if existing DER(s) installed
	D. Existing DER Intent (Exporting/Non-Exporting)	Select		Required if existing DER(s) installed

6. Other Information

6.01 Other Information

A. In the comment box below, the Applicant can provide any additional information that is required as indicated in the above section(s) or considered beneficial for the purpose of obtaining a preliminary connection assessment.

B. If the Applicant chooses to provide accompanying documents, please list them below.

7. Distributor Office Use Only (Optional)

7.01 PCIR Status

A. Date Received	Date	Completed by Distributor
B. Date Returned Incomplete	Date	Completed by Distributor
C. Date Preliminary Consultation Report Issued	Date	Completed by Distributor



Micro-Generation Connection Request Form

For Connection of Micro-Generation Facilities of ≤ 10 kW

This form is applicable to individual or multiple generating units at the Customer's facility with total nameplate rating of 10 kW or less. Your generation facility must generate electricity from a renewable energy source that is wind, water, solar radiation, or agricultural biomass.

Inverter-based generating units must not inject DC greater than 0.5% of the full rated output current at the point of connection of the generating units. The generated harmonic levels must not exceed those given in the CAN/CSA-C61000-3-6 Standards.

For generation size up to 10 kW, a Connection Impact Assessment will not be required and SYNERGY NORTH will not perform such an assessment. There may be a limitation on the number of micro-generation facilities that can be connected to the same distribution feeder.

IMPORTANT: All fields below are mandatory, except where noted. Incomplete applications may be returned by SYNERGY NORTH CORPORATION ("SYNERGY NORTH").

If you have any questions please e-mail SYNERGY NORTH at generator.connections@synergynorth.ca or call 807-343-1037.

Completed Micro-Generation Connection Request Form and other required documents may be returned:

By mail to:

SYNERGY NORTH CORPORATION
Attn: Asset Management and Engineering
Generation Connection Application
37 Front Street
Thunder Bay, Ontario P7A 8B2

or by email to:

generator.connections@synergynorth.ca

NOTE: Applicants are cautioned NOT to incur major expenses until SYNERGY NORTH responds with an "Estimate to Connect".

CHECKLIST

Please ensure that the following items are completed prior to submission. Your application will not be processed if any part is omitted or incomplete:

- ☐ **Completed Micro-Generation Connection Request Form**, must be signed and dated by the project owner or the consultant.
- ☐ **Manufacturer's Technical specifications and the model number of the generator and/or inverter selected for the project.**
- ☐ **Single-line Diagram (SLD)**
- ☐ **Micro-Embedded Generation Facility Connection Agreement (found in Appendix B) - completed, signed and dated by the project owner.**



DATE: _____(dd / mm / yyyy)

PROJECT NAME: _____

PROGRAM TYPE:

_____ OTHER: _____

PROPOSED IN-SERVICE DATE: _____(dd / mm / yyyy)

PROJECT SIZE:

Number of Units*: _____

Nameplate Rating of Each Unit (AC): _____ kW ☐ Single-phase ☐ Three-phase

Generator Connecting on: ☐ Single-phase

☐ Three-phase ☐ 208 volt ☐ 600 volt

Existing Total Nameplate Capacity (AC): _____ kW (if applicable)

Proposed Total Nameplate Capacity (AC): _____ kW

****If photovoltaics, generating unit(s) = inverter(s)***

PROJECT LOCATION:

Address: _____

City / Town / Township: _____

Lot Number(s): _____

Concession Number(s): _____

CONTACT INFORMATION:

Choose a Single Point of Contact: Owner ☐ Consultant ☐

	Owner (Mandatory)	Consultant (Optional)
Company/Person		
Contact Person		
Mailing Address Line 1		
Mailing Address Line 2		
Telephone		
Cell		
Fax		
E-mail		

Preferred method of communication with SYNERGY NORTH:

- ☐ E-mail
☐ Telephone
☐ Mail
☐ Fax



CUSTOMER STATUS:

Existing SYNERGY NORTH Customer? ☐ Yes
☐ No

If yes, SYNERGY NORTH Account Number: _____

Customer name registered in this Account: _____

Are you a GST registrant? ☐ Yes
☐ No

If yes, provide your GST registration number: _____ - _____ RT _____

FUEL TYPE:

Wind Turbine	<input type="checkbox"/>	Biomass	<input type="checkbox"/>
Hydraulic Turbine	<input type="checkbox"/>	Bio-diesel	<input type="checkbox"/>
Ground-Mounted Solar/Photovoltaic	<input type="checkbox"/>	Rooftop-Mounted Solar/Photovoltaic	<input type="checkbox"/>
Other (Please Specify)	<input type="checkbox"/>	_____	

CONNECTION TYPE*:

Indirectly in Parallel ☐ Directly ☐
 Net-Metered ☐

**Refer to Appendix A for available connection configurations*

CUSTOMER OWNED STEP-UP INTERFACE TRANSFORMER (IF APPLICABLE):

Transformer rating: _____ kVA

Nominal voltage of high (distribution) voltage winding: _____ kV

Nominal voltage of low (generator) voltage winding: _____ kV

Transformer type: ☐ Single-phase ☐ Three-phase

Transformer Impedances on: _____ kVA base _____ kV base R _____ pu
 X _____ pu

High voltage winding connection: ☐ Delta ☐ Wye

Grounding method of wye connected high voltage winding neutral: ☐ Solid ☐ Ungrounded ☐ Impedance: R _____ ohms
 X _____ ohms

Low voltage winding connection: ☐ Delta ☐ Wye

Grounding method of wye connected low voltage winding neutral: ☐ Solid ☐ Ungrounded ☐ Impedance: R _____ ohms
 X _____ ohms



CUSTOMER ACCESSIBLE MAIN DISCONNECT SWITCH

Is there an existing customer accessible main disconnect switch or breaker? ☐ Yes ☐ No

UTILITY INTERCONNECTION CHARACTERISTICS – COMPLETED BY SYNERGY NORTH:

Voltage at Point of Connection:	kV
Point of Connection Feeder:	
Originating Station of Point of Connection Feeder:	

ADDITIONAL DOCUMENTATION REQUIRED:

In addition to the completed “Micro-Generation Connection Request Form”, the Customer must also provide the following documents:

- 1) The manufacturer’s technical specifications for the generator and/or inverter complete with the model number of the generator and/or inverter selected for the project.
- 2) A single-line diagram of the proposed system which includes:
 - a. The arrangement of the Customer’s electrical load and the proposed generation facility;
 - b. The existing revenue metering arrangement;
 - c. The proposed isolating/disconnecting device for isolation of the generating unit(s) from the SYNERGY NORTH system.

Note: SYNERGY NORTH may request additional information if required.

Applicant: _____ **Date:** _____
(Signature) (dd/mm/yyyy)

Appendix A: Illustrations of Connection Type

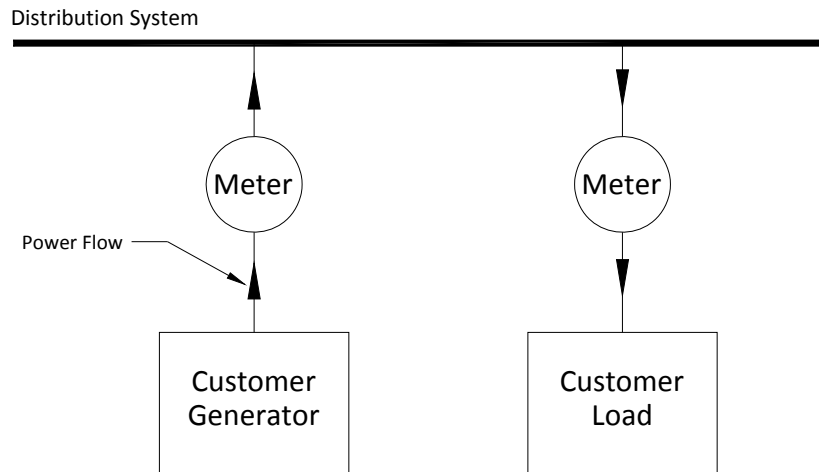


Figure 1 - Directly Connected

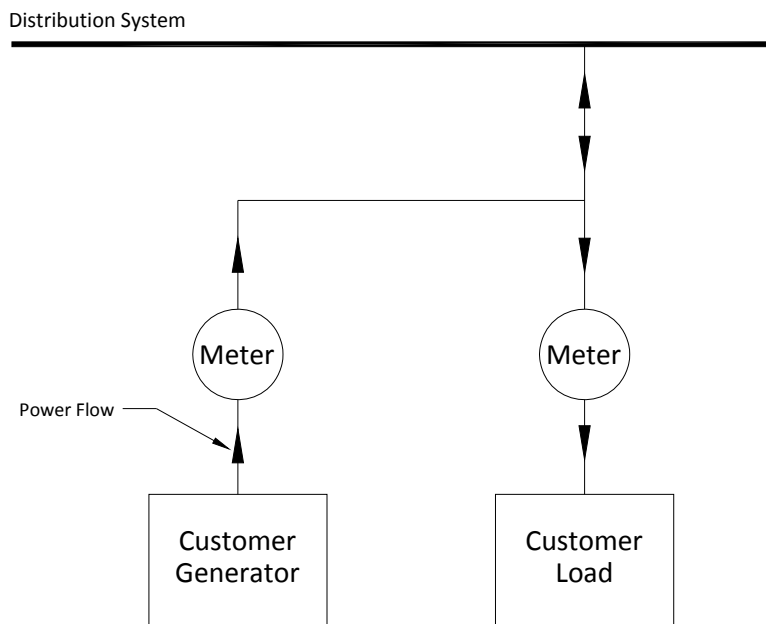


Figure 2 - Indirectly Connected In Parallel

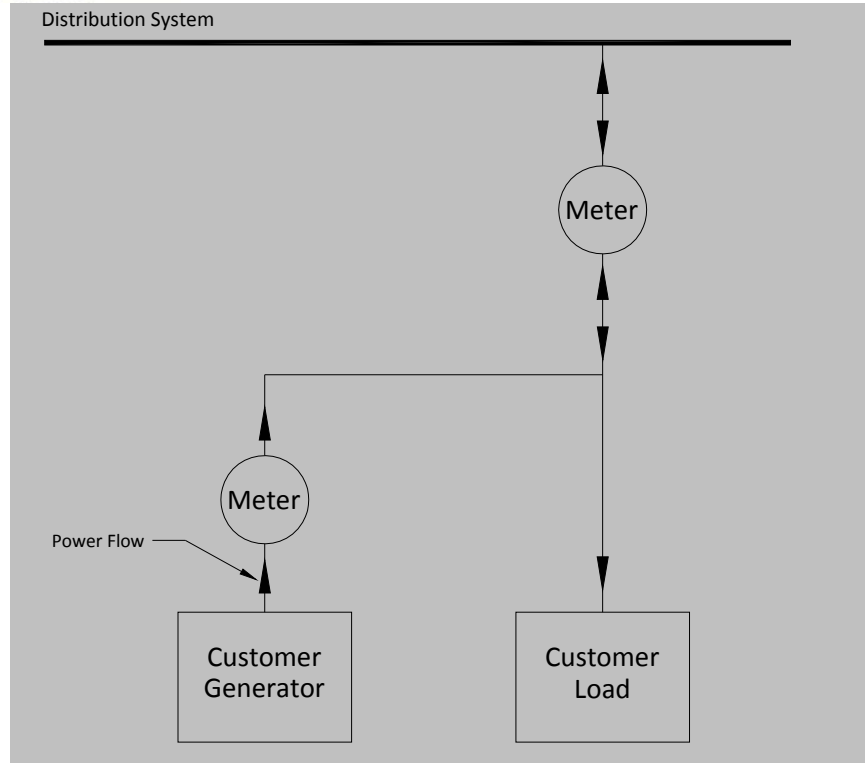


Figure 3 - Indirectly Connected In Series

****THIS CONFIGURATION IS UNDER REVIEW BY MEASUREMENT CANADA AND IS NOT CURRENTLY AVAILABLE AS AN OPTION****

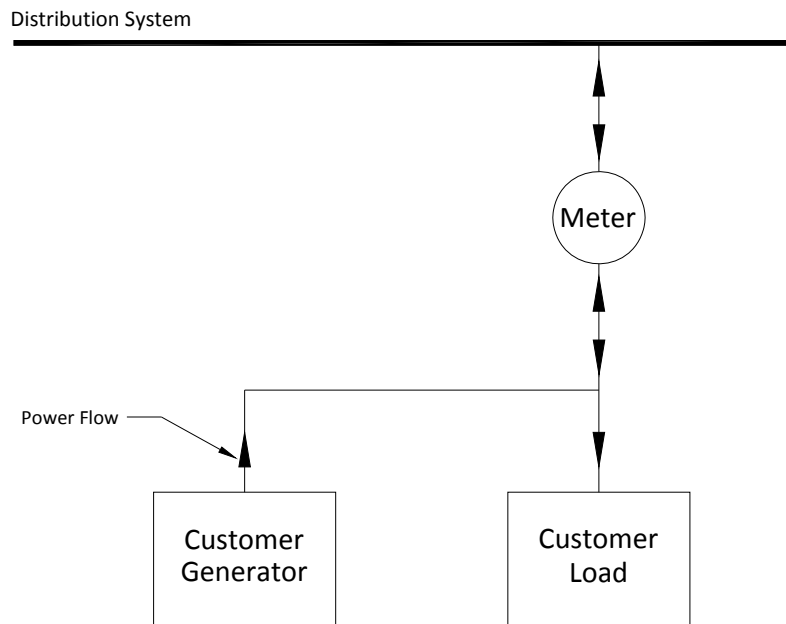


Figure 4 - Net-Metered

Appendix B: Micro-Embedded Generation Facility Connection Agreement

In consideration of the Local Distribution Company agreeing to allow you to connect your 10 kW name-plate rated capacity or smaller generation facility to the LDC's distribution system, you hereby agree to the following terms and conditions.

1. Eligibility

- 1.1. You agree that your generation connection shall be subject to all applicable laws and bound by the terms and conditions of the LDC's Conditions of Service as amended from time-to-time, which have been filed with the OEB and are available upon request.

2. Technical Requirements

- 2.1. You represent and warrant that you have installed or will install prior to the connection of your generation facility to the LDC's distribution system, an isolation device satisfying Section 84 of the Ontario Electrical Safety Code and agree to allow the LDC's staff access to and operation of this as required for the maintenance and repair of the distribution system.
- 2.2. You agree to perform regular scheduled maintenance to your generation facility as outlined by the manufacturer in order to assure that connection devices, protection systems, and control systems are maintained in good working order and in compliance with all applicable laws.
- 2.3. You agree that during a power outage on the LDC system your generation facility will shut down, unless you have installed special transfer and isolating capabilities on your generation facility. You agree to the automatic disconnection of your generation facility from the LDC's distribution system, as per the generator protective relay settings set out in this Agreement, in the event of a power outage on the LDC's distribution system or any abnormal operation of the LDC's distribution system.
- 2.4. You covenant and agree that the design, installation, maintenance, and operation of your generation facility are conducted in a manner that ensures the safety and security of both the generation facility and the LDC's distribution system.
- 2.5. Due to the LDC's obligation to maintain the safety and reliability of its distribution system, you acknowledge and agree that in the event the LDC determines that your generation facility (i) causes damage to; and/or (ii) is producing adverse effects affecting other distribution system customer or the LDC's assets, you will disconnect your generation facility immediately from the distribution system upon direction from the LDC and correct the problem at your own expense prior to reconnection.

3. Liabilities

- 3.1. You and the LDC will indemnify and save each other harmless for all damages and/or adverse effects resulting from either party's negligence or willful misconduct in the connection and operation of your generation facility of the LDC's distribution system.
- 3.2. The LDC and you shall not be liable to each other under any circumstances whatsoever for any loss of profits or revenues, business interruptions losses, loss of contract or loss of goodwill, or for any indirect, consequential, incidental, or special damages, including but not limited to punitive or exemplary damages, whether any of the said liability, loss or damages arise in contract, tort, or otherwise.

4. Compensation and Billing

- 4.1. If you are not an embedded retail generator, you agree that, subject to any applicable law:
 - 4.1.1. the LDC will not pay you for any excess generation that results in a net delivery to the LDC between meter reads; and



- 4.1.2. There will be no carryover of excess generation from one billing period to the next unless you are, at the relevant time, a net metered generator (as defined in section 6.7.1 of the Distribution System Code).
- 4.2. If you are an embedded retail generator selling output from the embedded generation facility to the Ontario Power Authority under contract, you agree that the LDC will pay you for generation in accordance with the Retail Settlement Code.
- 4.3. If you are an embedded retail generator delivering and selling output to the LDC, you agree that the LDC will pay you for generation in accordance with the Retail Settlement Code.

5. Termination

- 5.1. You understand that you have the right to terminate this agreement at any time, and that by doing so you are required to disconnect your generation facility and notify the LDC of such action.

6. Assignment

- 6.1. You may assign your rights and obligations under this Agreement with the consent of the LDC, which shall not withhold its consent unreasonably. The LDC shall have the right to assign its rights and obligations under this Agreement without your consent.

I understand, accept, and agree to comply with and be bound by the above terms and conditions governing the connection of my generation facility to the LDC's distribution system.

Customer Signature: _____ Date: _____

Print name: _____

I confirm that the following information is true and accurate:

Nameplate rating of Generator: _____ kW Total installed generation: _____ kW

Type: ☐ Wind Turbine ☐ Photovoltaic (Solar) ☐ Hydraulic Turbine
☐ Fuel Cell ☐ Battery Storage ☐ Other: _____

Inverter Utilized: ☐ Yes ☐ No

Inverter Certification: ☐ C22.2 #107.1 ☐ UL 1741 ☐ Site Certified by the ESA

For office use: Date Connected _____ Account Number _____

Generator Protective Relay Settings

Table 1 – Inverter Based Generation

The following relay settings shall be used for inverters built to the CSA standard:

Source: CSA C22.2 No. 107.1-01 Table 16

System Voltage Vn ' V nominal V (Volts)	Frequency F (Hertz)	Maximum number of cycles to disconnect	
		Seconds	Cycle
$V < 0.5 V_n$	60	0.1	6
$0.5 V_n \leq V < 0.88 V_n$	60	2	120
$1.10 V_n \leq V < 1.37 V_n$	60	2	120
$V > 1.37 V_n$	60	0.033	2
Vn	$F < 59.5^*$	0.1	6
Vn	$F > 60.5$	0.1	6

* The UL1741 & IEEE P1547 Standards use $F < \text{rated} - 0.7$ i.e. 59.3 Hz. To update if CSA C22.2 No. 107.1-01 is changed

Table 2 – Non-Inverter Generation

LDC's minimum requirements for other generation are as follows:

System Voltage Vn ' V nominal V (Volts)	Frequency F (Hertz)	Maximum clearing time*	
		Seconds	Cycle
$V < 0.5 V_n$	60	0.16	9.6
$0.5 V_n \leq V < 0.88 V_n$	60	2	120
$1.10 V_n \leq V < 1.20 V_n$	60	1	60
$V > 1.20 V_n$	60	0.16	9.6
Vn	$F < 59.3$	0.16	9.6
Vn	$F > 60.5$	0.16	9.6

*Clearing time is the time between the start of the abnormal condition and the generation ceasing to energize the LDC's distribution system

- If you are uncertain about your generation equipment's protective relay settings, please check with your generating equipment supplier.
- Automatic reconnect setting time for your generator is after 5 minutes of normal voltage and frequency on the LDC's distribution system.



Connection Impact Assessment (CIA) Application



Asset Management and Engineering | generator.connections@synergynorth.ca | (807) 343-1037

ABOUT THIS FORM

This Connection Impact Assessment (CIA) application is to be completed by any proponent interested in connecting a Distributed Energy Resources (DER) with a project size over 10 kilowatts (kW) to SYNERGY NORTH. This includes DER applying for a new CIA or for revision(s) to their original CIA. This form expresses an intent to enter into an agreement between SYNERGY NORTH and the customer (or host customer* for load displacement projects) for completion of a CIA associated with connecting a DER to the SYNERGY NORTH distribution grid. The CIA Application shall be part of the required servicing (electrical installation, maintenance, and operating) agreements between SYNERGY NORTH and the proponent. Through this process, SYNERGY NORTH will be the proponent's contact with the transmission system provider (e.g. Hydro One Networks Inc.) and, if necessary, the provincial market operator, namely, the Independent Electricity System Operator (IESO).

*For Load Displacement projects, the term "host customer" refers to the owner of the load facility. The term "DER owner" refers to the owner of the DER facility.

Emergency Backup Generators must follow all guidelines outlined in the Conditions of Service.

TECHNICAL REQUIREMENTS

For technical requirements of Synergy North's DER projects, refer to the "DER Technical Interconnection Requirements Interconnections at Voltages 50kV and Below", available at:

<https://synergynorth.ca/wp-content/uploads/2021/05/Synergy-North-Parallel-Generation-Requirements-Rev-9.pdf>

SUBMISSION INSTRUCTIONS

Please return the completed form, fees and other required documents by mail to:

SYNERGY NORTH
Attn: Asset Management and Engineering
Generation Connection Application
37 Front St.
Thunder Bay, ON P7A 8B2

IMPORTANT NOTES

- An engineering stamp and all red box fields (on electronic version of form) are mandatory. Incomplete applications may be returned by SYNERGY NORTH and will result in delays in processing your application. Click the "Validate Form" button on the top right of this page to ensure all required information is filled. If any of the required fields are not applicable to your project, type "N/A" in any required text field or "0" in any required numerical field
- SYNERGY NORTH specific requirements and notes are found in Sections S and T, respectively
- Applicants are cautioned NOT to incur major expenses until SYNERGY NORTH approves to connect the proposed DER facility.
- All technical submissions (CIA Application, Single Line Diagrams, etc.) must be signed, dated and sealed by a licensed Ontario Professional Engineer (P.Eng.).
- The proponent will pay for the CIA according to the SYNERGY NORTH CIA Fee Schedule.





- For Load Displacement or Energy Storage facility connections, the assessment performed by SYNERGY NORTH is referred to as a Detailed Technical Connection Assessment (DTCA). For such facilities, the term "CIA" as it appears throughout this Connection Impact Assessment (CIA) Application shall be interpreted to mean "DTCA".

- The siting restrictions in O. Reg. 274/18 which were administered by electricity distributors such as SYNERGY NORTH have been replaced by amendments to the Planning Act (Ontario) that puts siting and planning requirements for renewable DER facilities under municipal oversight. It is recommended that you discuss municipal permitting and approvals requirements with the planning department in the municipality where your DER project is located before you proceed.

- For micro-embedded projects (10 kW or less), please fill out SYNERGY NORTH's "Micro-Generation Connection Application (Form C)" available at:

https://synergynorth.ca/wp-content/uploads/2019/10/Micro-Generation_Connection_Request_Form.pdf

▶ SECTION A: APPLICATION INFORMATION

Engineering Stamp

Application Type *choose one*

Date *mm/dd/yyyy*

Program Type/Purpose *choose one*

Program Type (additional details)

Project Name

IESO Contract Number *F-XXXXXX-XXX-XXX-XXX*

IESO Reference Number *FIT-XXXXXX*

Ontario Corporate Number or Business Identification Number

Proposed In Service Date *mm/dd/yyyy*

If this project is a subdivision project, please complete the following fields:

Subdivision Project Name

Number of Lots

For certain application type selections, please complete the required fields:

Original CIA Project ID # *XX,XXX*

Revised Fields *list the fields that have changed from your previous application*

▶ SECTION B: PROJECT LOCATION

Address

City / Town / Township

Postal Code

Lot Number(s)

Concession Number(s)





▶ SECTION C: CONTACT INFORMATION

CIA will be issued in the name of the host customer (load facility owner). All agreements (including CCA and DCA) are only made between SYNERGY NORTH and the host customer. This section is strictly to gather contact information of some of the key contacts that are involved with the project.

Who is the single point of contact for this project?

Host Customer

DER Owner (if different from host customer)

Consultant

*Please enter the following information about the **host customer** (load facility owner)*

Contact Person

Company's Legal Name

Mailing Address including postal code, P.O. Boxes and Rural Routes will not be accepted

Work Telephone

Cell Phone

Fax Number

Email Address

*Please enter the following information about the **DER owner** (if different from host customer)*

Contact Person

Company's Legal Name

Mailing Address including postal code, P.O. Boxes and Rural Routes will not be accepted

Work Telephone

Cell Phone

Fax Number

Email Address

*Please enter the following information about the **consultant***

Contact Person

Company's Legal Name

Mailing Address including postal code, P.O. Boxes and Rural Routes will not be accepted

Work Telephone

Cell Phone

Fax Number

Email Address





▶ SECTION D: CUSTOMER STATUS

Is there an existing SYNERGY NORTH account at the project location?

Yes

No

Is the account holder aware of this application?

Yes

No

Does your account fall within a residential-rate classification?

Yes

No

☐ Do not Know

Existing Account Number

Account Holder Name

Does the account holder have an HST registration number?

Yes

No

HST Number

▶ SECTION E: EXISTING DER

Are there existing DER at the point of common coupling (PCC)?

Yes

No

Existing Project Number

Existing Project Size (kW)

Program Type For Existing DER *choose one*

DER type:

Synchronous

Induction

Inverter based

Other

For synchronous units	For induction units	For inverter based units
Min. power limit for stable operation <i>kW</i> <input type="text"/>	Direct axis sub-transient reactance, X''_d <i>pu</i> <input type="text"/>	Inverter rating <i>kVA</i> <input type="text"/>
Direct axis sub-transient reactance, X''_d <i>pu</i> <input type="text"/>	Direct axis transient reactance, X'_d <i>pu</i> <input type="text"/>	Maximum continuous power output <i>kW</i> <input type="text"/>
Direct axis transient reactance, X'_d <i>pu</i> <input type="text"/>	Total PF correction installed <i>kVAR</i> <input type="text"/>	
Direct axis synchronous reactance, X_d <i>pu</i> <input type="text"/>		
Zero sequence reactance, X_0 <i>pu</i> <input type="text"/>		





▶ SECTION F: PROJECT INFORMATION

Station Name *(optional to leave blank for behind the meter projects)*

Fuel/Energy Type *select all that apply*

Feeder *(optional to leave blank for behind the meter projects)*

Feeder Voltage (kV) *(optional to leave blank for behind the meter projects)*

Project Size (kW) *total maximum output capacity*

Equipment Capacity (kVA) *total equipment nameplate rating*

Type of Connection

Single Phase

Three Phase

If this is a solar project, please answer the following questions:

Mounting Type *select one*

If this is a water project, please answer the following questions:

Is your generation facility located on provincial Crown or federally-regulated lands?

Yes

No

Is water your primary energy source?

Yes

No

▶ SECTION G: STATION SERVICE LOAD INFORMATION

The host customer's station service load details

If there is an existing account at the project location, populating the fields in Section G is optional for SYNERGY NORTH. Ensure selection below matches with this note.

Required

Optional

Maximum Demand of Station Service Load of DER *kW*

Average Monthly Consumption *kWh*





SECTION H: CONNECTION INFORMATION

On a cut-out from the SYNERGY NORTH DOM (Distribution Operating Map) provide the location of the generation facility with proposed line routings for connection to SYNERGY NORTH's distribution system. It should identify the Point of Expansion (POE), the Point of Common Coupling (PCC), the location of the generation facility, and (if applicable) the route of the new line between the generation facility and the POE (ie. on private property or public road/right-of-way). This is not required for existing load customers that are connecting a load displacement generation, net metering generation or energy storage system behind their existing metered connection point. Please see

"Appendix A" for a visual representation of POE and PCC.
DOM Drawing/Sketch Number

DOM Revision Number

Please provide an SLD of the Generator's facilities, including the PCC, transformer and connecting station, feeder, and supply voltage.

SLD Drawing/Sketch Number

SLD Revision Number

POE Latitude degree decimal format

POE Longitude degree decimal format

PCC Latitude degree decimal format

PCC Longitude degree decimal format

Generation Facility Latitude degree decimal format

Generation Facility Longitude degree decimal format

Length of Line from POE to PCC km

Length of Line from PCC to Generation Facility km

Important: The line between the PCC and the Generation Facility must NOT be shared with any other DER owner (refer to Appendix A).

Conductor Type/Size for the line between the PCC and the Generation Facility

Generator Fault Contribution with fault location at the PCC

IMPORTANT NOTES:

If this project requires line expansion work between the POE and PCC, SYNERGY NORTH will provide a cost estimate to construct any line located on public road right-of-way. The cost estimate will include a breakdown of uncontested work (i.e. overbuild to existing line) that can only be performed by SYNERGY NORTH, as well as contestable work (i.e. new construction/green-field) that may be performed by the Generator, their contractor or SYNERGY NORTH. The design of uncontested and contestable work shall conform to SYNERGY NORTH specifications).

For Generator-owned line, the Generator may apply to construct the line on existing SYNERGY NORTH-owned poles. This is known as an application for Joint Use (JU) of poles. If the application is accepted, SYNERGY NORTH will provide the Generator with information on initial connection costs, annual pole-space rental and emergency service (ES) fees, and required JU & ES Agreements.





▶ SECTION I: ENERGY STORAGE OR UPS

Please complete the following section if your project includes energy storage.

Number of Units

Inverter Unit Size enter zero if inverter is shared with generation unit(s)

Energy Storage Unit Size kWh

Total Energy Storage Size kWh

Energy Storage Facility Control Strategy

Peak Shaving

Dynamic VAR Support

Frequency Support

Other

Please submit a detailed description of the control strategy according to the templates in Appendix B. SYNERGY NORTH reserves the right to modify the control strategy as part of its Detailed Technical Connection Assessment.

▶ SECTION J: LOAD DISPLACEMENT/PEAK SHAVING

Please complete the following section if this is a load displacement or peak shaving project

Operating Mode

Parallel

Non-Parallel

Transition Type

Closed "make before break"

Open "break before make"

Time that generator remains parallel to grid closed transition only, ms

For non-parallel load displacement, SCADA monitoring and Gross Load Billing (GLB) may apply. For load displacement generation facilities, please attach a schedule of the forecasted maximum generation output (as a function of loading of the facility). At a minimum, include the forecasted generation output information (i.e. Watts and VARs) during the minimum and maximum of the load facility to which the load displacement generator is connecting (see Appendix C for template)





SECTION K: DER CHARACTERISTICS

For facilities with multiple generators: If your generators have different characteristics, please use the "Add Page" button and provide the characteristics for each generator on the additional pages.

DER type: Synchronous Induction Inverter based Other

Number of Generating Units

Rated Capacity of Each Unit

kW

kVA

DER Output Voltage in kV

Manufacturer

Type or Model Number

If Power Conversion Type is "Other", please provide values equivalent to a Synchronous or Induction type generator.

Maximum Starting In-rush Current multiple of full load current, pu

Generator Winding Connection

Delta

Star

Neutral Grounding Method for star winding connection only

Solid

Ungrounded

Impedance

Impedance R in ohms

Impedance X in ohms

Limits of range of reactive power at the machine output:

Lagging over-excited, kVAR

Lagging Power Factor

Leading under-excited, kVAR

Leading Power Factor

Limits of range of reactive power at the PCC:

Lagging over-excited, kVAR

Lagging Power Factor

Leading under-excited, kVAR

Leading Power Factor

For synchronous units

Nominal Machine Voltage kV (LL)

Unsaturated Reactance kVA Base

Unsaturated Reactance kV Base

Direct Axis Subtransient Reactance, X_d'' pu

Direct Axis Transient Reactance, X_d' pu

Direct Axis Synchronous Reactance, X_d pu

Subtransient Time, T_d'' ms

Zero Sequence Reactance, X_0 pu

For induction units

Nominal Machine Voltage kV (LL)

Unsaturated Reactance kVA Base

Unsaturated Reactance kV Base

Direct Axis Subtransient Reactance, X_d'' pu





SECTION L: INTERFACE TRANSFORMER

The transformer connecting to the SYNERGY NORTH distribution system

Transformer Ownership

Customer SYNERGY NORTH

Transformer Rating *kVA*

Transformer Type

Single Phase

Three Phase

Nominal Voltage of High Voltage Winding *kV*

Nominal Voltage of Low Voltage Winding *kV*

Impedance Base (if different than ratings above)

kVA Base

kV Base

Impedance (R) *pu*

Impedance (X) *pu*

OR

Impedance (Z%) %

High Voltage Winding Connection

Delta

Star

High Voltage Grounding Method *for star winding connection only*

Solid

Ungrounded

Impedance

Star Impedance R *in ohms*

Star Impedance X *in ohms*

Low Voltage Winding Connection

Delta

Star

Low Voltage Grounding Method *for star winding connection only*

Solid

Ungrounded

Impedance

Star Impedance R *in ohms*

Star Impedance X *in ohms*

Notes

The term "High Voltage" refers to the connection voltage to SYNERGY NORTH's distribution system and "Low Voltage" refers to the generation or any other intermediate voltage.

Providing a photo of transformer equipment along with this application may help expedite your application.





SECTION M: INTERMEDIATE TRANSFORMER

Transformer between the interface transformer and DER

Please complete the following section if your project includes an intermediate transformer.

Do you intend to install an intermediate transformer?

Yes

No

Transformer Rating kVA

Transformer Type

Single Phase

Three Phase

Nominal Voltage of High Voltage Winding kV

Nominal Voltage of Low Voltage Winding kV

Impedance

kVA Base

kV Base

Impedance R pu

Impedance X pu

High Voltage Winding Connection

Delta

Star

High Voltage Grounding Method for star winding connection only

Solid

Ungrounded

Impedance

Star Impedance R in ohms

Star Impedance X in ohms

Low Voltage Winding Connection

Delta

Star

Low Voltage Grounding Method for star winding connection only

Solid

Ungrounded

Impedance

Star Impedance R in ohms

Star Impedance X in ohms

Notes:

The term "High Voltage" refers to the connection voltage to Hydro One's distribution system and "Low Voltage" refers to the generation or any other intermediate voltage.

SECTION N: HIGH-VOLTAGE GROUNDING TRANSFORMER

Please complete the following section if your project includes a high-voltage grounding transformer.

Do you have a high-voltage grounding transformer?

Yes

No

Transformer Type select one

Zig-Zag

Star-Delta

Zero Sequence Impedance (Z0) R ohms

Zero Sequence Impedance (Z0) X ohms





► SECTION O: SUBMISSION CHECKLIST

Please ensure the following items are completed prior to submission. Your application may not be processed if any part is omitted or incomplete:

- ☐ Payment in full including applicable taxes (by cheque payable to “**SYNERGY NORTH CORPORATION**”)
- ☐ Completed CIA Application stamped by a Professional Engineer
- ☐ Signed Study Agreement (original signature is required)
- ☐ Single Line Diagram (SLD) of the Generator’s facilities, must be stamped by a Professional Engineer
- ☐ Protection Philosophy
- ☐ Distribution Operating Map (DOM) and/or Site Plan *(not required for existing load customers that are connecting a load displacement generation, net metering generation or energy storage system behind their existing metered connection point)*
- ☐ Load Displacement Generation Facility’s load and generation schedules (if applicable)
- ☐ Load Displacement Generation Facility’s mode of operation (if applicable)
- ☐ Energy Storage Facility operating strategy description an parameters (if applicable)
- ☐ Emergency Backup Generation Facility’s mode of operation (if applicable)

► SECTION P: CIA APPLICATION FEE CHECKLIST

Please ensure the following items are completed prior to submission. Your application will not be processed if any part is omitted or incomplete. Check all that apply:

- ☐ **Applicable CIA Fee**
See the **Connection Impact Assessment Fee Schedule** on our website for costs. Please enter the amount from the fee schedule. \$ +HST
- ☐ **Transmission Customer Impact Assessment (TxCIA) Fee (if applicable)**
A TxCIA is also required if the total nameplate generation of the project is greater than 10MW. \$ +HST
- ☐ **IESO System Impact Assessment (SIA) Fee (if applicable)**
An SIA deposit is required if the total nameplate generation of the project is greater than 10MW. The total cost of the SIA will be Trued Up/Down upon the receipt of the SIA from the IESO. See the **IESO’s SIA Application** for costs. \$





▶ **SECTION Q: ATTACHMENTS**

Attached Documents / Drawings

Item #	Description	Document #	# of Pages
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

▶ **SECTION R: NOTES**





▶ SECTION S: SYNERGY NORTH Specific Required Fields

This section contains specific information that is required by SYNERGY NORTH. Please read Section T notes regarding this section if you need further details.

What is the number of the nearest pole serving the project location?

SYNERGY NORTH Account Number *if transformer is owned by utility*

▶ SECTION T: Hydro One Specific Additional Notes

Section A: no additional notes

Section B: no additional notes

Section C: no additional notes

Section D: no additional notes

Section E: no additional notes

Section F: no additional notes

Section G: no additional notes

Section H: no additional notes

Section I: no additional notes

Section J: no additional notes

Section K: no additional notes

Section L: At the Generator's expense, and if requested, SYNERGY NORTH may provide transformation up to a maximum of 500 kVA three-phase, as described in the Conditions of Service (Section 3.5 item C.4).

Section M: no additional notes

Section N: no additional notes

Section O: for new DER site, Distribution Operating Map (DOM) is required by SYNERGY NORTH in addition to Site Plan

Section P: no additional notes

Section Q: no additional notes

Section R: no additional notes

Section S: - For question: "What is the number of the nearest pole serving the project location?", this is only applicable if you choose "No" to question: "Is there an existing Synergy North account at the project location?" in Section D

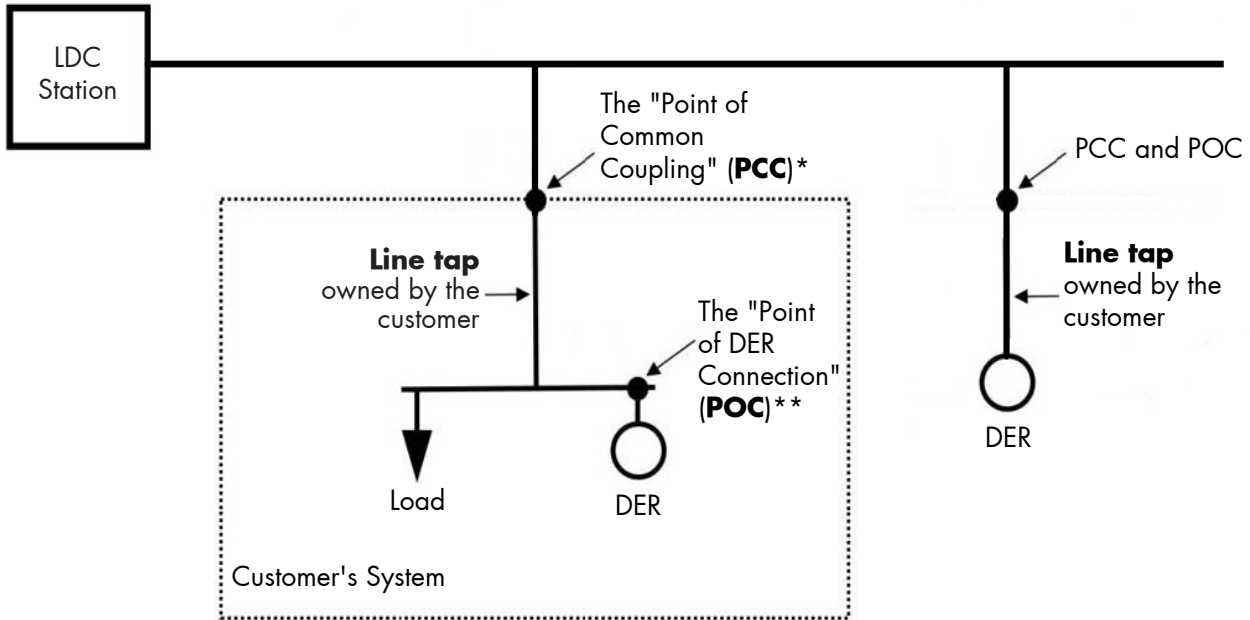
- For question: "Synergy North Account Number (if transformer is owned by utility)", this is only applicable if you answer "Synergy North" to question: "Transformer Ownership" in Section L.





► APPENDIX A - FIGURES & DIAGRAMS

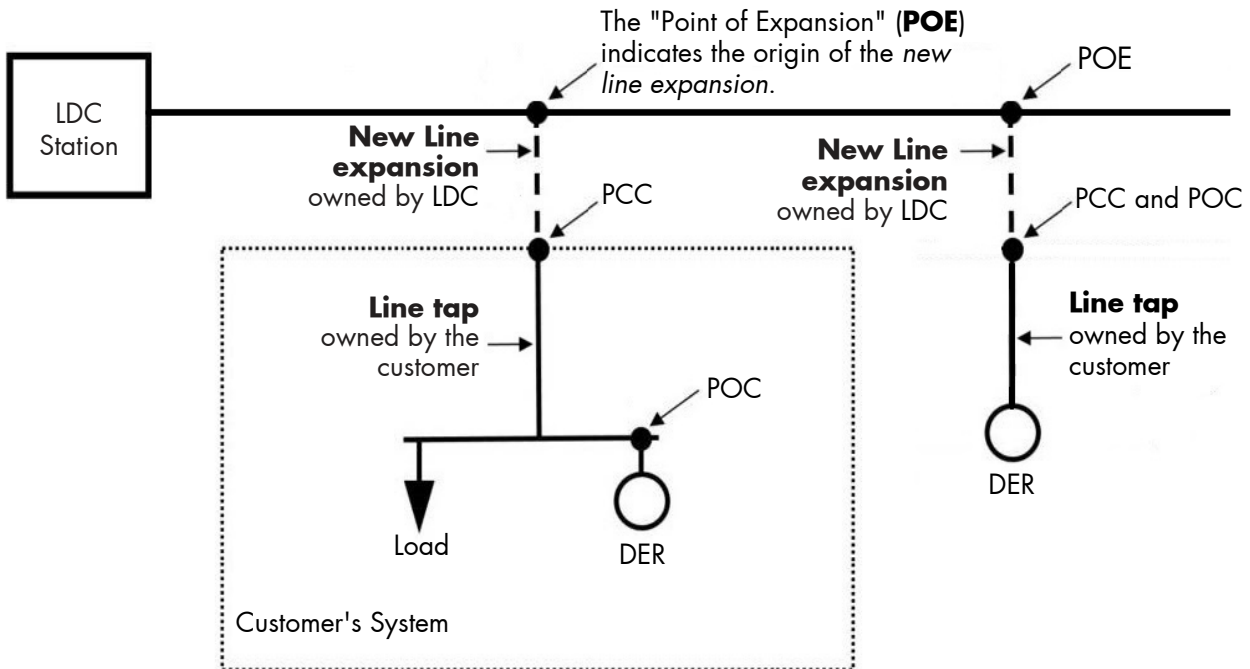
Figure A1: Where There is No New SYNERGY NORTH Owned Line Expansion



*PCC: the point where the customer facility connects to the LDC owned system

**POC: the point where the DER unit(s)'s interconnection system connects the DER unit(s) to the DER facility.

Figure A2: Where There is a New SYNERGY NORTH Owned Line Expansion





► **APPENDIX B - MINIMUM CONTROL STRATEGY INFORMATION FOR ENERGY STORAGE FACILITIES OR OTHER TECHNOLOGIES**

Figure B1: Peak Shaving

Peak Shaving			
Description of Control Strategy			
When Operating as a Load			
Switch In Time	Switch Out Time	Load kW (peak)	Load kVAR (peak, leading/lagging)
When Operating as a Generator			
Switch In Time	Switch Out Time	Generation kW (peak)	Generation kVAR (peak, leading/lagging)

Figure B2: Dynamic VAR Support

Dynamic VAR Support			
Description of Control Strategy			
Switch In Condition	Switch Out Condition	Generation kW (peak)	Generation kVAR (peak, leading/lagging)

Figure B3: Frequency Support

Frequency Support			
Description of Control Strategy			
Switch In Condition	Switch Out Condition	Generation kW (peak)	Generation kVAR (peak, leading/lagging)

Figure B4: Other Control Strategies

Other	
Description of Control Strategy and Relevant Operating Parameters	





► **APPENDIX C - LOAD DISPLACEMENT FIGURES**

Figure C1: Example Schedule With Minimum Information Required for Load Displacement Projects

	Load of Facility (kW)	Load of Facility (kVAR, lead or lag)	Generation Output (kW)	Generation Output (kVAR, lead or lag)
Minimum Load				
Maximum Load				



**Connection Impact
Assessment (CIA)
Application Instructions**

TABLE OF CONTENTS

1.	GENERAL APPLICATION INFORMATION.....	3
1.2	TECHNICAL REQUIREMENTS.....	3
1.3	SUBMISSION INSTRUCTIONS.....	3
1.4	IMPORTANT NOTES.....	3
2.	SECTION A – APPLICATION INFORMATION.....	4
3.	SECTION B – PROJECT LOCATION.....	5
4.	SECTION C – CONTACT INFORMATION.....	5
5.	SECTION D – CUSTOMER STATUS.....	6
6.	SECTION E – EXISTING DER.....	6
7.	SECTION F – PROJECT INFORMATION.....	7
8.	SECTION G – STATION SERVICE LOAD INFORMATION.....	7
9.	SECTION H – CONNECTION INFORMATION.....	7
10.	SECTION I – ENERGY STORAGE.....	9
11.	SECTION J – LOAD DISPLACEMENT INFORMATION.....	9
12.	SECTION K – DER CHARACTERISTICS (1/1).....	9
13.	SECTION L – INTERFACE TRANSFORMER.....	10
14.	SECTION M – INTERMEDIATE TRANSFORMER.....	10
15.	SECTION N – HIGH-VOLTAGE GROUNDING TRANSFORMER.....	10
16.	SECTION O – SUBMISSION CHECKLIST.....	10
17.	SECTION P – CIA APPLICATION FEE CHECKLIST.....	11
18.	SECTION Q – ATTACHMENTS.....	12
19.	SECTION R – NOTES.....	12
20.	SECTION S – SYNERGY NORTH SPECIFIC REQUIRED FIELDS.....	12
21.	SECTION T – SYNERGY NORTH SPECIFIC ADDITIONAL NOTES.....	12

1. GENERAL APPLICATION INFORMATION

1.1 ABOUT THE CIA FORM

The Connection Impact Assessment (CIA) application is to be completed by any proponent interested in connecting a Distributed Energy Resource (DER) with a project size over 10 kilowatts (kW) to SYNERGY NORTH. This includes DERs applying for a new CIA or for revision(s) to their original CIA. This form expresses an intent to enter into an agreement between SYNERGY NORTH and the customer (or host customer¹ for load displacement projects) for completion of a CIA associated with connecting a DER to the SYNERGY NORTH distribution grid. The CIA Application shall be part of the required servicing (electrical installation, maintenance, and operating) agreements between SYNERGY NORTH and the proponent. Throughout this process, SYNERGY NORTH will be the proponent's contact with the transmission system provider (e.g. Hydro One Networks Inc.) and, if necessary, the provincial market operator, namely, the Independent Electricity System Operator (IESO).

1.2 TECHNICAL REQUIREMENTS

For technical requirements of SYNERGY NORTH's DER projects, refer to the "SYNERGY NORTH Parallel Generation Requirements", available at: <https://synergynorth.ca/wp-content/uploads/2021/05/Synergy-North-Parallel-Generation-Requirements-Rev-9.pdf>

1.3 SUBMISSION INSTRUCTIONS

Please return the completed form, fees and other required documents by mail to: SYNERGY NORTH

Attn: SYNERGY NORTH Asset Management and Engineering

Generation Connection Application 37 Front St. Thunder Bay, ON P7B 8B2

1.4 IMPORTANT NOTES

An engineering stamp and all red box fields (on electronic version of form) are mandatory. Incomplete applications may be returned by SYNERGY NORTH and will result in delays in processing your application. Click the "Validate Form" button

¹ For Load Displacement projects, the term "host customer" refers to the owner of the load facility. The term "DER owner" refers to the owner of the DER facility.

on the top right of this page to ensure all required information is filled. If any of the required fields are not applicable to your project, type “N/A” in any required text field or “0” in any required numerical field

SYNERGY NORTH specific requirements and notes are found in Sections S and T, respectively

Applicants are cautioned NOT to incur major expenses until SYNERGY NORTH approves to connect the proposed DER facility.

All technical submissions (CIA Application, Single Line Diagrams, etc.) must be signed, dated and sealed by a licensed Ontario Professional Engineer (P.Eng.).

The proponent will pay for the CIA according to the SYNERGY NORTH CIA Fee Schedule.

The siting restrictions in O. Reg. 274/18 which were administered by electricity distributors such as SYNERGY NORTH have been replaced by amendments to the Planning Act (Ontario) that puts siting and planning requirements for renewable DER facilities under municipal oversight. It is recommended that you discuss municipal permitting and approvals requirements with the planning department in the municipality where your DER project is located before you proceed.

2. SECTION A – APPLICATION INFORMATION

- **Engineering Stamp:** Must be signed and sealed by a licensed Ontario Professional Engineer (P.Eng).
- **Application Type:** CHOOSE ONE.
 - **New CIA Application:** first application for any given project
 - **CIA Revision/Rework:** changes to a previous CIA.
 - **Capacity Increase Request**
 - **Modification or Addition to Existing Project**
 - **Reconnection of Existing Generator**

Your previous CIA must still be valid with SYNERGY NORTH (i.e. your previous CIA cannot be withdrawn or expired).

- **Date:** Fill in the current date
- **Program Type:** CHOOSE ONE.
 - **IESO (please specify)**
 - **Load Displacement**
 - **Net Metering**
 - **Net Metering (Subdivision)**
 - **Off-Grid Islanded Generation**
 - **Other (please specify)**

- **Program Type (additional details):** Use this field to provide additional details (Applicable for **IESO** or **Other** Program Type)
 - **IESO (please specify)**
 - **Other (please specify)**
- **Project Name:** Provide the exact project name of your proposed generation facility. SYNERGY NORTH will use this name along with your Project Number (if one already exists) to identify your project in our system going forward.
- **IESO Contract Number and IESO Reference Number:** (Applicable for IESO Program Type selection)
- **Ontario Corporate Number OR Business Identification Number:** PROVIDE ONE.
- **Proposed In-Service Date:** ____ / ____ / ____ (dd/mm/yyyy): Provide the date your generation facility will officially be connected and producing energy on SYNERGY NORTH's distribution system. If you are unsure how to determine an In-service Date, contact your Design Engineer (for new applicants) or your SYNERGY NORTH Account Executive Manager (for existing customers).
Important note: the In-service Date (ISD) you provide must be as accurate as possible. The SYNERGY NORTH schedules station maintenance, outages and other work based on ISDs. Failure to provide an accurate ISD could cause delays to your project's connection timeline.
- **Subdivision Project Name:** If you selected "Net Metering (Subdivision)" as the Program Type, please provide the name of the subdivision project.
- **Number of Lots:** If you selected "Net Metering (Subdivision)" as the Program Type, please provide the number of lots in the development.
- **Original CIA Project ID#** (if applicable): If this is a revision to a previous CIA Application Form that you submitted to the SYNERGY NORTH, and that Application is still valid with the SYNERGY NORTH, provide your current CIA Project Number.
- **Revised Fields:** If you are submitting a revised CIA Application, list the fields that have changed from your previous CIA in the box provided.

3. **SECTION B – PROJECT LOCATION**

In the Project Location section, provide project location information and complete accordingly.

4. **SECTION C – CONTACT INFORMATION**

- **Who is the single point of contact for this project?** CHOOSE ONE. This will be the person within your company who receives all communications regarding the project. Normally, this would be someone in a Project Management role.

He/she will be responsible for communicating information regarding your proposed facility.

- In the Contact Information section, provide contact information for the Host Customer, the DER Owner if different than the host customer and consultant if applicable. Note that the Host Customer and DER Owner may be the same. Also note that Post Office (PO) boxes and Rural Routes will not be accepted. Only list a physical address. Aside from the Single Point of Contact, the person(s) listed may be contacted by the SYNERGY NORTH for other matters regarding your project when necessary. Due to Privacy Laws, the SYNERGY NORTH will only release information to the persons listed on the CIA Application Form.

5. **SECTION D – CUSTOMER STATUS**

- **Is there an existing SYNERGY NORTH customer account at the project location?** Choose “Yes” if there is an existing electrical connection to SYNERGY NORTH's grid (i.e. load and/or generation) at the Project Location OR choose “No” if this generation facility will be the only connection to SYNERGY NORTH's grid at the location.
- **If yes, what is the SYNERGY NORTH account number of the property:** If you answered “Yes” to the previous question, provide the existing account number (i.e. customer load account number OR generation customer account number) found in the top right corner of your bill. Also select “Yes” or “No” to “**Is the account holder aware of this application?**” and “**Does your account fall within a residential-rate classification?**”
- **Account Holder Name registered on existing Account:** Provide the name on the existing customer account you provided in the previous question. If you answered “No” in the previous question, leave this space blank.
- **Is the owner an HST registrant?** Normally, a business – sole proprietor, partnership, corporation – has a Harmonized Sales Tax (HST) Number as a requirement to conduct regular business in Ontario.
- **If yes, provide your HST registration number:** If you answered “Yes” to “Are you an HST registrant?” provide your HST number. Failure to provide an accurate number will delay your application. If you are unsure of your HST number, please **sign into your Canadian Revenue Agency business account** to retrieve it.

6. **SECTION E – EXISTING DER**

- **Is there any existing DER facility located at the point of common coupling (PCC)?** Please select “Yes” if there is an existing DER facility on your premises.
- If yes, please provide the **Existing Project Number, Existing Project Size (kW) and the Program Type** for the Existing DER

- **Select the existing DER Type:** CHOOSE ONE. Synchronous, Induction, Inverter-based or Other and provide applicable power levels, ratings and reactance values.

7. SECTION F – PROJECT INFORMATION

- **Station Name:** provide the name of the SYNERGY NORTH station that your facility will connect to (e.g. “CONESTOGA DS”).
- **Feeder and Feeder Voltage:** Provide the name of the feeder that your facility will connect to (e.g. “F1” or “M1”) and feeder voltage if available.
- **Project Size:** Provide the total amount of generation your facility will produce, i.e. the facility’s maximum kW output. **Important note:** The project size on this application must match the project size you provided on your IESO contract (if applicable).
- **Equipment Capacity:** Provide the total amount of capacity in (kVA) of your facility’s equipment. **Important note:** For more information on the technical requirements of distribution generation facilities, see SYNERGY NORTH's Technical Interconnection Requirements (TIR). Note: Typically, the generator’s Nameplate Capacity or Gen-Set Name Plate Capacity shall be considered as project size.
- **Fuel / Energy Type:** CHOOSE ONE. Provide the type of energy your generation facility will produce. If it is “Other”, ensure to provide the type of generation you are proposing.
- **Type of connection:** CHOOSE ONE. Single phase **OR** Three phase.
 - If this is a solar project, please select the Mounting Type.
 - If this is a water project, please answer the indicated questions.

8. SECTION G – STATION SERVICE LOAD INFORMATION

- In the Load Information section, if required, provide *Maximum Demand of Station Service Load of the DER in KW and the Average Monthly Consumption in kWh*

9. SECTION H – CONNECTION INFORMATION

- DOM means “Distribution Operating Map”. From the original DOM that the SYNERGY NORTH provided to you during your preliminary consultation meeting or in the preliminary consultation report, outline where your generation facility site will be located in reference to the existing feeder. Indicate the POE-PCC distances.² Please be sure to include the project location’s GPS co-ordinates. If you require a DOM, you can request one through our website.

² Refer to CIA Application Form Appendix A for the definition of POE and PCC.

- **Single Line Diagram (“SLD”):** Provide an SLD of the DER’s facilities including the PCC, transformer and connecting station, feeder and supply voltage. **SLD Drawing No. and Rev:** ***Important note:*** An SLD is a very important piece of your application and must accurately reflect the project information provided on the CIA Application. Submitting an accurate SLD that meets SYNERGY NORTH's standards ensures your application is not delayed. Failure to submit an acceptable SLD will result in your application being deemed incomplete. Please refer to SYNERGY NORTH's Technical Interconnection Requirements for more information on SLDs and other technical requirements for your generation facility. Please ensure that the SLD is no larger than 11x17 inches.
- **The “Point of Expansion” (POE)** *indicates the origin of the new line expansion.*
- **The “Point of DER Connection” or “PODC”** *means the point where the DER connects with the DER’s connection assets as outlined in Appendix A of the CIA form.*
- **GPS coordinates of the following:** All three GPS coordinates must be provided: POE, PCC and generation facility. GPS Format: Latitude, Longitude -Degree Decimal (e.g. 49.392, -75.570).
- **Length of line distance from the POE to the PCC:** Provide the exact distance in kilometers of the line from the POE to the PCC.
- **Length of line distance from the PCC to the DER Facility** (refer to Appendix A of CIA Application Form): Provide the exact distance in kilometers of the line from the PCC to your proposed generation facility. See Appendix A at the end of the application document for a diagram.
- **Conductor type/size:** Provide what type of conductor you will be using, including the size. E.g. ACSR/ CU/ AL and size in kcmil or AWG
- **Fault contribution from the DER’s Facilities, with the fault location at the PCC:**
 - **Three-phase generators:** *3-phase short circuit*
 - **Single-phase generators:** *1-phase short circuit*
- **Connection Figure:** *See Appendix A at the end of the application document and choose ONE appropriate figure that is most applicable to how your proposed generator will connect.*

Important Notes:

If this project requires line expansion work between the **POE** and **PCC**, SYNERGY NORTH will provide a cost estimate to construct any line located on public road right-of-way. The cost estimate will include a breakdown of **Uncontestable** work (i.e. overbuild to existing line) that can only be performed by the SYNERGY NORTH, as well as **Contestable** work (i.e. new construction/ green-field) that can be performed by the Generator/their contractor or the SYNERGY NORTH. (Both Uncontestable work and Contestable work requires design to SYNERGY NORTH specifications). SYNERGY NORTH will become the owner of the line expansion.

For a Generator-owned line, the Generator may choose to apply for installation of the line on existing the SYNERGY NORTH -owned poles. This is known as an application for Joint Use (JU) of poles. If the application is accepted, the SYNERGY NORTH will provide the Generator with information on initial connection costs, annual pole-space rental and emergency service (ES) fees and required JU & ES Agreements.

10. SECTION I – ENERGY STORAGE

In the Energy Storage section, provide Number of Units, Inverter Size (enter zero if inverter is shared with generation unit(s)), Energy Storage Unit Size (kWh) and Total Energy Storage Size (kWh).

Select the Energy Storage Facility Control Strategy to be used and include with this application a detailed description of the control strategy according to the templates in Appendix B. SYNERGY NORTH reserves the right to modify the control strategy as part of its Connection Impact Assessment.

11. SECTION J – LOAD DISPLACEMENT INFORMATION

In the Load Displacement Information section, provide the Operating Mode, Transition Type, and Time that Generator Remains Parallel to the Grid (closed transition only).

For non-parallel load displacement, SCADA monitoring and Gross Load Billing (GLB) may apply. For load displacement generation facilities, please attach a schedule of the forecasted maximum generation output (as a function of loading of the facility). At a minimum, include the forecasted generation output information (i.e. Watts and VARs) during the minimum and maximum of the load facility to which the load displacement generator is connecting (see Appendix C for template)

12. SECTION K –DER CHARACTERISTICS (1/1)

In the DER Characteristics section, complete all fields accordingly.

For facilities with multiple DERs: If your generators have different characteristics, please use the “Add Page” button and provide the characteristics for each generator on the additional pages.

Important note:

The SYNERGY NORTH requires that all CIA Applicants have a P.Eng. review this section. Failure to complete this section correctly will result in delays to your application.

13. SECTION L – INTERFACE TRANSFORMER

14. SECTION M – INTERMEDIATE TRANSFORMER

15. SECTION N – HIGH-VOLTAGE GROUNDING TRANSFORMER

In the Interface Transformer section, complete all fields accordingly.

At the Generator's expense, and if requested, the SYNERGY NORTH may provide transformation up to a maximum of 500KVA three-phase, as described in the

SYNERGY NORTH Conditions of Service.

The term "High Voltage" refers to the connection voltage to SYNERGY NORTH's distribution system and "Low Voltage" refers to the generation or any other intermediate voltage.

Providing a photo of transformer equipment along with this application may help expedite your application.

16. SECTION O – SUBMISSION CHECKLIST

Please ensure the following items are completed prior to submission. Your application will not be processed if any part is omitted or incomplete: **Payment**
Payment in full including applicable taxes (by cheque payable to "SYNERGY NORTH CORPORATION") Completed Form B stamped by a Professional Engineer

Signed Study Agreement

Attach a Signed Study Agreement

Single Line Diagram (SLD)

Attach a SLD of the Generator's facilities, must be stamped by a Professional Engineer

Protection Philosophy

Attach Protection Philosophy documents

Distribution Operating Map

Distribution Operating Map (DOM) and/or Site Plan (not required for existing load customers that are connecting a load displacement generation, net metering generation or energy storage system behind their existing metered connection point)

Load Schedules

Load Displacement Generation Facility's load and generation schedules (if applicable)

Load Displacement Generation Facility's mode of operation (if applicable)

Operating Strategy

Energy Storage Facility operating strategy description and parameters (if applicable)

Emergency Backup Generation Facility's mode of operation (if applicable)

17. SECTION P – CIA APPLICATION FEE CHECKLIST

Please ensure the following items are completed prior to submission. Your application will not be processed if any part is omitted or incomplete. Check all that apply.

Applicable CIA Fee

See the Connection Impact Assessment Fee Schedule on our website for costs. Please enter the amount from the fee schedule. Note HST will be applicable.

Transmission Customer Impact Assessment (TxCIA) Fee (if applicable)

A Tx CIA is also required if the total nameplate generation of the project is greater than 10MW. Note HST will be applicable.

IESO System Impact Assessment (SIA) Fee (if applicable)

An SIA deposit is required if the total nameplate generation of the project is greater than 10MW. The total cost of the SIA will be Trued Up/Down upon the receipt of the SIA from the IESO. See the IESO's SIA Application for costs.

18. SECTION Q – ATTACHMENTS

Please provide a description, document number and number of pages for each supporting document/drawing attachment.

19. SECTION R – NOTES

Please include any additional details that you think SYNERGY NORTH should be aware of in support of this application.

20. SECTION S – SYNERGY NORTH SPECIFIC REQUIRED

FIELDS This section contains specific information that is required by SYNERGY NORTH. Please read Section T notes regarding this section if you need further details.

21. SECTION T – SYNERGY NORTH SPECIFIC ADDITIONAL NOTES

DISCLAIMER

By submitting a CIA Application, the Proponent authorizes the collection by SYNERGY NORTH Corporation. ("SYNERGY NORTH"), of any agreements and any information pertaining to agreements made between the Proponent and the Independent Electricity System Operator from the Independent Electricity System Operator, the information set out in the CIA Application and otherwise collected in accordance with the terms hereof, the terms of SYNERGY NORTH's Conditions of Service, SYNERGY NORTH's Privacy Policy and the requirements of the Distribution System Code and the use of such information for the purposes of the connection of the generation facility to SYNERGY NORTH's distribution system.



Appendix D: Study Agreement

_____ (the "Customer") has requested and SYNERGY NORTH CORPORATION ("SYNERGY NORTH") has agreed to perform the Work described below to determine the feasibility and impact of the Proposed Project defined below and to undertake the Work as defined in Section 4, forming a part hereof (the "Agreement") dated _____.

1. Proposed Project

The Proposed Project is the connection of _____ (the "Generation Facility") to SYNERGY NORTH's distribution system.

2. Completion Date:

SYNERGY NORTH shall complete the Work, by no later than sixty (60) days after the latter of:

- a) the Customer executing this Agreement.
- b) the Customer paying SYNERGY NORTH the amount specified below in Section 5(a).
- c) the Customer providing the information described in Section 3.

3. Impact of Subsequent Changes to the Information Provided by Customer

Should the Customer make any changes to the information provided in the Connection Impact Application after SYNERGY NORTH has commenced the Work and those changes:

- a) result in costs to SYNERGY NORTH greater than the cost shown in Section 5(a), the Customer shall make such further payment as may be required by SYNERGY NORTH in the time specified by SYNERGY NORTH.
- b) otherwise affect any other provision of this Agreement, such as the time required for completion of the Work, the parties shall negotiate and agree upon the required amendments to this Agreement and SYNERGY NORTH shall be under no obligation to resume performance of the Work until such time as the parties agree on such amendments.

4. Scope of Work

- a) SYNERGY NORTH will perform and provide the Customer with a Connection Impact Assessment to determine the feasibility of the Proposed Project by reviewing the impact of the Proposed Project on SYNERGY NORTH's distribution system.
- b) SYNERGY NORTH will advise the Customer of specific requirements for each of the alternative connections that are identified by the Connection Impact Assessment.
- c) SYNERGY NORTH will describe the necessary modifications to SYNERGY NORTH's distribution system facilities based on SYNERGY NORTH's review of the Proposed Project in order to permit the connection of the Proposed Project.
- d) SYNERGY NORTH will apply for a Transmitter Connection Impact Assessment which will determine the impact of the Generation Facility on the transmitter's transmission system.



5. Deposit:

- a) The Customer shall submit a deposit of \$ _____ towards SYNERGY NORTH's Actual Cost of performing the Work. SYNERGY NORTH's Actual Cost of performing the Work includes:
- i. All engineering, administrative costs, and overheads associated with the Work described in Section 4 – Scope of Work.
 - ii. The Transmitter's fee for the performance of the Transmitter's Connection Impact Assessment.
- b) The Customer agrees to remit to SYNERGY NORTH the amount shown in Section 5(a) by no later than 15 days after the date first written above towards the Actual Cost of the Work.
- c) Within 90 days after the completion of the work, SYNERGY NORTH shall provide the Customer with a final invoice. Any difference between the final Invoice (including applicable taxes) and the amount deposited by the Customer shall be paid (refunded) within 30 days of the invoice.

6. GST Registration Information

The GST registration number for SYNERGY NORTH is 89209-0614 RT0001 and the GST registration number for the Customer is _____ RT _____.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed by the signatures of their proper officers, as of the day and year first written above.

SYNERGY NORTH CORPORATION

Daniel Dillon

Title: Distribution Engineer

I have the authority to bind the corporation

(Company name)

(Print and sign)

Title: _____

I have the authority to bind the corporation

SYNERGY NORTH Connection Impact Assessment (CIA) Deposit Schedule		
Proposed Generator Project Size	SYNERGY NORTH CIA Deposit	Hydro One CIA Fee*
≤ 10kW	N/A	N/A
≤ 250kW Connected at < 15kV OR ≤ 500kW Connected at > 15kV	\$3,000	N/A
> 250kW ≤ 500kW Connected at < 15kV OR > 500kW ≤ 1MW Connected at > 15kV	\$5,000	\$5,969.89
> 500kW < 10 MW Connected at < 15kV OR > 1MW < 10 MW Connected at > 15kV	\$8,000	\$5,969.89
≥ 10MW	\$8,000	\$5,969.89

*Hydro One fees set by HONI and subject to change

CONNECTION AGREEMENT FOR A SMALL EMBEDDED GENERATION FACILITY

This Connection Agreement is made this ____ day of _____, 20__.

BETWEEN

SYNERGY NORTH CORPORATION, (the "Distributor")

AND

_____, (the "Customer")

(each a "Party" and collectively the "Parties")

FOR

_____, (the "Facility")

RECITALS

WHEREAS the Distributor is the owner of the distribution system serving the service area described in electricity distribution licence number **EG-2008-0330** (the "Licence") issued by the Ontario Energy Board (the "Board").

AND WHEREAS the Customer owns or operates an embedded generation facility that is located in the Distributor's licensed service area (the "Facility").

AND WHEREAS the Customer has connected or wishes to connect its Facility to the Distributor's distribution system and the Distributor has connected or has agreed to connect the Facility to the Distributor's distribution system.

AND WHEREAS the Distributor has previously reviewed and accepted the Customer's application to connect and related materials that were submitted to the Distributor in accordance with the process set out in the Distribution System Code (the "Code") (altogether, the "Application") and the Customer has signed the Estimate to Connect (both of which are attached to this Agreement as Schedule A).

AND WHEREAS in accordance with its Licence and the Code, the Distributor has agreed to offer, and the Customer has agreed to accept, distribution service in relation to the Facility.

NOW THEREFORE in consideration of the foregoing, and of the mutual covenants, agreements, terms and conditions herein contained, the Parties, intending to be legally bound, hereby agree as follows:

1. Definitions and Schedules

1.1 Words and phrases contained in this Agreement (whether capitalized or not) that are not defined in this Agreement have the meanings given to them in the *Electricity Act, 1998*, the *Ontario Energy Board Act, 1998*, any regulations made under either of those Acts, or the Code.

1.2 The following schedules form part of this Agreement:

Schedule A – Application and Estimate to Connect (recitals)

Schedule B – Single Line Diagram, Connection Point and Location of Facilities (Section 2.3)

Schedule C – List of Other Contracts (section 3.4)

Schedule D – Technical and Operating Requirements (section 4.1(d))

Schedule E – Billing and Settlement Procedures (section 5.3)

Schedule F – Contacts for Notice (section 12.1)

Schedule G – Dispute Resolution (section 16.1)

Schedule H – Provisions Applicable if Facility Financed by a Lender (sections 19.3, 20.3 and 21.1)

Where a schedule is to be completed by the Parties, the Parties may not include in that schedule a provision that would be contrary to or inconsistent with the Code or the remainder of this Agreement.

2. Type of Facility and Customer

2.1 The Facility has a name-plate rated capacity of:

more than 10 kW and:

- a) up to and including 500 kW, if the Facility is or will be connected to a less than 15 kV line; or
- b) up to and including 1 MW, if the Facility is or will be connected to a 15 kV or greater line (in which case the Facility is a “Small Embedded Generation Facility”)

2.2 The Facility is or will be connected:

- ☐ directly to the Distributor's distribution system
- ☐ on the load customer side of a connection point to the Distributor's distribution system
- ☐ the load customer is the same as the Customer
- ☐ the load customer is: _____

2.3 Schedule B sets out the following:

- a) a single line diagram of the Facility; and
- b) a list of the facilities of one Party that are on the property of the other Party; and

2.4 The Customer:

- ☐ intends to:
 - ☐ sell output from the Facility to the Ontario Power Authority and has entered into an agreement with the Ontario Power Authority for that purpose
 - ☐ deliver and sell output from the Facility to the Distributor(in which case the Customer is an “Embedded Retail Generator”)
- ☐ does not intend to sell any of the output of the Facility to the Ontario Power Authority or the Distributor

3. Incorporation of Code and Application of Conditions of Service and Other Contracts

- 3.1 The Code, as it may be amended from time to time, is hereby incorporated in its entirety by reference into, and forms part of, this Agreement. Unless the context otherwise requires, all references to “this Agreement” include a reference to the Code.
- 3.2 The Distributor hereby agrees to be bound by and at all times to comply with the Code, and the Customer acknowledges and agrees that the Distributor is bound at all times to comply with the Code in addition to complying with the provisions of this Agreement.
- 3.3 In addition to this Agreement, the relationship between the Distributor and the Customer will be governed by the Distributor’s Conditions of Service that are in effect at the relevant time. In the event of a conflict or an inconsistency between a provision of this Agreement and a provision of the Distributor’s Conditions of Service, the provision of this Agreement shall govern.
- 3.4 The Distributor may require or may have already required the Customer to enter into one or more of the other contracts listed in Schedule C. In the event of a conflict or an inconsistency between a provision of the Code or this Agreement and a provision of such other contract, the provision of the Code or this Agreement shall govern.

4. Facility Standards

- 4.1 The Customer’ Facility is required to:
 - a) meet all applicable requirements of the Electrical Safety Authority (“ESA”);
 - b) conform to all applicable industry standards including, but not limited to, those of the Canadian Standards Association (“CSA”), the Institute of Electrical and Electronic Engineers, the American National Standards Institute and the International Electrotechnical Commission;
 - c) be installed, constructed, operated and maintained in accordance with this Agreement, the Distributor’s offer to connect, the requirements of the ESA, the connection cost agreement, all applicable reliability standards and good utility practice; and
 - d) meet the technical and operating requirements set out in Schedule D. These requirements shall not exceed any technical or operating requirements set out in the Code unless the Customer agrees.

5. Charges, Settlement and Billing

- 5.1 The Customer shall pay the Distributor such charges as may be approved by the Board in relation to the connection of, and the provision of distribution service to, the Facility.
- 5.2 The Customer agrees to the following in relation to settlement for the output of the Facility:
- ☐ if the Customer is not an Embedded Retail Generator (see section 2.4) the Distributor will not pay the Customer for any excess generation that results in a net delivery to the Distributor between meter reads and there will be no carryover of excess generation from one billing period to the next unless the Customer is at the relevant time a net metered generator
 - ☐ if the Customer is an Embedded Retail Generator (see section 2.4) the Distributor will settle all applicable payments and charges in accordance with the Retail Settlement Code
- 5.3 Billing and settlement activities will be conducted in accordance with the procedures set out in Schedule E.

6. Representations and Warranties

- 6.1 The Customer represents and warrants to the Distributor as follows, and acknowledges that the Distributor is relying on such representations and warranties without independent inquiry in entering into this Agreement:
- a) the Facility is fully and accurately described in the Application;
 - b) all information in the Application is true and correct;
 - c) the Facility is in compliance with all applicable technical requirements and laws;
 - d) the Customer has been given warranty information and operation manuals for the Facility;
 - e) the Customer has been adequately instructed in the operation and maintenance of the Facility and the Customer has developed and implemented an operation and maintenance plan based on those instructions;
 - f) if the Customer is a corporation or other form of business entity, the Customer is duly incorporated, formed or registered (as applicable) under the laws of its jurisdiction of incorporation, formation or registration (as applicable);
 - g) the Customer has all necessary power, authority and capacity to enter into this Agreement and to perform its obligations under this Agreement;
 - h) this Agreement constitutes a legal and binding obligation on the Customer, enforceable against the Customer in accordance with its terms;
 - i) the Customer holds all permits, licences and other authorizations that may be necessary to enable it to own and operate the Facility; and
 - j) any individual signing this Agreement on behalf of the Customer has been duly authorized by the Customer to sign this Agreement and has the full power and authority to bind the Customer.
- 6.2 The Distributor represents and warrants to the Customer as follows, and acknowledges that the Customer is relying on such representations and warranties without independent inquiry in entering into this Agreement:
- a) the Distributor is duly incorporated under the laws of Ontario;
 - b) the Distributor has all necessary power, authority and capacity to enter into this Agreement and to perform its obligations under this Agreement;
 - c) this Agreement constitutes a legal and binding obligation on the Distributor, enforceable against the Distributor in accordance with its terms; and

- d) any individual signing this Agreement on behalf of the Distributor has been duly authorized by the Distributor to sign this Agreement and has the full power and authority to bind the Distributor.

7. Disconnection Device at the Point of Connection

- 7.1 The Customer shall furnish and install a disconnection switch at the point of connection for the Facility that opens, with a visual break, all ungrounded phases of the connection circuit. The disconnection switch at the point of connection shall be rated for the voltage and fault current requirements of the Facility, and shall meet all applicable CSA standards, ESA requirements, and all other applicable laws. The switch enclosure, if applicable, shall be properly grounded. The disconnection switch at the point of connection shall be accessible at all times, located for ease of access to the Distributor's personnel, and shall be capable of being locked in the open position. The Customer shall follow the Distributor's procedures for switching, clearance, tagging, and locking.

8. Modifications to the Facility

- 8.1 The Customer shall not modify its connection assets or the Facility except in accordance with this section. Where the modification will not increase the maximum electrical output of the Facility, the Customer shall give the Distributor no less than 15 working days notice prior to the date on which the modification will be completed. Where the modification will increase the maximum electrical output of the Facility, the Customer shall submit a new application for connection to the Distributor. The Distributor shall process that application for connection in accordance with the Code. The Customer shall not commence such modification until that process has been completed.

9. Insurance

- 9.1 Throughout the term of this Agreement, the Customer shall carry commercial general liability insurance for third party bodily injury, personal injury, and property damage in an amount as follows:

not less than \$1,000,000 per occurrence and in the annual aggregate

Prior to execution of this Agreement, the Customer shall provide the Distributor with a valid certificate of insurance. The Customer shall provide the Distributor with prompt notice of any cancellation of the Customer's insurance by the insurer.

10. Liability and Force Majeure

- 10.1 The liability provisions of section 2.2 of the Code apply to this Agreement and are hereby incorporated by reference into, and form part of, this Agreement.
- 10.2 A Party shall have a duty to mitigate any losses relating to any claim for indemnification from the other Party that may be made in relation to that other Party. Nothing in this section shall require the mitigating Party to mitigate or alleviate the effects of any strike, lockout, restrictive work practice or other labour dispute.
- 10.3 A Party shall give prompt notice to the other Party of any claim with respect to which indemnification is being or may be sought under this Agreement.
- 10.4 The force majeure provisions of section 2.3 of the Code apply to this Agreement and are hereby incorporated by reference into, and form part of, this Agreement.

11. Facility Commissioning and Testing

- 11.1 The Customer shall give the Distributor at least fifteen days advance written notice of the date(s) and time(s) on which the Facility will be commissioned and tested prior to connection. The Customer shall give the Distributor the same notice in relation to the commissioning and testing of any material modification to the Customer's connection assets or Facility that occurs after connection.
- 11.2 The Distributor shall have the right to witness the commissioning and testing activities referred to in section 11.1.

12. Notice

- 12.1 Any notice, demand, consent, request or other communication required or permitted to be given or made under or in relation to this Agreement shall be given or made: by courier or other personal form of delivery; by registered mail; by facsimile; or by electronic mail. Notices shall be addressed to the applicable representative of the Party identified in Schedule F.
- 12.2 A notice, demand, consent, request or other communication referred to in section 12.1 shall be deemed to have been made as follows:
- a) where given or made by courier or other form of personal delivery, on the date of receipt;
 - b) where given or made by registered mail, on the sixth day following the date of mailing;
 - c) where given or made by facsimile, on the day and at the time of transmission as indicated on the sender's facsimile transmission report; and
 - d) where given or made by electronic mail, on the day and at the time when the notice, demand, consent, request or other communication is recorded by the sender's electronic communications system as having been received at the electronic mail destination.

13. Access to Facility

- 13.1 Each Party are required to secure their facilities at all times.
- 13.2 The Customer shall permit and, if the land on which the Facility is located is not owned by Customer, cause such landowner to permit, the Distributor's employees and agents to enter the property on which the Facility is located at any reasonable time. Such access shall be provided for the purposes of inspecting and/or testing the Facility as and when permitted by this Agreement, the Code or the Distributor's Conditions of Service or as required to ensure the continued safe and satisfactory operation of the Facility, to ensure the accuracy of the Distributor's meters, to establish work protection, or to perform work.
- 13.3 Any inspecting and/or testing referred to in section 13.2 shall not relieve the Customer from its obligation to operate and maintain the Facility and any related equipment owned by the Customer in a safe and satisfactory operating condition and in accordance with this Agreement.
- 13.4 The Distributor shall have the right to witness any testing done by the Customer of the Facility and, to that end, the Customer shall provide the Distributor with at least fifteen working days advance notice of the testing.
- 13.5 Notwithstanding section 10.1, where the Distributor causes damage to the Customer's property as part of this access, the Distributor shall pay to the Customer the Customer's reasonable costs of repairing such property or, if such property cannot be repaired, replacing such property.

- 13.6 Notwithstanding section 10.1, if the Customer has been given access to the Distributor's property, and if the Customer causes damage to the Distributor's property as part of that access, the Customer shall pay to the Distributor the Distributor's reasonable costs of repairing such property or, if such property cannot be repaired, replacing such property.

14. Disconnection of Facility to Permit Maintenance and Repairs

- 14.1 If the Customer requests it, the Distributor will provide the Customer with reasonable notice of any planned equipment outages in the Distributor's distribution system that occur on or after the date of the Customer's request which will impact the Facility or its connection.
- 14.2 The Distributor will make reasonable efforts to ensure that the outages referred to in section 14.1 will be of minimal duration and cause minimal inconvenience to the Customer.
- 14.3 In connection with any planned equipment outage, either Party may disconnect or isolate, or require the disconnection or isolation of, its Facility or system (as applicable) from the other Party's Facility or system (as applicable) so that the employees, contractors or agents of the Party may construct, maintain, repair, replace, remove, investigate or inspect its own Facility or system (as applicable) in accordance with the terms of this Agreement and good utility practice.
- 14.4 Where practical, the Customer shall notify the Distributor prior to temporarily isolating or disconnecting the Facility from the Distributor's distribution system.

15. Disconnection of Facility for Other Reasons

- 15.1 The Customer shall discontinue operation of the Facility and the Distributor may isolate or disconnect the Facility from the Distributor's distribution system, upon any of the following:
- a) termination of this Agreement in accordance with section 19;
 - b) if the Customer's connection assets or the Facility are modified by the Customer in a manner contrary to section 8.1;
 - c) during an emergency or where necessary to prevent or minimize the effects of an emergency;
 - d) in accordance with section 31, 31.1 or 40(5) of the *Electricity Act, 1998*, other applicable law, the Code, the Distributor's Licence or the Distributor's Conditions of Service; or
 - e) where required to comply with a decision or order of an arbitrator or court made or given under Schedule G.
- 15.2 In the event of disconnection under section 15.1(b), the Facility shall remain isolated or disconnected from the Distributor's distribution system until the connection process referred to in section 8.1 has been completed.
- 15.3 In the event of disconnection under section 15.1(c), the Distributor shall reconnect, or permit the reconnection of, the Facility to the Distributor's distribution system when it is reasonably satisfied that the emergency has ceased and that all other requirements of this Agreement are met.
- 15.4 In the event of disconnection under section 15.1(d) or 15.1(e), the Distributor shall reconnect, or permit the reconnection of, the Facility to the Distributor's distribution system when the Distributor is reasonably satisfied that the reason for the disconnection no longer exists, the Customer agrees to pay all Board approved reconnection costs

charged by the Distributor, and the Distributor is reasonably satisfied of the following, where applicable:

- a) the Customer has taken all necessary steps to prevent the circumstances that caused the disconnection from recurring and has delivered binding undertakings to the Distributor that such circumstances shall not recur; and
- b) any decision or order of a court or arbitrator made or given under Schedule G that requires a Party to take action to ensure that such circumstances shall not recur has been implemented and/or assurances have been given to the satisfaction of the affected Party that such decision or order will be implemented.

15.5 Where the Facility has been isolated or disconnected, each Party shall be entitled to decommission and remove its assets associated with the connection. Each Party shall, for that purpose, ensure that the other Party has all necessary access to its site at all reasonable times.

15.6 The Customer shall continue to pay for distribution services provided up to the time of isolation or disconnection of its Facility.

15.7 The Customer shall pay all reasonable costs including, but not limited to, the costs of removing any of the Distributor's equipment from the Customer's site, that are directly attributable to the isolation or disconnection of the Facility and, where applicable, the subsequent decommissioning of the Facility. The Distributor shall not require the removal of the protection and control wiring on the Customer's site.

16. Dispute Resolution

16.1 Any dispute between the Customer and the Distributor arising under or in relation to this Agreement will be resolved in accordance with Schedule G. The Parties shall comply with the procedure set out in Schedule G before taking any civil or other proceeding in relation to the dispute, provided that nothing shall prevent a Party from seeking urgent or interlocutory relief from a court of competent jurisdiction in the Province of Ontario in relation to any dispute arising under or in relation to this Agreement.

17. Amendments

17.1 The Parties may not amend this Agreement without leave of the Board except where and to the extent permitted by this Agreement.

17.2 The Parties may by mutual agreement amend this Agreement to reflect changes that may from time to time be made to the Code during the term of this Agreement.

17.3 The Parties may by mutual agreement amend any portion of a schedule that was originally to be completed by the Parties.

17.4 No amendment made under section 17.2 or 17.3 shall be contrary to or inconsistent with the Code or the remainder of this Agreement.

17.5 The Parties shall amend this Agreement in such manner as may be required by the Board.

17.6 Any amendment to this Agreement shall be made in writing and duly executed by both Parties.

18. Waiver

18.1 A waiver of any default, breach or non-compliance under this Agreement is not effective unless in writing and signed by the Party to be bound by the waiver. The waiver by a Party of any default, breach or non-compliance under this Agreement shall not operate

as a waiver of that Party's rights under this Agreement in respect of any continuing or subsequent default, breach or non-compliance, whether of the same or any other nature.

19. Term of Agreement and Termination

- 19.1 This Agreement shall become effective upon execution by the Parties, and shall continue in effect until terminated in accordance with section 19.2 or 19.3.
- 19.2 The Customer may, if it is not then in default under this Agreement, terminate this Agreement at any time by giving the Distributor thirty days prior written notice setting out the termination date.
- 19.3 Except as set out in Schedule H, the Distributor may terminate this Agreement upon any material breach of this Agreement by the Customer (a "Default"), if the Customer fails to remedy the Default within the applicable cure period referred to in section 19.4 after receipt of written notice of the Default from the Distributor.
- 19.4 The Customer shall cure a Default within the applicable cure period specified in the Code or the Distributor's Conditions of Service. If no such cure period is specified in relation to a given Default, the cure period shall be sixty working days.
- 19.5 Termination of this Agreement for any reason shall not affect:
- a) the liabilities of either Party that were incurred or arose under this Agreement prior to the time of termination; or
 - b) the provisions that expressly apply in relation to disconnection of the Customer's facilities following termination of this Agreement.
- 19.6 Termination of this Agreement for any reason shall be without prejudice to the right of the terminating Party to pursue all legal and equitable remedies that may be available to it including, but not limited to, injunctive relief.
- 19.7 The rights and remedies set out in this Agreement are not intended to be exclusive but rather are cumulative and are in addition to any other right or remedy otherwise available to a Party at law or in equity. Nothing in this section shall be interpreted as affecting the limitations of liability arising from section 10.1 or the obligation of a Party to comply with section 16 while this Agreement is in force.
- 19.8 Sections 19.5 to 19.7 shall survive termination of this Agreement.

20. Exchange and Confidentiality of Information

- 20.1 Confidential information in respect of a Party means
- (i) information disclosed by that Party to the other Party under this Agreement that is in its nature confidential, proprietary or commercially sensitive and
 - (ii) information derived from the information referred to in (i), but excludes the following:
 - a) information that is in the public domain; or
 - b) information that is, at the time of the disclosure, in the possession of the receiving Party, provided that it was lawfully obtained from a person under no obligation of confidence in relation to the information.
- 20.2 Subject to section 20.3, each Party shall treat all confidential information disclosed to it by the other Party as confidential and shall not, without the written consent of that other Party:
- a) disclose that confidential information to any other person; or
 - b) use that confidential information for any purpose other than the purpose for which it was disclosed or another applicable purpose contemplated in this

Agreement. Where a Party, with the written consent of the other Party, discloses confidential information of that other Party to another person, the Party shall take such steps as may be required to ensure that the other person complies with the confidentiality provisions of this Agreement.

20.3 Nothing in section 20.2 shall prevent the disclosure of confidential information:

- a) where required or permitted under this Agreement, the Code, the Market Rules or the Distributor's Licence;
- b) where required by law or regulatory requirements;
- c) where required by order of a government, government agency, regulatory body or regulatory agency having jurisdiction;
- d) if required in connection with legal proceedings, arbitration or any expert determination relating to the subject matter of this Agreement, or for the purpose of advising a Party in relation thereto;
- e) as may be required to enable the Distributor to fulfill its obligations to any reliability organization; or
- f) as may be required during an emergency or to prevent or minimize the effects of an emergency.

20.4 Notwithstanding section 10.1, a Party that breaches section 20.2 shall be liable to the other Party for any and all losses of the other Party arising out of such breach.

20.5 The Parties agree that the exchange of information, including, but not limited to, confidential information, under this Agreement is necessary for maintaining the reliable operation of the Distributor's distribution system. The Parties further agree that all information, including, but not limited to, confidential information, exchanged between them shall be prepared, given and used in good faith and shall be provided in a timely and cooperative manner.

20.6 Each Party shall provide the other with such information as the other may reasonably require to enable it to perform its obligations under this Agreement.

20.7 Each Party shall, as soon as practicable, notify the other Party upon becoming aware of a material change or error in any information previously disclosed to the other Party under this Agreement and, in the case of the Customer, in any information contained in its Application. The Party shall provide updated or corrected information as required to ensure that information provided to the other Party is up to date and correct.

21. Assignment, Successors and Assigns

21.1 Except as set out in Schedule H, the Customer shall not assign its rights or obligations under this Agreement in whole or in part without the prior written consent of the Distributor, which consent shall not be unreasonably withheld or unduly delayed. The Distributor may withhold its consent to any proposed assignment until the proposed assignee assumes, in writing, all of the Customer's obligations contained in this Agreement.

21.2 The Distributor shall have the right to assign this Agreement in whole upon written notification to the Customer.

21.3 This Agreement shall be binding upon and enure to the benefit of the Parties and their respective successors and permitted assigns.

22. Governing Law

22.1 This Agreement shall be governed by the laws of the Province of Ontario and the federal laws of Canada applicable therein.

23. Entire Agreement

23.1 Except as expressly provided herein, this Agreement constitutes the entire agreement between the Parties with respect to the subject-matter hereof and supersedes all prior oral or written representations and agreements of any kind whatsoever with respect to the subject-matter hereof.

IN WITNESS WHEREOF, the Parties hereto, intending to be legally bound, have caused this Agreement to be executed by their duly authorized representatives.

Company Name (Customer)

_____/_____
Signature / Date

Name (Print)

Title

SYNERGY NORTH CORPORATION

Company Name (Distributor)

_____/_____
Signature / Date

Name (Print)

Title

SCHEDULE A

Application and Estimate to Connect (recitals)

A.1 Application

- *Refer to “Connection Impact Assessment (CIA) Application – Study Agreement”*
- *SYNERGY NORTH work order reference # WF_____.*

A.2 Estimate to Connect

- *Refer to “Estimate to Connect Fit Project to the SYNERGY NORTH CORPORATION Network” and “Estimate to Connect Commercial Customers & Customers over 200 Amp”*
- *SYNERGY NORTH work order reference # WF_____.*

SCHEDULE B

Single Line Diagram, Connection Point and Location of Facilities (section 2.3)

B.1 Single Line Diagram and Connection Point

- Refer to “_____”

B.2 List of Facilities and Equipment on the Property of the Other Party

B.2.1 The following facilities of the Customer are located on the property of the Distributor:

-
-

B.2.2 The following facilities or equipment owned by the Distributor are located in the property of the Customer:

- Bi-directional Meter
-

B.2.2.1 Access to or modifications of such equipment is strictly limited to SYNERGY NORTH or a representative of SYNERGY NORTH.

B.2.2.2 Any equipment owned by SYNERGY NORTH on the Customer's property shall be subject to routine auditing. This includes, but is not limited to, checking for any damages, signs of forced entry or tampering to the equipment.

SCHEDULE C

List of Other Contracts (section 3.4)

The following other contracts have been or will be entered into by the Parties:

C.1 Generation Customer Contract

- *Billing account (Customer Service)*

SCHEDULE D

Technical and Operating Requirements (section 4.1(d))

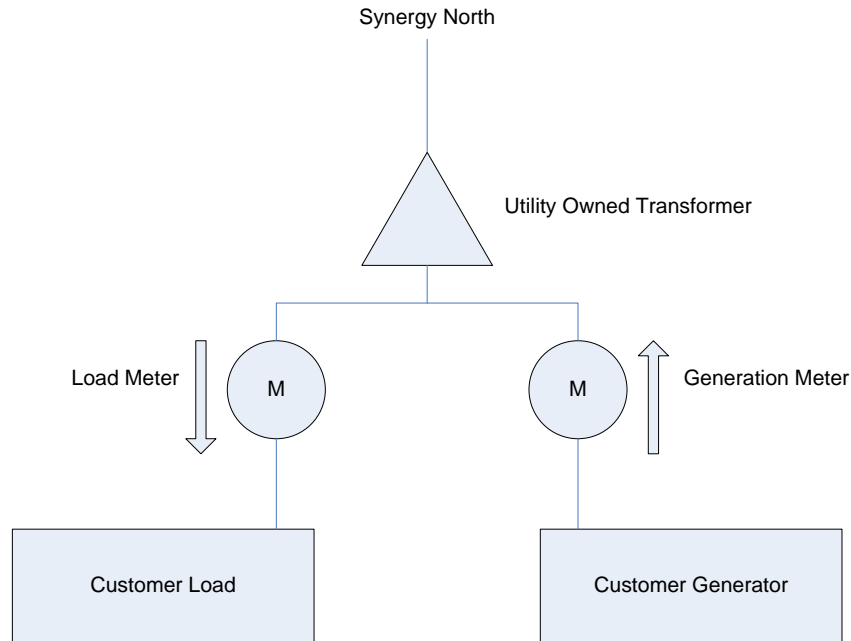
The following technical and operating requirements apply to the Facility:

- *Refer to “SYNERGY NORTH Parallel Generation Requirements”*

SCHEDULE E

Billing and Settlement Procedures (section 5.3)

E.1 Customer Facility Settlement Block Diagram



E.2 Prior to Customer Declaration of Commercial Operation Date

E.2.1 The Customer may, upon execution of the Connection Agreement, operate in synchronism with the utility. Until such time as the Distributor has received notification from the Ontario Power Authority that the Customer has declared its Commercial Operation Date, the Customer shall receive the rate specified in its energy retailer contract for all generated electricity.

E.2.2 Further to Section E.2.1, until the Commercial Operation Date has been declared the Customer shall be compensated for generation according to the following equation;

$$\text{compensation} = kWh_{\text{Generated}} \times HOEP$$

where, $kWh_{\text{Generated}}$ = The total energy exported from the Facility to the Distributor's distribution system

HOEP = Hourly Ontario Energy Price

E.3 Post Customer Declaration of Commercial Operation Date

- E.3.1 Upon confirmation from that Ontario Power Authority that the Customer has completed the Commercial Operation Date Declaration Process the Distributor shall transition from the settlement plan described in Section E.2 to the settlement plan described in Section E.3.2.
- E.3.2 Following the events described in Section E.3.1 the Customer shall be paid for energy exported to the Distributor's distribution system in accordance with the following equation:

$$\text{Generation} = \text{kWh}_{\text{Generated}} \times \text{FIT}$$

where, $\text{kWh}_{\text{Generated}}$ = The total energy exported from the Facility to the Distributor's distribution system, less delivered electricity
FIT = The Feed In Tariff applicable contract rates

Contract payments for any hour will be reduced by the Hourly Delivered Electricity multiplied by the price at which energy sales from the Customer are settled, in accordance with Section 3.2 of the Retail Settlement Code.

- E.3.3 The Feed In Tariff Rate shall be credited to the Customer by the Distributor at the rate and manner specified by the Ontario Power Authority and follow TBH's existing billing cycle.

SCHEDULE F

Contacts for Notice (section 12.1)

Activity Taking Place	Party to be Contacted	Individual to be Contacted	Contact Information
Emergency (generator)			
Emergency (LDC)	SYNERGY NORTH	System Control Operator	Phone: 807-343-1015 Alternate: 807-343-1002
Outage Planning	SYNERGY NORTH	Power Systems Clerk	Office: 807-343-1176
Contract Issues (generator)			
Contract Issues (LDC)	SYNERGY NORTH	Distribution Engineer Daniel Dillon	Office: 807-343-1037 Email: ddillon@synergynorth.ca

SCHEDULE G

Dispute Resolution (section 16.1)

- G.1 The Party claiming a dispute will provide written notice to the other Party. The Parties will make reasonable efforts through or by their respective senior executives to resolve any dispute within sixty days of receipt of such notice.
- G.2 If a dispute is settled by the senior executives of the Parties, the Parties shall prepare and execute minutes setting forth the terms of the settlement. Such terms shall bind the Parties. The subject-matter of the dispute shall not thereafter be the subject of any civil or other proceeding, other than in relation to the enforcement of the terms of the settlement. If a Party fails to comply with the terms of settlement, the other Party may submit the matter to arbitration under section G.3. A copy of the minutes referred to in this section from which all confidential information has been expunged shall be made available to the public by the Distributor upon request.
- G.3 If the senior executives of the Parties cannot resolve the dispute within the time period set out in section G.1 or such longer or shorter period as the Parties may agree, either Party may submit the dispute to binding arbitration under sections G.4 to G.8 by notice to the other Party.
- G.4 The Parties shall use good faith efforts to appoint a single arbitrator for purposes of the arbitration of the dispute. If the Parties fail to agree upon a single arbitrator within ten working days of the date of the notice referred to in section G.3, each Party shall within five working days thereafter choose one arbitrator. The two arbitrators so chosen shall within fifteen working days select a third arbitrator.
- G.5 Where a Party has failed to choose an arbitrator under section G.4 within the time allowed, the other Party may apply to a court to appoint a single arbitrator to resolve the dispute.
- G.6 A person may be appointed as an arbitrator if that person:
- a) is independent of the Parties;
 - b) has no current or past substantial business or financial relationship with either Party, except for prior arbitration; and
 - c) is qualified by education or experience to resolve the dispute.
- G.7 The arbitrator(s) shall provide each of the Parties with an opportunity to be heard orally and/or in writing, as may be appropriate to the nature of the dispute.
- G.8 The *Arbitration Act, 1991* (Ontario) shall apply to an arbitration conducted under this Schedule G.
- G.9 The decision of the arbitrator(s) shall be final and binding on the Parties and may be enforced in accordance with the provisions of the *Arbitration Act, 1991* (Ontario). The Party against which the decision is enforced shall bear all costs and expenses reasonably incurred by the other Party in enforcing the decision.
- G.10 A copy of the decision of the arbitrator(s) from which any confidential information has been expunged shall be made available to the public by the Distributor upon request.
- G.11 Subject to section G.12, each Party shall be responsible for its own costs and expenses incurred in the arbitration of a dispute and for the costs and expenses of the arbitrator(s) if appointed to resolve the dispute.
- G.12 The arbitrator(s) may, if the arbitrator(s) consider it just and reasonable to do so, make an award of costs against or in favour of a Party to the dispute. Such an award of costs may relate to either or both the costs and expenses of the arbitrator(s) and the costs and expenses of the Parties to the dispute.

- G.13 If a dispute is settled by the Parties during the course of an arbitration, the Parties shall prepare and execute minutes setting forth the terms of the settlement. Such terms shall bind the Parties, and either Party may request that the arbitrator(s) record the settlement in the form of an award under section 36 of the *Arbitration Act, 1991* (Ontario). The subject-matter of the dispute shall not thereafter be the subject of any civil or other proceeding, other than in relation to the enforcement of the terms of the settlement.
- G.14 If a Party fails to comply with the terms of settlement referred to in section G.13, the other Party may submit the matter to arbitration under section G.3 if the settlement has not been recorded in the form of an award under section 36 of the *Arbitration Act, 1991* (Ontario).
- G.15. A copy of the minutes referred to in section G.13 from which all confidential information has been expunged shall be made available to the public by the Distributor upon request.
- G.16 The Parties may not, by means of the settlement of a dispute under section G.2 or section G.13, agree to terms or conditions that are inconsistent with or contrary to the Code or this Agreement.

SCHEDULE H

Provisions Applicable if Facility Financed by a Lender (sections 19.3, 20.3 and 21.1)

- H.1 For the purposes of this Schedule, "lender" means a bank or other entity whose principal business is that of a financial institution and that is financing or refinancing the Facility.
- H.2 Where notice of a Default has been served on the Customer under section 19.3, an agent or trustee for and on behalf of a lender ("Security Trustee") or a receiver appointed by the Security Trustee ("Receiver") shall upon notice to the Distributor be entitled (but not obligated) to exercise all of the rights and obligations of the Customer under this Agreement and shall be entitled to remedy the Default specified in the notice within the applicable cure period referred to in section 19.4. The Distributor shall accept performance of the Customer's obligations under this Agreement by the Security Trustee or Receiver in lieu of the Customer's performance of such obligations, and will not exercise any right to terminate this Agreement under section 19.3 due to a Default if the Security Trustee, its nominee or transferee, or the Receiver acknowledges its intention to be bound by the terms of this Agreement and such acknowledgment is received within 30 days of the date of receipt by the Customer of the notice of Default.
- H.3 The Customer may, without the prior written consent of the Distributor, assign by way of security only all or any part of its rights or obligations under this Agreement to a lender. Both the Customer and the lender remain liable to fulfill the obligations of this Agreement. The Customer shall promptly notify the Distributor upon making any such assignment.
- H.4 The Customer may disclose confidential information of the Distributor to a lender or a prospective lender.

SYNERGY NORTH Parallel Generation Requirements

Revision List

Rev #	Date	Changes By	Comments
9	May 11, 2021	Dan Dillon, P. Eng	Update to comply with CSA C22.3 No. 9-20.
8	Oct 9, 2019	Dan Dillon, P. Eng	Remove “traceable” requirement. Update provisions for monitoring.
7	Jan 15, 2019	Dan Dillon, P. Eng	Updated to SYNERGY NORTH
6	Oct 9, 2013	Joe McVety, P.Eng	Volt/Freq. to match IEEE1547
5	May 15, 2013	Joe McVety, P.Eng	Net Metering, Title to match COS
4	Nov 11, 2012	Joe McVety, P.Eng	Addition of Metering Information
3	July 31, 2012	Joe McVety, P.Eng	Minor format corrections.
2	July 14, 2011	Joe McVety, P.Eng	Voltage Regulation, Maintenance,
1	June 1, 2011	Joe McVety, P.Eng	Revised Formatting
0	Nov 27, 2009	Matthew Denis, EIT	Initial Release

Limitation of Liability and Disclaimer

SYNERGY NORTH ‘Technical Requirements for Generators’ identifies minimum requirements for generation projects connecting to SYNERGY NORTH’s distribution system. Additional requirements may need to be met by the owner of the generation project to ensure that the final connection design meets all local and national standards and codes and is safe for the application intended. The Distributed Generator Requirements are based on a number of assumptions, only some of which have been identified. Changing system conditions, standards and equipment may make those assumptions invalid. Use of this document and the information it contains is at the user’s sole risk. SYNERGY NORTH, nor any person employed on its behalf, makes no warranties or representations of any kind with respect to the DG Requirements, including, without limitation, its quality, accuracy, completeness or fitness for any particular purpose, and SYNERGY NORTH will not be liable for any loss or damage arising from the use of this document, any conclusions a user derives from the information in this document or any reliance by the user on the information it contains. SYNERGY NORTH reserves the right to amend any of the requirements at any time. Any person wishing to make a decision based on the content of this document should consult with SYNERGY NORTH prior to making any such decision.

1) Introduction

These technical requirements for Distributed Generation (“DG”) are to ensure public and employee safety, to protect the integrity of SYNERGY NORTH’s system, and to guarantee reliable and quality service to SYNERGY NORTH customers. The technical requirements in this document are for the protection of SYNERGY NORTH’s facilities, and the DG should satisfy itself as to any requirements for the protection of its own facilities.

The requirements below are primarily from Appendix F.2 of the Distribution System Code’s (“DSC”), Institute of Electrical and Electronics Engineers (“IEEE”) Standard 1547, CAN/CSA C22.2 No. 257-06, C22.2 No. 107.1 and C22.3 No. 9. DG developers are encouraged to consult the listed references for more details.

2) Point of Disconnection –

a) Safety

A point of disconnection is required to isolate the DG for the purpose of work protection for SYNERGY NORTH crews. Switching, lockout and tagging procedures shall be coordinated with SYNERGY NORTH.

The disconnect or isolation device must be:

- Readily accessible by SYNERGY NORTH
- Lockable
- Gang operated
- Visible open point
- Located between the PCC and the DG, within 2m and visible to the meter
- Have visible warning signs that inside parts can be energized when the switch is open
- Labeled as “WARNING – TWO POWER SOURCES”

An additional point of disconnection (similar to the above) between the PCC and the meter is recommended in order to minimize outages to the load service during generator related work.

Reference codes and standards that apply to the disconnect or isolation device are as follows: Ontario Electrical Safety Code (“OESC”) rule 84-026, CAN/CSA-C22.2 No. 257-06 Clause 5.3.4 and DSC Appendix F.2 Section 1.

b) Metering

Metering equipment including base, cabinet, instrument transformers / primary metering unit (PMU), and the meter unit itself, is specified explicitly by SYNERGY NORTH. The generation customer is responsible to purchase and installs meter base, CSTE cabinet, and/or PMU, based on SYNERGY NORTH approved shop drawings. SYNERGY NORTH performs the instrument transformer (IT) terminations and meter installation.

c) Parallel connections

- Where installation of generation is into or onto a building with existing General Service (Under 50kW), the meter configuration will be required as dual meter base if generation rate is different from load rate (microFIT program), and single meter base where the rates are equal (Net Metering program) and is subject to all requirements under SYNERGY NORTH’s Conditions of Service.

- Where installation of generation is into or onto a building with existing General Service (50kW to 5000kW), and the service type is “secondary” – not requiring SYNERGY NORTH owned transformation facilities on customer owned property; the meter configuration is subject to all requirements under SYNERGY NORTH's Conditions of Service.
- Where installation of generation is into or onto a building with existing General Service (50kW to 5000kW), and the service type is “primary” - requiring SYNERGY NORTH owned transformation facilities on customer owned property), the meter configuration will be negotiated and decided by SYNERGY NORTH based on
 - Available space near existing facilities
 - Potential safety hazards
 - Accessibility
- Where installation of generation is into or onto a building with existing General Service (5000kW and up), meter configuration will be determined on a case-by-case basis.

*Reference codes and standards that apply to the metering configuration for parallel connections are as follows:
SYNERGY NORTH Conditions of Service.*

3) Preferred Interface Transformer Config. and HV Interrupting Device

The table below lists the configuration that will normally be required by SYNERGY NORTH for the DG facility interface transformer. The interface transformer connection significantly affects the DG interaction with SYNERGY NORTH's distribution system under steady state and fault conditions therefore the specification is critical to avoid adverse effects.

Selecting an appropriate configuration is dependent on the local distribution system at the point of connection. The configurations suggested are applicable for the majority of connections. SYNERGY NORTH will assess each connection individually to determine the required configuration based on the local conditions. In some situations, a DG neutral impedance or grounding transformer may be required. Effective grounding criteria of the distribution system must be maintained so that the maximum overvoltage on the distribution system under fault conditions is less than 125% of the nominal steady state voltage. The HV interrupting device should be a breaker capable of withstanding 220% of the interconnection system rated voltage in accordance with CSA C22.3 No. 9 section 7.4.2.

DG Rating	Distribution System Grounding Impedance (Low, High*)	Interface Transformer Configuration (HV:LV)
> 1 MW	Low	Wye Ground / Delta
> 1 MW	High	Delta / Wye Ground
< 1 MW	Low	Wye Ground / Wye Ground

* Low impedance grounding is where effective multi-point grounding can be achieved. High impedance grounding is where effective multi-point grounding cannot be achieved.

Reference: CSA C22.3 No. 9 section 7.3.2, DSC Appendix F.2 Section 2 and Section 10.6, SYNERGY NORTH Requirement

4) Equipment Rating and Requirements Reference

The generation facility interface equipment shall be compatible with SYNERGY NORTH equipment design and ratings under all operating conditions.

Equipment ratings to be reviewed, but are not limited to, are:

- a) Equipment **thermal loading limits**. This equipment includes feeder conductor/cable, station breaker and transformer ratings.

- b) Impact of generation facility **fault contribution** on equipment rating - If power is to be exported to the distribution system then all **metering devices** shall be suitable for **bi-directional flow**.

Reference: DSC Appendix F.2 Section 5

5) Voltage Regulation Reference

Voltage variations at the point of common coupling ("PCC") are limited to +/- 6% of the nominal voltage.

The DER system shall be capable of PCC voltage control provision via following DER system autonomous, mutually exclusive reactive power, Q control functions, as follows:

- adjustable constant power factor (ACPF) control function.
- adjustable constant reactive power (ACQ) control function.
- reactive power as function of voltage [Q(V)] control function; and
- reactive power as function of active power [Q(P)] control function.

Unless otherwise specified the default control will be constant power factor of 1.0.

During normal operation, the generation facilities, particularly multiple units, must be loaded and unloaded gradually to allow adequate time for regulating devices to respond and avoid excessive voltage fluctuation.

The generation facility must not further deteriorate existing unbalanced conditions.

The generation facility shall not cause objectionable voltage and current unbalance conditions.

The generation facility shall not cause voltage imbalance beyond 3% and current imbalance beyond 10% at the PCC.

Reference: CSA CAN3-C235, CSA C22.3 No. 9 Section 6.2 and 7.2.3, IEEE 1547 Clause 5.3.1 DSC Appendix F.2 Section 3, CAN CSA C22.2 No. 257-06 Section 5.2.3

6) Synchronization Reference

The generation facility shall parallel with the distribution system without causing a **voltage fluctuation of +/- 3%** of the prevailing voltage at the PCC if the PCC is at medium voltage or **+/- 5%** if the PCC is at low voltage.

Interconnection shall take place only when the differences in **frequency, voltage and phase angle** are within the limits shown below.

Total DG System Capacity	Frequency Difference	Voltage Difference	Phase Angle Difference
0-500kVA	0.3Hz	10%	20°
>500-1500kVA	0.2Hz	5%	15°
>1500kVA	0.1Hz	3%	10°

Reference: CAN CSA C22.2 No. 257-06 Section 5.3.21, IEEE 1547 Clause 4.10.4, CSA C22.3 No. 9 Section 7.4.6, DSC Appendix F.2 Section 3.2, OESC rule 84-006

7) Feeder Relay Directionality

To prevent sympathetic tripping of the DG feeder due to faults on adjacent feeders, breaker protection may need a directional feature for reverse fault current conditions.

Transmission Station relay settings may need to be changed so that protection systems are coordinated.

Reference: DSC Appendix F.2 Section 8, SYNERGY NORTH requirement

8) Monitoring Reference

A generation facility with total capacity rated **greater than 250 kVA** at the PCC, shall have active monitoring for items a) to d) below. A generation facility **greater than 50 kVA** shall have provisions for monitoring of items below to allow future telemetry.

- a) Connection status
- b) Real power output
- c) Reactive power output
- d) Voltage at PCC or aggregate connection

Monitoring typically includes status of load interrupting switches, circuit breakers and interface protection annunciation. Communication media options will be mutually agreed upon.

Reference: DSC Appendix F.2 Section 9, IEEE 1547 Clause 10.5, CAN CSA C22.2 No. 257-06 Clause 5.3.22, CSA C22.3 No. 9 Section 7.4.1

9) Power Factor Reference

- a) DG Facilities shall be capable of operating in constant power factors anywhere between 0.9 leading and 0.9 lagging.

DER system interconnection Q capability grade	Sourcing (capacitive) capability as % of as nameplate apparent power, S (kVA) rating	Consumption (inductive) capability as % of as nameplate apparent power, S (kVA) rating
baseline grade	44% at PCC nominal voltage	25% at PCC nominal voltage
supplemental grade	44% over +/- 5% of PCC nominal voltage range	44% over +/- 5% of PCC nominal voltage range

Note: 44% is equivalent to a power factor range of ± 0.9 (i.e., 0.9 lagging and leading) at rated output.

- b) If warranted by local distribution system conditions (such as causing a violation of CSA/CAN3-C235-83 voltage limits at the PCC), this range may be narrower or wider and will be specified by SYNERGY NORTH in the CIA.
- c) The DG Facility shall be capable of operating within lagging and leading power factor ranges with or without other DG Facilities in service on the feeder
- d) SYNERGY NORTH shall determine the required operating power factor of the DG Facility during the CIA study and shall specify this to the DG Owner.
- e) Power factor correction or reactive power compensation techniques may be required.

- f) Induction generators consume reactive power and the DG Owner shall be required to provide reactive power compensation to correct the power factor at the PCC.
- g) DG Facilities greater than 10 MW (Class 4 DGs) shall be assessed by the IESO to determine whether the proposed generation is IESO-impactive¹ and whether the reactive power compensation at the generator units shall be sufficient so as not to cause any material increase in the reactive power requirements at the transmission system transformer station due to the operation of the DGs at all load conditions on the feeder.

Reference: DSC Appendix F.2 Section 4, CSA C22.3 No. 9, CAN CSA C22.2 No. 257-06 Clause 5.3.13

1 IESO-impactive; The Independent Electricity System Operator (IESO) will determine whether a DG Facility impacts the bulk transmission system and whether additional reactive power compensation shall be required

10) Maximum Power Transfer & Synchronous Stability Reference

To ensure distribution system stability and prevent adverse effects on the steady state voltage profile of the feeder, the maximum power export of a generating facility shall be limited so as to not exceed 10° phase shift between line ends.

Reference: SYNERGY NORTH Requirement

11) Cease to Energize Reference

A. Distribution System Faults and Customer Facility Faults

Interface protection of the generation facility shall **cease to energize** SYNERGY NORTH's distribution system under the following conditions:

- **Internal Faults** within the DG facility.
- **External Faults** on the SYNERGY NORTH Distribution System.
- Equipment and Conductors energized from both directions shall have suitable protection from each supply source.

Reference: DSC Appendix F.2 Section 6.4, IEEE 1547 Clause 6.2, OESC 84-014, CAN CSA C22.2 No. 257-06 Clause 5.3.8, CSA C22.3 No. 9 Section 7.4.4

B. Feeder Breaker Reclosing Coordination

The generation facility shall cease to energize SYNERGY NORTH's feeder before automatic reclosing of the breaker takes place.

SYNERGY NORTH's 25 kV feeders incorporate an auto reclose operation typically half a second in duration.

Reference: IEEE 1547 Clause 6.3, DSC Appendix F.2 Section 6, CAN CSA C22.2 No. 257-06 Clause 5.2.9, CSA C22.3 No. 9 Section 6.10

C. Over-Voltage and Under-Voltage Protection

The typical range of protection settings shall comply with the following table and will be set to the default settings unless otherwise specified:

Response to abnormal voltages

Trip function	Default settings		Ranges of adjustability	
	Voltage (% of nominal voltage)	Clearing time (s)	Voltage (% of nominal voltage)	Clearing time (s)
OV2	120	0.16	N/A	N/A
OV1	110	2.0	110 – 120	1.0 – 13.0
UV1	88	2.0	0 – 88	2.0 – 21.0
UV2	45	0.16	0 – 50	0.16 – 2.0

Reference: CSA C22.3 No. 9 Section 7.4.6.4, IEEE 1547 Clause 6.4.1, DSC Appendix F.2 Section 6.5, CAN CSA C22.2 No. 257-06 Clause 5.3.9, SYNERGY NORTH Requirement

D. Over-Frequency and Under-Frequency Protection

The generation facility shall cease to energize SYNERGY NORTH's distribution system at the frequency set points and clearing times outlined in the table below.

Response to Abnormal Frequency

Trip function	Default settings		Ranges of adjustability	
	Frequency (Hz)	Clearing time (s)	Frequency (Hz)	Clearing time (s)
OF2	62.0	0.16	61.8 – 66.0	0.16 – 1000.0
OF1	61.2	300.0	61.0 – 66.0	180.0 – 1000.0
UF1	58.5	300.0	50.0 – 59.0	180.0 – 1000.0
UF2	56.5	0.16	50.0 – 57.0	0.16 – 1000.0

Unless otherwise specified by SYNERGY NORTH, the adjustable set point for generators shall be set to defaults above. The frequency and clear times shall be field adjustable.

Reference: CSA C22.3 No. 9 Section 7.4.6.3, IEEE 1547 Clause 6.5.1, DSC Appendix F.2 Section 6.5, CAN CSA C22.2 No. 257-06 Clause 5.3.10, NPCC Regional Reliability Reference Directory 12, SYNERGY NORTH Requirement

E. Interface Protection System

The interface protection study shall include coordination of key interface protection elements, along with the proposed relays and settings to be used at the PCC. The

protection study submission shall include required AC & DC schematics and wiring diagram.

Reference: DSC Appendix F.2 Section 6, SYNERGY NORTH Requirement

F. Source Configuration Change

In the event that the source configuration changes, other than what was studied in the DG Owner's CIA or listed in their DCA, all connected DG Facilities shall disconnect their generation from the distribution system as directed by SYNERGY NORTH

Reference: Hydro One Technical Interconnection Requirements Section 2.4.1, CSA C22.3 No. 9 Section 6.11 SYNERGY NORTH Requirement

12) Connection to SYNERGY NORTH's System Reference

Connection to SYNERGY NORTH's System following a grid disturbance shall take place only when the voltage at the PCC is within 6% and frequency between 59.5 and 60.5 Hz.

The generation facility shall reconnect no less than five (5) minutes after the system has stabilized within the above voltage and frequency ranges.

For large and mid-sized generating facilities that incorporate transfer trip protection, a lockout relay (86) shall prevent resynchronization until enabled by SYNERGY NORTH. No automatic reconnection to the system shall be allowed unless:

- a) there is always contact with the DG Owner or DG Facility operator who has the ability to immediately disconnect the DG Facility from the system if requested by the Controlling Authority (24 hours/7 days per week); or
- b) the Distributor's Controlling Authority has the ability to remotely disconnect the DG Facility from the system, and
- c) Feeder relay studies must be updated if circuit configuration is materially altered. If the source changes from the configuration studied in the CIA, the generator will not be allowed to reconnect.

Where multiple units on the same feeder are involved, staggering the reconnection times may be required.

Reference: DSC Appendix F.2 Section 6, IEEE 1547 Clause 4.5, CSA C22.3 No. 9 Section 7.4.7, SYNERGY NORTH Requirement

13) Anti-Islanding Protection and Transfer Trip Requirements Reference

The generation facility shall disconnect from SYNERGY NORTH's System upon the loss of utility supply voltage in one or more phases.

Local islanding protection at the generation facility is required.

For large, mid-sized, and aggregated generation facilities with capacity greater than 1 MW or 50% of the minimum feeder load or where the reclosing interval is less than 1.0 second, the design shall include a Transfer Trip scheme to prevent islanding. In this case, Distributed Generator End Open (DGEO) logic is to be included to supervise the auto reclose operation of the feeder breaker and mid-feeder recloser(s).

Reference: DSC Appendix F.2 Section 6.1.2, IEEE 1547 Clause 8, CSA C22.3 No. 9 Section 7.4.7, OESC rule 84-008, CAN CSA C22.2 No. 257-06 Clause 5.3.11, SYNERGY NORTH Requirement

14) Grounding and Generation Facility Reference

The generation facility's grounding scheme shall not cause over voltages that exceed the rating of SYNERGY NORTH equipment.

The generation facility will not disrupt the co-ordination of ground fault protection of SYNERGY NORTH's distribution system

Generation and interconnection facilities must be grounded as per manufacturer's specifications and the OESC.

Wind generation facilities may be restricted from connecting to the distribution system neutral.

Reference: DSC Appendix F.2 Section 2, IEEE 1547 Clause 4.12, CSA C22.3 No. 9 Section 7.3.3, OESC rule 84-030, CAN CSA C22.2 No. 257-06 Clause 5.3.6, SYNERGY NORTH Requirement

15) Power Quality

The generation facility must not negatively impact the power quality of SYNERGY NORTH's distribution system.

A) Limitation of DC injection

The maximum DC injection value is limited to 0.5% of the full rated output current (RMS) at the generation facility PCC after a period of six cycles following the paralleling with SYNERGY NORTH's distribution system.

Reference: DSC Appendix F.2 Section 10.3, CSA C22.3 No. 9 Section 7.2.6, IEEE 1547 Clause 7.1

B) Limitation of Flicker

The generation facility must not create objectionable flicker for other customers on SYNERGY NORTH's distribution system.

Reference: DSC Appendix F.2 Section 10.1, CSA C22.3 No. 9 Section 7.2.2, IEEE 1547 Clause 7.2.3, CAN/CSA-C61000-3-7

C) Limitation of Harmonics

Voltage distortions in percent of nominal voltage must not exceed the limits specified in IEC 61000-3-6

Reference: IEC 61000-3-6, DSC Appendix F.2 Section 10.2, CSA C22.3 No. 9 Section 7.2.1, IEEE 1547 Clause 7.3, CAN/CSA-C61000-3-6

16) Warning Signs and Diagrams

The following warning sign shall be posted on the point of disconnection, generator feeder cell and switch room door to warn people of the presence of DG:

WARNING
TWO POWER
SOURCES SYSTEM

As well, a single line, permanent and legible diagram of the switching arrangement shall be placed at the Customer's control room and the switch room to indicate the position of the distributed generators and isolation points with their interlocking arrangements.

Operating designations will be assigned to the switching equipment of the generation system as required by SYNERGY NORTH. The Customer shall update the single line electrical diagram and operating diagram to include the assigned operating designations, and the switching equipment shall be identified by the operating designations as well.

Reference: ESA-SPEC-004, ESA-SPEC-005-00

17) Maintenance Requirements–Protections & Control Systems Equipment

1. The DG Owner shall re-verify its Interconnection Protections and Control sub-systems that impact SYNERGY NORTH's Distribution System on a periodic basis, according to the following schedule:
 - a) whenever any protections and control sub-system equipment requires replacement, design modification or changes to settings ¹;
 - b) every eight (8) years for Intelligent Electronic Device (IED) - based protection sub-systems that employ comprehensive self-diagnostic features ² to detect and provide alarm telemetry to Distributor for internal sub-system failures;
 - c) every four (4) years for electromechanical or other non IED-based protection sub-systems that do not employ comprehensive self-diagnostic features to detect and provide alarm telemetry to SYNERGY NORTH for internal sub-system failures; and
 - d) The above periodic re-verification intervals may need to be made more frequent if required to restore or sustain the safety or reliability of SYNERGY NORTH's Distribution System to acceptable levels of performance, as required by the Distribution System Code and Conditions of Service.
2. The protections and control systems that require periodic maintenance are the same ones that were required to be confirmed and verified during commissioning as part of the COVER process (described in the Distribution Connection Agreement).
3. Within three (3) months of Connection, the Customer shall provide SYNERGY NORTH with their proposed Protection and Control re-verification program (including test procedures and schedules). It is expected that the re-verification tests will be similar to the tests conducted during commissioning, with the exception of checking equipment conditions that are obviously proven to be functional during normal day-to-day operation as described below.

- a) Instrument transformer checks (insulation, ratio/polarity, excitation and resistance results) – should not require re-verification providing secondary load readings are correct (Item l) below);
 - b) Breaker timing trip tests for those breakers used to disconnect the Customer Facility from the Distribution System as a result of protection operations – may not be required if adequate Sequence of Events Recorder (SER) or Digital Fault Recorder (DFR) records are available to show correct timing has been sustained;
 - c) Verification of the transformer and neutral reactor/resistor impedances that impact the Customer Facility's ground integration with the Distribution System and correct connection, where applicable - should not require re-verification unless this equipment is replaced;
 - d) Relay setting field work sheets (showing the measured results of the relay calibration checks). Relay element settings/directioning are to be confirmed by AC secondary injection – shall require re-verification;
 - e) Voltage measurements for any external power supplies used to supply the protections shall be recorded – shall require re-verification;
 - f) Verification that all AC and DC measurements have test equipment traceable to National Research Council (NRC) standards – shall require re-verification;
 - g) Functional tests confirming the protection and control logic and timer settings - shall require re-verification;
 - h) Verification of test trips and alarm processing. Monitoring of breakers outputs using suitable indicators can be used to avoid repeated tripping of the same from different protections, but at least one live trip test per breaker (where the breaker is proven to open) needs to be demonstrated - shall require re-verification;
 - i) Verification of control interlocks in protections - shall require re-verification;
 - j) Verification of synchronizing system and synch-check controls – should not require re-verification providing the Customer Facility has been connected and disconnected on a regular basis (at least once per month);
 - k) Voltage phasing checks (prior to first connection) – should not require re-verification unless three-phase power equipment is replaced;
 - l) Secondary load readings, voltage and current phasor checks (immediately after first connection) to prove correct magnitude and phase angle of all secondary AC voltage and current circuits correspond to primary quantities. Primary current, voltage, MW and MVA_r values shall be calculated from the measured secondary values and compared to known primary quantities at adjacent locations - shall require re-verification; and
 - m) Verification of Transfer Trips and DGEO end to end checks. This will require participation and coordination with SYNERGY NORTH and Hydro One Networks Inc - shall require re-verification;
4. The Customer shall make modifications to correct any problems that are found during re-verification.
5. Within thirty (30) working days of receiving the above documentation or as required by the Code, Distributor shall notify the Customer that it:
- a) Agrees with the proposed re-verification program and test procedures; or
 - b) Requires changes in the interest of safety or maintaining the reliability of SYNERGY NORTH's Distribution System. Such request for changes shall be sent to the Customer promptly

6. For those tests that require Distributor's participation or witnessing, the Customer shall provide Distributor with no less than fifteen (15) working days' notice prior to the test date.
7. All tests shall be coordinated and approved ahead of time through the normal outage and work management system planning processes.
8. The Customer shall complete the re-verification in accordance with Item (5) above and submit complete documentation of the test results to Distributor within one month of the completed tests.

Maintenance requirements are equivalent to what the Distributor requires for re-verification of its own facilities that have similar potential impact to the Distribution System.

1. *Distributor must be advised of and approve all interconnection equipment replacement, design modification and setting changes*
2. *Distributor will assess the adequacy of the self-diagnostic features of protection sub-systems based on the same criteria used for assessing Distributor feeder protections*



DATE: November 26, 2020

TO: **All Licensed Electricity Distributors**
All Other Interested Parties

RE: **EB-2019-0207 Guidance - Protection Philosophy for DER Connections**

This letter provides information for distributors to aid discussions with prospective distributed energy resource (DER) proponents in relation to a sample protection philosophy for use with connection projects intended for self-supply that use non-exporting, inverter-based technologies.

In August 2019, the Ontario Energy Board (OEB) initiated a review of its requirements in regard to the connection of DERs by licensed electricity distributors (DER Connections Review¹). The purpose of this initiative has been to identify any barriers to the connection of DERs, and where appropriate to standardize and improve the connection process. OEB staff convened a Working Group to identify changes that could quickly improve the consistency and clarity of the process and lower costs for both the proponents and the industry. The Working Group's membership represents a broad range of distributors, consumer groups, firms that are working on DER projects, and groups advocating for generation technologies and environmental concerns.

The Working Group identified a concern with the lack of clear technical requirements for connections which can lead to insufficient information from proponents in a connection application submitted to a distributor. The Distribution System Code (Code) specifies the responsibilities of licensed distributors regarding connection of generators. Section 6.2.11 of the Code specifies that a distributor shall require a person, upon making an application for the connection of a generation facility to the distributor's distribution system, to provide the following information: a preliminary design of the proposed interface protection; and all necessary technical information required by the distributor to complete the connection impact assessment. The Working Group suggested that project proponents would be able to submit better applications if there were a common

¹ [EB-2019-0207: DER Connections Review](#)

understanding of the requirements that may be necessary for the protection interface between the proposed DER and the distribution system.

The Working Group adapted a protection philosophy that was provided in the 2019 Ontario Energy Association report entitled “Report of the OEA Interconnection Working Group” to illustrate an example of good utility practice regarding the kinds of protection interface distributors typically require. The result of the Working Groups’ effort, in Attachment A, is a sample protection philosophy that may be shared with a customer or contractors working on their behalf seeking connection for a non-exporting, inverter-based DER for load displacement. This sample protection philosophy is not a substitute for the technical requirements outlined in Appendix F.2 of the Code, but rather an aid to improve information being submitted for the connection assessment process described in Appendix F.1 of the Code.

The purpose of this letter is to make available to distributors the protection philosophy developed by the Working Group so that it can be shared with customers and DER proponents as a reference to aid in improving the quality of their connection applications. OEB staff believes that the protection philosophy can be of assistance to those distributors that have had few or no connections of DERs to their system. Based on the input from the Working Group, the use of a common approach like this will likely reduce costs for both distributors and their customers and facilitate responses to DER connection inquiries from customers.

OEB staff expects that the work of the Working Group in reviewing technical and process requirements will continue over the next several months and may lead to further information or guidance for distributors and DER providers. However, given the Working Group’s view that there is value to the sector in making this sample protection philosophy available, OEB staff is providing it to the sector. As additional technical matters are addressed and recommendations made by the Working Group, OEB staff may issue guidance to the industry.

Any enquiries regarding this letter should be directed to the OEB’s Industry Relations email address at industry.relations@oeb.ca.

Yours truly,

Original Signed By

Brian Hewson,
Vice President, Consumer Protection & Industry Performance

Attachment

ATTACHMENT

Sample Protection Philosophy for Non-exporting Inverter-based Sources



Protection for Distributed Energy Resource Proponents Applying for Connection

This document is a summary of a sample protection philosophy for non-exporting, inverter-based (NE/I) connections including storage, solar, and wind. The OEB intends it as a guide for proponents regarding the kinds of protections, and particularly the categories of protections, that distributors will require for connection.

This is one example of a protection philosophy that would meeting the interconnection standards¹. Other philosophies may also meet the standards. It provides guidance to a distributed energy resource (DER) proponent on good utility practice as it relates to protection requirements of non-exporting, inverter-based (NE/I) DERs. To form a protection scheme, all the elements for each category within any given protection philosophy are requirements.

This document is not an approval for connection. This information should help proponents file better and more complete applications for connection. A proponent will need to submit detailed protection settings after the utility has completed the impact assessment of the submitted connection application.

The standards and certification testing referenced in this document should be read as referring to the current versions of these standards at time of reading.

Sample Protection Philosophy for Non-exporting Inverter-based Sources

The protection system of the connection will be designed to:

- Detect internal faults with the generator facility, downstream of the Point of Common Coupling (PCC), and automatically disconnect the NE/I source
- Detect external faults on the utility feeder and automatically disconnect the NE/I source
- Detect islanding conditions and disconnect the NE/I source
- Detect export of power from the NE/I source to the utility feeder and automatically disconnect the NE/I source

¹ The contents of this document, although intended as guidance, conform to the interconnection and approval requirements prevalent at the time of its issuance. At all times, the current versions of relevant codes and standards govern.

Internal Faults Within the Generator Facility

The following protections are in place to protect against internal faults resulting from the NE/I source:

- **Multi-Function Relay**-At the PCC, a multi-function relay will be installed to monitor internal faults resulting from the NE/I source. The 52 Trip Breaker will trip if it detects the following:
 - 25 - Synchronization Check
 - 27 - Undervoltage
 - 59 - Overvoltage
 - 81O/U - Under and Over Frequency
 - ID -Active Anti-Islanding
- **Inverter Breakers** - Each inverter is equipped with an AC breaker at the output of the inverter providing additional overcurrent protection
- **Facility Overcurrent Protection** - All circuits within the facility are protected from both phase-to-phase and phase-to-ground faults by appropriate overcurrent protection devices. Fuses are sized to clear under fault conditions within the generator facility

External Phase and Ground Faults in the Distribution System

The following protections are in place to protect against external faults resulting from the utility feeder:

- **Multi-Function Relay** - At the main utility service, prior to the first facility load, a multi-function relay will be installed to monitor faults from the utility feeder. The 52 Trip Breaker at the NE/I source PCC will trip under the following faults:
 - 27 - Undervoltage
 - 32R- Reverse Power
 - 50/51- Overcurrent
 - 59 - Overvoltage
 - 81O/U - Under and Over Frequency
 - 67 - Directional
- **Inverter Protection:** The inverters proposed for this project are certified to UL 1741, IEEE 1547, CSA C22.2 107.1-01 standards² and will behave accordingly.

² All references to standards or testing certifications should be read as the most current version.

Anti-Islanding

- The Energy Resource Facility will operate in a grid following mode and will not operate islanded.
- **Anti-Islanding Inverters** -The NE/I source inverters contain both passive and active anti- islanding protection as required by IEEE 1547 and UL1741 SA. If the utility normal power supply is interrupted, the inverters detect the loss of power and disconnect.

Reverse Power

- **Reverse Power Protection** - In addition to the multi-function relay at the utility supply monitoring reverse power (32R), the load is continually monitored to ensure the NE/I source discharge is below the consumption of the facility. This additionally protects against power injection to the utility grid.

Directional Overcurrent

- **Directional overcurrent protection** - Directional overcurrent relays are normally used on incoming line circuit breakers on buses which have two or more sources. They are connected to trip an incoming line breaker for fault current flow back into the source, so that a fault on one source is not fed by the other sources.

Special Comment Regarding Inverter Based Generation

The inverters specified for this project have a limited fault current contribution.

- Because inverters are current-limited devices, unlike rotating generators, the fault current is very close to the maximum output current, limiting the fault current in the system to 120% -140% of FLA.

Table 1: Protection Summary Matrix

Description	IEEE Device	Internal Faults	External Faults	Anti-Islanding	Reverse Power
Over-Voltage	59	X	X	X	
Under-Voltage	27	X	X	X	
Over-Frequency	81O	X	X	X	
Under-Frequency	81U	X	X	X	
Instantaneous Over-Current Phase	50	X	X		
Timed Over-Current Phase	51	X	X		
Reverse Power	32R			X	X
Directional	67	X	X		
Active Anti-Islanding	IEEE 1547			X	

Table 2: Protection Elements

Protection Element Function	Device#	Feeder Protection Relay/Shunt Trip	IEEE 1741 SA Inverter
Over-Voltage	59	X	Y
Under-Voltage	27	X	Y
Over-Frequency	81O	X	Y
Under-Frequency	81U	X	Y
Synchronization Check	25	X	Y
Reverse Power	32R	X	
Overcurrent	50/51	X	Y
Directional	67	X	
Active Anti-islanding	ID		X

X = Primary

Y = Secondary



Generation Connection Request Form

For Connection of Generation Facilities of > 10 kW

This form is applicable to individual or multiple generating units at the Customer's facility with total nameplate rating greater than 10 kW.

IMPORTANT: All fields below are mandatory, except where noted. Incomplete applications may be returned by SYNERGY NORTH CORPORATION ("SYNERGY NORTH").

If you have any questions please e-mail SYNERGY NORTH at generator.connections@synergynorth.ca or call 807-343-1037.

Completed Generation Connection Request Form and other required documents may be returned:

By mail to:

SYNERGY NORTH CORPORATION
Attn: Asset Management and Engineering
Generation Connection Application
37 Front Street
Thunder Bay, Ontario P7A 8B2

or by email to:

generator.connections@synergynorth.ca

CHECKLIST

Please ensure that the following items are included in your submission. Your application will not be processed if any part is omitted or incomplete.

- ☐ **Completed Generation Connection Request Form**, must be signed and dated by the project owner or the consultant.
- ☐ Construction was completed on _____ (mm/dd/yy)
- ☐ Detailed Commissioning Plan
- ☐ Regulatory Approvals
- ☐ ESA inspection complete, Certificate number _____
- ☐ COVER (up to section 6) signed by a P.Eng
- ☐ A letter, signed by a P.Eng, stating that all components and installation meet CSA
- ☐ A complete set of as-built drawings
- ☐ Generation Account (Customer Service), account # _____
- ☐ Distribution Connection Agreement executed on _____ (mm/dd/yy)
- ☐ Proof of Insurance Certificate
- ☐ COVER (up to section 7) completion date
- ☐ Proposed SYNERGY NORTH inspection Date _____ (mm/dd/yy)
- ☐ Proposed In Service Date _____ (mm/dd/yy)

Note: SYNERGY NORTH may request additional information if required.

Applicant: _____ **Date:** _____
(Signature) (dd/mm/yyyy)



CUSTOMER INSTRUCTIONS FOR COMPLETING A COVER FORM

PART 1: PLAN

Step 1: Generator Information

- Complete Facility and Customer Contact Information of the COVER Form by completing the highlighted portions on the Facilities and Contact Information page.

Step 2: Identify the tests that the Generator intends to conduct

- Complete highlighted portions of Sections 3, 4, 5, and 6.

Note: The design review must be finalized prior to completing this step.

Step 3: The Distributor COVER Coordinator review

- Return the COVER form by email to the Distributor COVER Coordinator listed on the Facilities and Contact Information page.
- The COVER Coordinator will review the proposed and respond to the acceptability of the proposed COVER tests within 5 business days.

Note: The commissioning plan review must be finalized prior to commencing testing for the next step.

PART 2: PRE-ENERGIZATION

Step 4: Completion of testing and resolution of all comments

- Complete all applicable testing in Sections 3, 4, 5, and 6
- Sign off the COVER in Section 4 by a Generator P.Eng Representative, and submit it to the COVER Coordinator
- The COVER Coordinator will review the certified COVER and recommend to the Transmitter for connection to the grid by signing Section 6.
- Section 5 testing can only proceed when all salient comments have been resolved and tests completed for Sections 3, 4, 5, and 6.
- Controlling Authority will provide authorization to connect to the grid (for OGCC controlled distributed generators, the OGCC is the controlling authority. For other feeders the controlling authority will be Provincial Lines.)

PART 3: POST-ENERGIZATION

Step 5: Final potential and on-load tests

- Transmitter will provide authorization to connect (where applicable)
- Complete and sign Section 7 when all parts of the COVER form are complete. (Note: Cross readings to be performed within 5 business days of placing load on station)
- Summary of testing results and certificates must be kept on file for a minimum period of seven years by the Generator (as indicated by the IESO Market Rules). The Distributor may require the information on an exception basis.



SYNERGY NORTH

Confirmation of Verification Evidence Report (COVER)

Section 1 Facilities Information			
Name of Customer			
Name of Facility			
Proposed Energization Date			
TBH Operating Designation			
Supply Feeder Designation			
Section 2 Contact Information			
Customer Contact		Distributor COVER Coordinator	
Name		Name	Daniel Dillon, P. Eng.
Title		Title	Distribution Engineer
Date		Date	
Tel#		Tel#	(807)343-1037
Email		Email	ddillon@synergynorth.ca

SECTION 3	VERIFICATION – PROTECTION AND CONTROL					
Legend: C = Confirm W = Witness Results: P = Pass, F = Fail, N/A = Not Applicable	Test		Results	Initials	Date (mm/dd/yyyy)	Note #
Is commissioning in compliance with the submitted Commissioning plans?	C					
Are reviewed relay settings applied?	W					
Confirm that the following protection systems, as applicable, have been verified to function as per the design. NOTE: Tests marked with and asterisks (*) require Distributor and/or Transmitter staff coordination						
• Line Protection	N					
• HV Breaker Failure Protection and reclose	N					
• LV Breaker Failure Protection and reclose	N					
• Transformer Differential	N					
• Transformer Backup Protection	N					
• Over/Under Frequency	N					
• Over/Under Voltage	N					
• Transfer Trip/Remote Trip*	N					
• Pilot Wire Protection*	N					
• Blocking Scheme Circuits*	N					
• Generation Rejection and Load Rejection Circuits*	N					
• Reverse Power	N					
• Generator Prot. that Trip HV Sync Breakers	N					
• Instrument Transformers	N					

SECTION 3	VERIFICATION – PROTECTION AND CONTROL					
Legend: C = Confirm W = Witness Results: P = Pass, F = Fail, N/A = Not Applicable	Test		Results	Initials	Date (mm/dd/yyyy)	Note #
<ul style="list-style-type: none"> Monitoring Equipment (Digital Fault Recorder, Sequence of Events Recorder, etc.) 	N					

SECTION 4	TELEMETRY TESTS BEFORE ENERGIZATION AT GENERATION FACILITY					
Confirm the following SCADA telemetry quantities, where applicable: Test Needed: D = to be Done Legend: C = Confirm W = Witness Results: P=Pass, F=Fail All Parts: N/A = Not Applicable	Test		Results	Initials	Date (mm/dd/yyyy)	Note #
<ul style="list-style-type: none"> MW flows and direction 	N					
<ul style="list-style-type: none"> MVAR flow and direction 	N					
<ul style="list-style-type: none"> Phase to Neutral voltages 	N					
<ul style="list-style-type: none"> HV switchers/HV breakers/Bus Tie Breakers Open/Close Status 	N					
<ul style="list-style-type: none"> HV Line Disconnect switches Open/Close Status 	N					
<ul style="list-style-type: none"> Synchronizing Breakers Open/Close Status 	N					
<ul style="list-style-type: none"> AVRs, PSSs status 	N					
<ul style="list-style-type: none"> Generation Rejection Selection Status 	N					

SECTION 4	TELEMETRY TESTS BEFORE ENERGIZATION AT GENERATION FACILITY					
Confirm the following SCADA telemetry quantities, where applicable: Test Needed: D = to be Done Legend: C = Confirm W = Witness Results: P=Pass, F=Fail All Parts: N/A = Not Applicable	Test		Results	Initials	Date (mm/dd/yyyy)	Note #
• LV Breakers/Switchers, Open/Close Status	N					
• LV Synchronizing Breakers, Open/Close Status	N					
• Protection Trip Alarms	N					
• Other (Specify): Remote Trip	N					

SECTION 5	CONFIRMATION OF VERIFICATION – POWER EQUIPMENT					
<div>Legend: C = Confirm, W = Witness, Not Applicable</div> <div>Results: P=Pass, F=Fail, N/A = Not Applicable</div>		Test	Results	Initials	Date (mm/dd/yyyy)	Note #

SECTION 5	CONFIRMATION OF VERIFICATION – POWER EQUIPMENT					
Legend: C = Confirm, W = Witness, Not Applicable Results: P=Pass, F=Fail, N/A = Not Applicable		Test	Results	Initials	Date (mm/dd/yyyy)	Note #
<ul style="list-style-type: none"> Verify the LV disconnect switches/circuit switchers are suitable as an isolation point per Utility Work Protection Code? <p>NOTE: Any future modifications to the isolation device(s) used to provide supporting guarantees to Distributor staff under the Utility Work Protection Code must be re-witnessed by Distributor personnel.</p>		W				
<ul style="list-style-type: none"> Confirm correct operation of the LV disconnect switches/circuit switchers/breakers 		W				
<ul style="list-style-type: none"> Is closing time within manufacturer's specification? 		N/A				
<ul style="list-style-type: none"> Is opening time within manufacturer's specification? 		N/A				
<ul style="list-style-type: none"> Are the specified HV surge arrestors installed? 		N/A				
<ul style="list-style-type: none"> Confirm the power transformer test results are within specification 		N/A				
<ul style="list-style-type: none"> Confirm power transformers connected correctly as per the design. 		N/A				
<ul style="list-style-type: none"> Confirm the DC system installed (ie battery, charger, dc panel, dc monitoring)? Verified 		C				
<ul style="list-style-type: none"> Does the LV equipment (ie disconnect switches, circuit switchers, breakers, CVTs, CTs) have the appropriate voltage class and current ratings as per the submitted Single Line Diagram? 		C				
<ul style="list-style-type: none"> Other (specify): 		N/A				
<ul style="list-style-type: none"> Name of Distributor Witness 						

SECTION 6	ELECTRICAL SAFETY		
Legend: SD = Supporting Document, N/A = Not Applicable		Legend	Date (mm/dd/yyyy)
<ul style="list-style-type: none"> Prior to energizing any new or modified customer or generator facilities, Electrical Safety Authority (ESA) must provide a Temporary Connection Authorization (Ontario Electrical Safety Code Article 2-014). Attach Document 		SD	
<ul style="list-style-type: none"> Prior to final in-service of new or modified customer or generator facilities, ESA must provide Connection Authorization (Code Article 2-012). Attach Document 		SD	
<ul style="list-style-type: none"> All customers must provide a letter signed and stamped by a Professional Engineer registered in the province of Ontario stating that their equipment and installation meets CSA and/or other applicable electrical safety standards, prior to ready for Service Date. Attach Document 		SD	
The COVER Coordinator approves the proposed checks, verifications, tests and notes submitted by the Generator for the scheduled COVER.		COVER Coordinator Initials _____	



NOTES: (For Sections 3-6)

#:	Comments:	Initials	Date Action Resolved: (dd/mm/yyyy)
1			
2			
3			
4			
5			
6			
7			
8			
9			



By signing this form, the Generator acknowledges that all required verifications specified under this COVER document have been completed and that the Generation Facility design and operation meets the minimum standards for customer facilities connected to a distribution system, as per the Distribution System Code.

Signature of Generator Representative (Note: Must be P. Eng)

Print Name: _____

Title: _____

Date: _____

☐ Part 1 Completed (Sections 3-6) COVER Coordinator Initials _____

The COVER Coordinator has reviewed the Generator's Certified COVER document and the Generator's Facilities may be connected to the Distributor's distribution system subject to the Transmitter's final review (if applicable).

Signature of SYNERGY NORTH Representative

Print Name: _____

Title: _____

Date: _____

SECTION 7	CONFIRM ON POTENTIAL LOAD CHECKS AT RATED SYSTEM VOLTAGE					
Legend: C = Confirm, W = Witness, N/A = not applicable Result: P = Pass, F = Fail All Parts: N/A = Not Applicable		Test	Results	Initials	Date (mm/dd/yyyy)	Note #
Are phasor (X-Watt meter) readings completed and analyzed by the Generator vs protection listed in Section 1?		W				
Are phasor (X-Watt meter) readings completed and analyzed by the Generator vs SCADA quantities listed in Section 4?		N/A				
On Load SCADA Values confirmed consistent with test(s) performed in Section 4?		N/A				
Other (specify):		N/A				

NOTES: (For Section 7)

#:	Comments:	Initials	Date Action Resolved: (dd/mm/yyyy)
1			
2			



I/we acknowledge the completion of the COVER as noted and the deficiencies identified in the “NOTES” section have been resolved.

Signature of Generator Representative (Note: Must be P. Eng)

Print Name: _____

Title: _____

Date: _____

The COVER Coordinator has reviewed the Generator’s potential/on load checks at the rated system voltage

Signature of SYNERGY NORTH Representative

Print Name: _____

Title: _____

Date: _____

SECTION 8	TEST SUMMARY REPORTS
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In accordance with the Code, Appendix F, the Generator shall at the Distributor’s request, provide the Distributor with a summary of testing results, including any certificates of inspection or other applicable authorizations or approvals certifying that any of the Generator’s new, modified, or replacement Facilities have passed the relevant tests and comply with all applicable instruments and standards referred to in the Code. This information will be kept on file for a period of seven years by the Generator.