KITCHENER WILMOT HYDRO INC.		**Title:** **Customer Guideline**	
		File No. **7542-2009-3**	
Prepared by:	**S. Wang**	**Document No.** **KWHDG-2**	**Rev:** **4**
Approved by:	**M. B. McKague**		
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How to Connect Your Generation Facility (>10 kW & ≤ 10 MW) To Kitchener-Wilmot Hydro Inc.'s Distribution System

See Kitchener-Wilmot Hydro Inc.'s website for the latest revision

Contents

Appendixes

GENERAL

The following guideline applies to the generation facilities under two categories:
Small: >10kW but ≤ 500kW connected on distribution system with feeder voltage of 13.8 kV or 8.3 kV
>10kW but ≤ 1MW connected on distribution system with feeder voltage of 27.6 kV
Mid-Sized:
> 500kW but ≤ 10MW connected on distribution system with feeder voltage of 13.8 kV or 8.3 kV
> 1MW but ≤ 10MW connected on distribution system with feeder voltage of 27.6 kV

The micro generation facility (≤10KW) is subject to a simplified connection process; please check Kitchener-Wilmot Hydro Inc.'s Document No. KWHDG-1.

Generation facilities larger than 10MW may exceed Kitchener-Wilmot Hydro Inc.'s system limit and will be subject to special engineering review and connection process. The Customer shall contact Kitchener-Wilmot Hydro Inc. for further information.

CONTACT INFORMATION

For customer inquiry and application submission, please contact Kitchener-Wilmot Hydro Inc. at:

For generation facility no more than 10kW

John Theriault
Service Design Supervisor
Kitchener-Wilmot Hydro Inc.
Phone: 519-745-4771 Ext 6240
Fax: 519-745-0643
Email: JTheriault@kwhydro.ca

For generation facility above 10kW

Shaun Wang, P. Eng
System Planning & Projects Engineer
Kitchener-Wilmot Hydro Inc.
Phone: 519-745-4771 Ext 6312
Fax: 519-745-0643
Email: SWang@kwhydro.ca

RESPONSIBILITY OF KITCHENER-WILMOT HYDRO INC.

- The safety, reliability, and efficiency of its distribution system,
- Ensuring that the new generation connection does not adversely affect the distribution system or risk the hydro employees and the existing customers;
- Ensuring that the Distribution System Code and applicable standards are followed;
- Keep connection cost effective to promote renewable energy.

RESPONSIBILITY OF THE CUSTOMER

- The safety, design, construction, operation, metering, protection and control, and maintenance of the generating facility.
- Contacting Kitchener-Wilmot Hydro Inc. early in the process.
- Contacting the various agencies involved before finalizing plans.

- Ensuring all necessary submissions and agreements are completed and required payments clear.

In addition to satisfy the requirements listed in this guideline, the customer is solely responsible to obtain regulatory approvals for installing and operating the generation facility, which may include but not be limited to the following:

- Compliance with all municipal zoning and land use by-laws, Ontario Building Code, please contact City/Township's Planning Department.
- Renewable Energy Approval for renewable energy project or Certificate of Approval for non-renewable energy project (please consult Ministry of Environment and Ministry of Natural Resources)
- Electricity Generator License required by Ontario Energy Board for generation facility above 500kW
- Connection Authorization by Electrical Safety Authority (ESA)

ESA approval will be required before the generation facility is allowed to connect. The ESA can be contacted at 1-877-ESA-SAFE (1-877-372-7233). The ESA website is http://www.esasafe.com/ .

CONNECTION PROCESS

In compliance with the Distribution System Code, the connection process and timing for Small and Mid-Sized generation facility to be connected in parallel with Kitchener-Wilmot Hydro Inc. distribution system is as follows:

1) **Initial Contact**

   The Customer proposing the installation of a generation facility contacts Kitchener- Wilmot Hydro Inc. and the ESA for information. If power is to be sold under Feed-In Tariff (FIT) contract with Independent Electricity System Operator (IESO), the Customer must contact the IESO for the program requirements. The Customer may also contact various involved agencies like the City's Planning Department, Ontario Energy Board, Ministry of Environment, Ministry of Natural Resources before finalizing the plan.

   IESO FIT Program Link: http://fit.powerauthority.on.ca/

2) **Provision of Information**

   Kitchener-Wilmot Hydro Inc. provides a copy of this guideline to the Customer within 5 business days to explain the connection process and technical requirements including the application form. More information related to Kitchener-Wilmot Hydro Inc.'s distribution system information can be found in Appendix B2.

   ESA provides information on electrical safety requirements and plan approval process.

3) Develop Plan and Register Project

The Customer reviews relevant information from Kitchener-Wilmot Hydro Inc. and ESA on the proposed project, and puts together an installation plan.

- Size / type of generation facility
- Potential site(s)
- Load displacement / net metering / isolated from the distribution system / grid connection; and
- project plan

4) Initial Consultation (No charge)

The Customer completes the Application for Preliminary Review (Appendix C2: Form DG02) and requests a meeting with Kitchener-Wilmot Hydro Inc. Within 15 days from receipt of the application and a request for a meeting, Kitchener-Wilmot Hydro Inc. will meet with the Customer to review the plans at a basic level:

- Voltage levels used for distribution
- Transformer and distribution stations
- Major distribution and sub-transmission lines including reference road map
- Location of existing distribution facilities in reference to the proposed generation facility location
- Rough costs and timing which could be associated with the connection work

If the Customer is eligible to the FIT program and decides to participate in, the Customer should submit FIT application to IESO and obtain a FIT contract before submitting the Hydro Application for Connection Impact Assessment (Step 5). Kitchener-Wilmot Hydro Inc. will provide the relevant distribution system information and assistance if required.

5) Application for Connection Impact Assessment (CIA)

The Customer submits Kitchener-Wilmot Hydro Inc. a complete application form for CIA (Appendix D2: Form DG03) with all required information.
NOTE: All technical submissions (CIA application form, single line diagrams, protection philosophy, etc.) for projects greater than 10 kW must be signed and sealed by a licensed Ontario Professional Engineer (P.Eng).
NOTE: For Generator under FIT program, the Application for Impact Assessment will ***not*** *be accepted until a signed FIT contract is in place.*

Within 15 days of submitting a complete CIA application, Kitchener-Wilmot Hydro Inc. requests the Customer to enter into a Connection Impact Study Agreement. The Customer returns the signed Connection Impact Study Agreement with the payment as required by Kitchener-Wilmot Hydro Inc.

6) Connection Impact Assessment and Cost Estimate

Kitchener-Wilmot Hydro Inc. performs an impact assessment of the proposed generation facility to determine the connection feasibility and upgrade requirements, following the technical requirements outlined in Appendix A2.

Within 60 days from receipt of both signed Impact Study Agreement and payment, Kitchener-Wilmot Hydro Inc. returns the Customer a CIA report with the connection feasibility and the system fault level information at the connection point.

If the Customer decides to revise the original plans based on the results of the CIA report, the plans must be resubmitted for another CIA review by going back to Step 5.

6a) For Small generators

Kitchener-Wilmot Hydro Inc. issues a draft Connection Cost Agreement (CCA) after the CIA report to outline the system modification/upgrade requirements, metering requirements, the detailed connection costs and timing. To prepare the cost estimate, Kitchener-Wilmot Hydro Inc. requires a site visit with the customer.

6b) For Mid-Sized generators

Kitchener-Wilmot Hydro Inc. issues a draft Cost Estimate Study Agreement along with the CIA report if the connection is acceptable. If the Customer feels that the CIA result is manageable, the Customer returns the signed Cost Estimate Study Agreement with the payment as required by Kitchener-Wilmot Hydro Inc.

Within 60 days from receipt of signed Cost Estimate Study Agreement and payment, Kitchener-Wilmot Hydro Inc. performs the connection cost estimate and returns the Customer a draft Connection Cost Agreement (CCA) to outline the system modification/upgrade requirements, metering requirements, transfer trip and telemetry requirements, the detailed connection costs and timing.

7) Decision to Proceed

If the Customer is satisfied with the CCA, the Customer agrees and signs the CCA and returns it to Kitchener-Wilmot Hydro Inc. with the required payment within the valid timeframe.

If the Customer feels that the CCA is not fair and reasonable, the Customer should request Kitchener-Wilmot Hydro Inc. review using the dispute resolution process as defined in Kitchener-Wilmot Hydro Inc.'s Conditions of Service.

8) Implementation and Design Review

The Customer works close with Kitchener-Wilmot Hydro Inc. and ESA and any other related organizations from which work, inspections, approvals or licenses are required to prevent delays.

The Customer submits all detailed engineering drawings and commissioning plan to Kitchener-Wilmot Hydro Inc. as requested in the CCA. In the meantime, the Customer submits all detailed plans to ESA for Plan Approval process as requested by ESA.

Kitchener-Wilmot Hydro Inc. performs the design review on the distribution system level and the transformer station level to ensure the detailed engineering of the generation facility has no adverse impact on Kitchener-Wilmot Hydro Inc.'s system. Kitchener-Wilmot Hydro Inc. will inform the Customer the review result **within 60 days** from receipt of all required engineering documents.

*NOTE: The detailed engineering drawings must be submitted to Kitchener-Wilmot Hydro Inc. at least **6 months** before the proposed Commercial Operation Date. All technical submissions must be signed and sealed by a licensed Ontario Professional Engineer (P.Eng).*
NOTE: It is recommended that the design review be completed before equipment purchase if possible.

The Customer constructs generation facility and applies for ESA inspection. All requirements from the design review and ESA Plan Approval Process must be met.

Kitchener-Wilmot Hydro Inc. implements the system upgrades, metering installation and service connection as outlined in the CCA.

9) Connection Agreement

Kitchener-Wilmot Hydro Inc. and the Customer mutually agree and sign a Connection Agreement (CA). The CA must be signed by the Customer **at least 15 days before** the proposed *Commercial Operation Date.*

10) New Account Application and Metering Preparation

The customer shall complete, sign and return a copy of New Account Application (Appendix E2: DG05) and Direct Deposit Form (Appendix G2: DG07) to Kitchener- Wilmot Hydro Inc. **at least 15 days before** the generation meter can be installed (New Account Application is not required for Net Metering Customer). A valid ID, like driver's license is required for settlement purpose.

If the distributed generation service entrance is larger than 200amps, the customer shall contact Kitchener-Wilmot Hydro Inc. Metering Department at 519-745-4771 x6270 to schedule the instrument transformer wiring. The customer's electrician shall come to Kitchener-Wilmot Hydro Inc. Metering Workshop to drop off the backplate of the metering cabinet. Kitchener-Wilmot Hydro Inc. Metering Technician will mount the current transformers on the backplate. The customer's electrician shall come to Kitchener-Wilmot Hydro Inc. Metering workshop to pick up the backplate and install the metering cabinet on site. Kitchener-Wilmot Hydro Inc. metering technician will wire the instrument transformers to the meter base.

If additional disconnect/reconnect work is required for the generation facility tie-in, the customer's on-site electrician shall contact Kitchener-Wilmot Hydro Inc. Service Coordinator at 519-745-4771 x6199 and schedule the work **at least 10 business days** before the proposed disconnect/reconnect work.

All metering preparation work must be done before the meter installation can be scheduled with Kitchener-Wilmot Hydro Inc. Service Coordinator.

11) Meter Installation

Before scheduling the meter connection, the customer shall ensure all following commitments fulfilled:

- Generation facility fully installed
- Payment to Kitchener-Wilmot Hydro Inc. clear
- Connection Agreement Signed
- New Generation Account Application signed and submitted
- Direct Deposit Form signed and submitted
- the ESA inspection completed and Connection Authorization issued by the ESA

The customer shall contact Kitchener-Wilmot Hydro Inc. Service Coordinator at 519-7454771 x6199 after the ESA completes the inspection and faxes Kitchener-Wilmot Hydro Inc. an Authorization to Connect. Kitchener-Wilmot Hydro Inc. requires **at least 5 business day notice** to schedule the meter installation when all above customer commitments have been satisfied. The customer's electrician must be on site when the meter is installed.

Kitchener-Wilmot Hydro Inc. metering technician installs the meter on site.

12) On-line Commissioning and Verification

Once the meter is installed, the Customer can perform the commissioning and testing on the generation facility, including off-line test and on-line test.

During the commissioning, the Customer is responsible for completing a Kitchener- Wilmot Hydro Inc. form of 'Confirmation of Verification Evidence Report" (COVER) in Appendix G2 and submitting it to Kitchener-Wilmot Hydro Inc. The results from COVER should provide complete assurance that the generation facility has been proven to function properly and be in compliance with Kitchener-Wilmot Hydro Inc.'s design review.

Note: The form of COVER must be signed and sealed by a licensed Ontario Professional Engineer (P.Eng).

Kitchener-Wilmot Hydro Inc. may request site witnessing and verification during commissioning if Kitchener-Wilmot Hydro Inc. feels necessary.

13) Final Connection

The Customer completes the commissioning and submits Kitchener-Wilmot Hydro Inc. the complete and signed COVER form **at least 15 days** before the proposed *Commercial Operation Date*.

The Customer contacts ESA for final inspection and receives a Formal Authorization to Connect.

Kitchener-Wilmot Hydro Inc. will issue the connection approval subject to the following:

- The signed and approved COVER form received and reviewed

Kitchener-Wilmot Hydro Inc. starts recording the generation once the meter is installed.

For generators under FIT program, the Customer also needs to ensure all IESO obligations are met in order to receive the payment for generation.

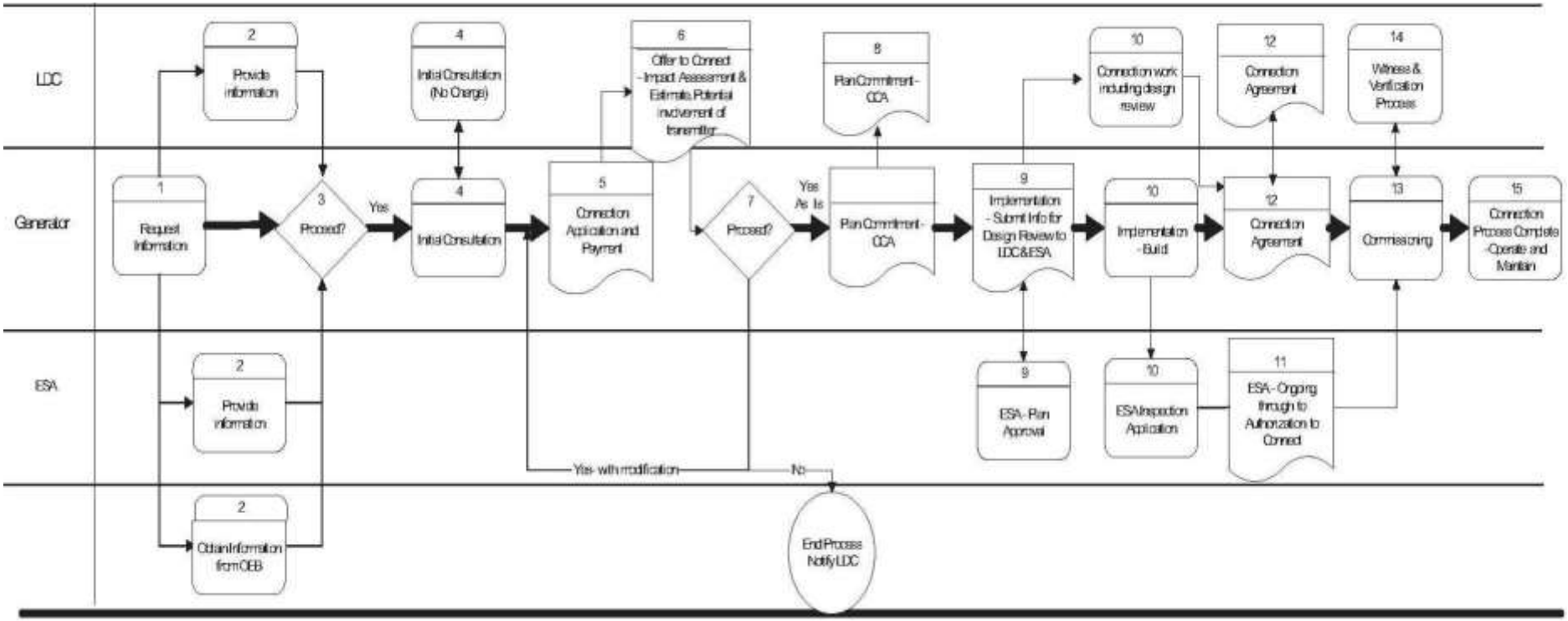

Fig 1: Connection Process for Small and Mid-Sized Generation Facility (>10kW, ≤10MW) (Courtesy of OEB)

Appendix A2:

Technical Requirements for Distributed Generators > 10 kW to be Connected to Kitchener-Wilmot Hydro Inc.'s Distribution System

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A. INTRODUCTION

This document outlines the technical requirements for distributed generators to be connected to Kitchener-Wilmot Hydro Inc.'s distribution system. It is intended to guide the DG proponent in connecting distributed generators into Kitchener-Wilmot Hydro Inc.'s distribution system. The purpose of this document is to ensure public safety, protect Kitchener-Wilmot Hydro Inc.'s system and employees and maintain reliable service to all Kitchener-Wilmot Hydro Inc.'s customers while connecting the distributed generators. This document doesn't contain all details in designing and protecting the generation system. The DG proponent shall ensure the safety of its own facilities.

This document applies only to the distributed generation facilities larger than 10kW.
The micro generation facility (≤10KW) is subject to a simplified connection process with simpler connection requirements, please check Kitchener-Wilmot Hydro Inc.'s Document No. KWHDG-1.

This document is for guidance purpose only. Kitchener-Wilmot Hydro Inc. does not accept any responsibility or liability for any of the information provided in this document. And meeting these requirements does not necessarily guarantee an acceptable design. Kitchener-Wilmot Hydro Inc. reserves the rights to amend these requirements at any time.

B. REFERENCE

OEB	Ontario Energy Board – Distribution System Code (DSC)
Ontario Regulation	Ontario Electric Safety Code (OESC)
CSA C22.3 No.9	Interconnection of Distributed Resources and Electricity Supply Systems
IEEE 1547	IEEE Standard for Interconnecting Distributed Resources with Electric Power Systems
IEEE 1547.1	Standard Conformance Test Procedures for Equipment Interconnecting Distributed Resources with Electric Power Systems
IEEE 1547.2	IEEE Application Guide for IEEE Std 1547, Interconnecting Distributed Resources with Electric Power Systems
IEEE 1547.3	IEEE Guide for Monitoring, Information Exchange, and Control of Distributed Resources Interconnected with Electric Power Systems
CSA CAN3-C235	Preferred Voltage Levels for AC Systems, 0 to 50,000kV
Hydro One Networks	Distributed Generation Technical Interconnection Requirements
NPCC D12	Northeast Power Coordinating Council, Regional Reliability Reference Directory #12 – Under frequency Load Shedding Program Requirements
IEEE 1453	IEEE Recommended Practice for Measurement and Limits of Voltage Fluctuations and Associated Light Flicker on AC Power Systems
IEEE C37.119	IEEE Guide for Breaker Failure Protection of Power Circuit Breakers

C. TECHNICAL REQUIREMENTS FOR DG INTERCONNECTION

In line with the Appendix F2 of the Ontario Distribution System Code, IEEE 1547 and CSA No.C22.3 No.9, Kitchener-Wilmot Hydro Inc. will review and ensure the DG interconnection requirements at the following 3 stages before final connection.

- Stage of Preliminary Review
- Stage of Connection Impact Assessment
- Stage of Design Review

Additional power quality requirements apply after the DG is in service.

1. STAGE OF PRELIMINARY REVIEW

In the very early stage when a DG proponent is considering the site selection and planning, Kitchener- Wilmot Hydro Inc. will conduct a simple project review based on the limited parameters provided by the DG proponent and high-level distribution system information. The purpose of the preliminary review is to quickly screen some apparently infeasible projects by using some highly simplified rules. The preliminary review does not guarantee the viability of the proposed DG project.

- ***Document Submission Requirements for Preliminary Review***

  Before meeting with Kitchener-Wilmot Hydro Inc. for preliminary review, the DG proponent shall submit the following documents:

  - A copy of completed application form in Appendix C2: DG02.
  - A copy of high level single line diagram of the proposed facility if available;
  - A copy of site plan showing the generation facility and the proposed Point of Connection if available;

- ***Preliminary Review Criteria***

  Kitchener-Wilmot Hydro Inc. is committed to working with the DG proponent on the preliminary review. All existing connected DG projects and all committed DG projects will be included into consideration following the criteria in Table 1. It is advised that these capacity limits might be superseded under special circumstances, and a special engineering review by Kitchener-Wilmot Hydro Inc. will be required before approval. The preliminary review process may be amended to be in line with the directions from Ontario Energy Board and Independent Electricity System Operator when required.

  Kitchener-Wilmot Hydro Inc.'s transmission and distribution system information is available in Appendix B2 to assist the DG proponent developing their plan. The service maps showing K-W Hydro Inc.'s transformer stations and distribution systems and a nearly up-to-date table showing the system capacity available to the potential renewable generation are listed on Kitchener-Wilmot Hydro Inc.'s website at: http://www.kwhydro.ca/generation_connection.asp

Table 1: Preliminary Review Criteria by Kitchener-Wilmot Hydro

<table>
<tr><th>Criteria</th><th>Reference</th></tr>
<tr><td>

1.1 Capacity Limits – Transformer/Distribution Station

Subject to the thermal load limit of other station equipment Kitchener-Wilmot Hydro Inc. will limit DG connected to each station following the criteria:

<table>
<tr><th>Nominal Station Secondary Voltage (PP/PG)</th><th>Max. Allowable Aggregate Capacity on Station Transformer</th><th>Max. Allowable Aggregate Capacity on Station Bus</th></tr>
<tr><td>27.6/16 kV</td><td rowspan="3">60% nameplate rating of station transformer for normal 2-winding station transformer. No reverse flow is allowed for dual secondary winding station transformer due to overheating.</td><td rowspan="3">60% nameplate rating of station transformer + min station bus load for normal 2-winding transformer;

Min bus load for dual secondary winding transformer</td></tr>
<tr><td>13.8/8 kV</td></tr>
<tr><td>8.32/4.8 kV</td></tr>
</table>

</td><td>Kitchener-Wilmot Hydro Inc. requirements</td></tr>
<tr><td>

1.2 Capacity Limits – Distribution Feeder

Subject to the thermal loading limit of other distribution equipment, Kitchener-Wilmot Hydro Inc. will limit DG connected to each feeder following the criteria:

<table>
<tr><th>Nominal Feeder Voltage (PP/PG)</th><th>Feeder Max. Allowable 1-Phase Unit Capacity</th><th>Feeder Max. Allowable 3-Phase Unit Capacity</th><th>Feeder Max. Allowable Aggregate Capacity</th></tr>
<tr><td>27.6/16 kV</td><td>50kW</td><td>10MW</td><td>10MW</td></tr>
<tr><td>13.8/8 kV</td><td>50kW</td><td>5MW</td><td>5MW</td></tr>
<tr><td>8.32/4.8 kV</td><td>50kW</td><td>0.5MW</td><td>1.5MW</td></tr>
</table>

</td><td>Kitchener-Wilmot Hydro Inc. requirements</td></tr>
</table>

2. STAGE OF CONNECTION IMPACT ASSESSMENT (CIA)

After DG proponent decides the site location and develops a project plan, Kitchener-Wilmot Hydro Inc. will conduct the connection impact assessment to determine what adverse impact the proposed DG may have on Kitchener-Wilmot Hydro Inc.'s Distribution System with regard to voltage fluctuation, fault contribution, equipment thermal loading etc. The purpose of the CIA is to determine the viability of the proposed DG project and all necessary upgrades at both Kitchener-Wilmot Hydro Inc.'s System and the DG site to mitigate the adverse impact on Kitchener-Wilmot Hydro Inc.'s System. The connection impact assessment does not consider the system impact on the proposed DG equipment.

- ***Document Submission Requirements for CIA***

  To conduct the Connection Impact Assessment, the DG proponent shall submit Kitchener-Wilmot Hydro Inc., the following:

  - A copy of completed Application Form in Appendix D2: Form DG03.
  - 2 copies of high-level single line diagrams showing the line conductor sizes and distance from the generation interface transformer to the Kitchener-Wilmot Hydro Inc.'s distribution system;
  - 2 copies of site plan showing the generation facility, line routing, isolating device and the proposed Point of Connection;
  - 2 copies of technical description of the operating philosophy of the electrical equipment, protection and control philosophy of the generation system and interconnection device.

  The application form and all above technical documents shall be signed and sealed by a licensed Ontario Professional Engineer.

  Kitchener-Wilmot Hydro Inc. may have additional requirements for CIA and will clarify when signing the Connection Impact Study Agreement.

- ***Impact Assessment Criteria***

  Kitchener-Wilmot Hydro Inc. will conduct the connection impact assessment using the criteria in Table 2. All existing connected DG projects and all committed DG projects with signed Connection Cost Agreement will be considered in the impact assessment.

Table 2: Connection Impact Assessment Criteria by Kitchener-Wilmot Hydro Inc.

Criteria	Reference
2.1 Isolation at the Point of Connection The DG proponent shall provide a means of isolation at the Point of Connection in compliance with the OESC. The isolation device shall be readily accessible by Kitchener-Wilmot Hydro Inc. staff, lockable, and with visible break. The Point of Connection, normally at the HV tap of the connected distribution feeder, will be clarified by Kitchener-Wilmot Hydro Inc. at early stage.	DSC Appendix F.2 Sec.1 OESC rule 84-026 IEEE 1547 Item 4.1.7
2.2 Interconnection Grounding and HV Interrupting Device The generator facilities and the associated interconnection transformer(s) shall be grounded as per manufacturer's recommendation and the OESC. The interconnection grounding shall not cause overvoltage or fault current exceeding the rating of Kitchener-Wilmot Hydro Inc.'s distribution equipment. For wind generation facility, the grounding of wind towers shall not connect to the distribution system neutral. The table below lists the preferred connection for the interconnection transformer and the suggested High Voltage Interrupting Device. Kitchener-Wilmot Hydro Inc. will review each interconnection individually to accommodate the local system restraints and the DG manufacturer's	DSC Appendix F.2 Sec. 2 OESC rule 84-026 CSA C22.3 No.9 rule 7.3.2, 7.4.9 IEEE 1547 Item 4.1.2 Kitchener-Wilmot Hydro Inc.'s requirement

Criteria	Reference
recommendations. **Nominal Feeder Voltage** / **Proposed Generator Size** / **Preferred Interconnection Transformer (HV-LV)** / **Suggested HV Interrupting Device** 27.6/16kV (4 wire) 13.8kV/8kV (4 wire): >1MW — Yg-D — HVI (breaker or switcher) + LV Breaker 27.6/16kV (4 wire) 13.8kV/8kV (4 wire): >200kW, ≤1MW — Yg-D or Yg-Yg (Δ tertiary may be required); — HVI (breaker or switcher) or LV breaker 27.6/16kV (4 wire) 13.8kV/8kV (4 wire): ≤200kW — Yg-Yg — Fused load break switch 8.32 kV (4-wire): >200kW, ≤500kW — Yg-D or Yg-Yg (Δ tertiary may be required); — HVI (breaker or switcher) or LV breaker 8.32 kV (4-wire): ≤200kW — Yg-Yg — Fused load break switch	
2.3 Steady State Voltage The DG shall operate satisfactorily within the extreme voltage level variation limits of ± 6% of the nominal voltage at the Point of Connection. The generation facility shall not intently regulate the voltage at the Point of Connection. During normal operation and wherever possible, the generator shall be loaded or unloaded gradually to allow adequate time for regulating device to respond so as to avoid unnecessary voltage fluctuation.	DSC Appendix F.2 Sec. 3, 3.2 CSACAN3-C235 Item 6.1 IEEE 1547 Item 4.1.1
2.4 Voltage Fluctuation Operating the DG shall not cause a voltage fluctuation of more than ± 5% at the Point of Connection for any normal steady state situations including: with or without the DG generating power under minimum and maximum load conditions.	DSC Appendix F.2 Sec. 3.1, 3.2 CSA C22.3 No 9 rule 7.4.14.1
2.5 Synchronization Paralleling or sudden tripping the DG shall not cause a voltage fluctuation of more that ± 5% at the Point of Connection. For synchronized generators, the interconnection with the distribution system may occur only within the synchronization limits below (from CSA C22.3 No. 9): **Total DG system** / **Frequency Difference** / **Voltage Difference** / **Phase Angle** 0-500 kVA — 0.3 Hz — 10% — 20º >500-1500 kVA — 0.2 Hz — 5% — 15º >1500 kVA — 0.1 Hz — 3% — 10º For an induction generator or an inverter-based DG, the synchronization shall not create a voltage drop greater than 5% or the voltage flicker. And the induction generator should be brought close to synchronous speed prior to interconnection. For interconnection to Kitchener-Wilmot Hydro Inc.'s distribution system, the paralleling device shall be capable of withstanding 220% of the interconnection system rated voltage.	DSC Appendix F.@ Sec. 3.2, 10.6 OESC rule 84-006 CSA C22.3 No. 9 rule 7.4.14, 7.4.2 IEEE 1547 Item 4.1.3, 5.1.2
2.6 Voltage Unbalance Operation of the generation facility shall not cause objectionable voltage unbalance by more than 3% and current unbalance by 10% at the Point of Connection.	DSC Appendix F.2 Sec. 3.2 CSA C22.3 No. 9 rule 7.2.5
2.7 Power Factor The generation facility shall be capable of operating in the preferred power factor range of 0.9 lagging and 0.95 leading unless otherwise requested or approved by Kitchener-Wilmot Hydro Inc. The generation facility of 30 kW and less is not required to be capable of adjusting the power factor. Where Kitchener-Wilmot Hydro Inc. determines that the operation of a generation facility will impact the	DSC Appendix F.2 Sec. 4 CSA C22.3 No. 9 rule 7.2.4.2

Criteria	Reference
distribution system voltage levels at the Point of Connection, Kitchener-Wilmot Hydro Inc. may require the DG proponent to limit power factor range or power output of the generation facility or take other compensatory measures (e.g., field-settable fixed and dynamic power factor correction techniques).	
2.8 Equipment Ratings and Requirements The generation facility interface equipment shall be compatible with Kitchener-Wilmot Hydro Inc. equipment ratings and the incorporation of the added generation facility must not result in any distribution system equipment operating beyond its ratings. Kitchener-Wilmot Hydro Inc. will review the ratings of the impacted equipment in the distribution system and transformer stations under all operating conditions including but not limited to the following: - Nominal equipment thermal loading – including feeder conductor/cable, disconnect switch, fuse, station breaker/recloser and transformers etc. - DG fault contribution impact on the equipment rating – including disconnect switch, fuse, station breaker/recloser etc. at phase or ground fault. - Voltage regulating and metering device – if the generation facility causes reversed power flow at feeder level or station level, the feeder/station voltage regulation and metering device shall be capable of handling bi-directional power flow. - DG fault contribution impact on the feeder protection equipment – the DG fault contribution may reduce the fault current through the station breaker and cause the feeder protection malfunctioned. The feeder relay setting adjustment or relay replacement may be required. Kitchener-Wilmot Hydro Inc. will determine all necessary system upgrades required to accommodate the proposed generation facility. The detailed protection coordination and relay setting will be reviewed and approved at Design Review stage.	DSC Appendix F.2 Sec. 5 CSA C22.3 No.9 rule 7.4.2
2.9 Anti-Islanding and Transfer Trip Requirement The generation facility shall automatically disconnect from Kitchener-Wilmot Hydro Inc.'s System upon the loss of utility supply voltage to prevent equipment caused by out-of-phase reclosing. No unplanned or planned islanding is allowed by Kitchener-Wilmot Hydro Inc.. The necessity of anti-islanding device will be determined at this stage. Details be verified and approved at Design Review stage. Kitchener-Wilmot Hydro Inc. use "50%" rule for the installation of DG anti-equipment. If the aggregate DG nameplate rating on the feeder is less than 50% the minimum load on a certain feeder, the islanding situation is supposed not sustain and no special anti-islanding equipment is required. Otherwise, all facilities on this feeder will be required to install anti-islanding protection, like transfer trip scheme. For generation facility ≥ 1MW, a transfer trip scheme from the upstream breaker to the generation facility is required. For generation facility ≤ 500kW, passive anti-islanding protections, like Rate Change of Frequency over Power, Rate of Change of Frequency over Power, Jump methodology may be considered upon Kitchener-Wilmot Hydro Inc.'s approval.	DSC Appendix F.2 Sec. 6.1.2, 6.1.3 CSA C22.3 No.9 rule 7.4.8, 7.4.12 IEEE 1547 Item 4.4.1
2.10 Revenue Metering Kitchener-Wilmot Hydro Inc. will specify the metering requirement and instrument transformer requirements. In general, all metering device shall be Measurement Canada Approved. For generation facility larger than 50kW, 4 Quadrant meter is required. For generation facility larger than 5MW, primary metering is required. The DG proponent shall incorporate the metering requirements into the system design.	DSC Appendix F.2 Sec. 7

<table>
<tr><th>Criteria</th><th>Reference</th></tr>
<tr><td>2.11 Feeder Relay Directioning
The fault on the adjacent feeder may cause sympathetic tripping of the overcurrent protection on the feeder with DG connected due to the fault contribution from the DG.
Kitchener-Wilmot Hydro Inc. will conduct the fault analysis and determine if the DG feeder relay shall be replaced with directional overcurrent relay or distance relay to detect the reverse fault current situation.</td><td>DSC Appendix F.2 Sec. 8</td></tr>
<tr><td>2.12 Monitoring and Information Exchange
The generation facility with aggregate capacity larger than 10 kW shall have provision for monitoring.

All generation facilities larger than 10 kW but less than or equal to 250 kW shall have the provision for monitoring the disconnecting device at the Point of Connection. Provisions for other real-time monitoring signals may be required and shall be determined by Kitchener-Wilmot Hydro Inc.

For all generation facilities larger than 250 kW, Kitchener-Wilmot Hydro Inc. requires real-time monitoring information at Kitchener-Wilmot Hydro Inc. Control Center as summarized in the table below. The Generator shall install a communication terminal (could be SCADA master station, RTU, advanced metering, IED or equivalent) that is capable of communicating with Kitchener-Wilmot Hydro Inc. Control Center using serial DNP 3.0 protocol. The Generator is responsible to provide all the required hardware and software and make arrangements to bring all required signals to the Kitchener-Wilmot Hydro Inc. Control Center, including the communication circuit (typically a Bell circuit) between the generation facility and Kitchener-Wilmot Hydro Inc. SCADA Master Station. Other real-time monitoring signals may be required and shall be determined by Kitchener-Wilmot Hydro Inc.

If Kitchener-Wilmot Hydro Inc. requires additional monitoring information for a certain generation facility, Kitchener-Wilmot Hydro Inc. will specify the requirements in the Connection Impact Assessment Report.

<table>
<tr><th>Remote Monitoring Points</th><th>>10kW ≤250kW</th><th>>250kW</th></tr>
<tr><td>Analog: total MW and MVar</td><td>No</td><td>Yes</td></tr>
<tr><td>Analog: DG 3-phase voltage</td><td>No</td><td>Yes</td></tr>
<tr><td>Analog: DG 3-phase current</td><td>No</td><td>Yes</td></tr>
<tr><td>Status: HVI/LVI Open/Close</td><td>Yes (provision only)</td><td>Yes</td></tr>
<tr><td>Status: Transfer Trip Received</td><td>No</td><td>Yes (if TT required)</td></tr>
<tr><td>Alarm: transfer trip circuit failure</td><td>No</td><td>Yes (if TT required)</td></tr>
<tr><td>Alarm: DG interface protection failure</td><td>No</td><td>Yes</td></tr>
</table>
</td><td>DSC Appendix F.2 Sec. 9
OESC Rule 2-022
IEEE 1547 Item 4.1.6
IEEE 1547.3
CSA C22.3 No.9 rule 7.4.16</td></tr>
</table>

3. STAGE OF DESIGN REVIEW

After DG proponent accepts the Connection Impact Assessment Report and reaches the Connection Cost Agreement with Kitchener-Wilmot Hydro Inc., Kitchener-Wilmot Hydro Inc. will conduct a detailed engineering Design Review to verify the suitability of the DG installation. The purpose of the Design Review is to confirm that all technical requirements in the CIA are met and protection coordination between the DG interface

protection and the distribution feeder protection is sufficient. Kitchener-Wilmot Hydro Inc. will also review the DG commissioning plan at this stage to ensure the testing requirements. Kitchener-Wilmot Hydro Inc. may advise more technical requirements to supplement the information provided in the CIA.

- ***Document Submission Requirements for Design Review***

  After signing the Connection Cost Agreement, the DG proponent shall submit Kitchener-Wilmot Hydro Inc. two (2) copies of the following documents for design review:

  - Single-line diagrams showing ratings of all electrical equipment, such as disconnect switches, bushing potential devices, CVTs, power transformers, grounding transformers, grounding resistors, breakers, etc. The example of single line drawing is shown in Fig. 1.
  - GPR Study and associated station ground design.
  - DC station service schematics showing ratings of all electrical equipment such as batteries, chargers, etc.
  - Switchgear fault ratings
  - HV surge arrestor specification
  - Transformer protection, AC and DC wiring diagrams
  - Disconnect switch or HV breaker AC and DC wiring diagrams
  - LV breaker (transformer & bus tie breakers) AC and DC wiring diagrams
  - Breaker failure schematics (HV breaker, LV breaker)
  - HV equipment operating and protection philosophy.
  - Power transformer and generator nameplate ratings
  - Relay settings including relay logic diagrams, coordination studies and fault calculations.
  - Commissioning Procedure including the partially completed COVER form following the COVER instruction in Appendix F2: Form DG06.
  - Preliminary and final generator data, including excitation system performance, automatic voltage regulator (AVR), power factor regulator, power system stabilizer, static exciter and speed governor to ensure compliance with all applicable reliability standards required under the IESO Market Rules.
  - Generator absorption/deliverance of VARs from/to Kitchener-Wilmot Hydro Inc.'s distribution system to maintain the voltage to a given set point.

  All technical documents for submission shall be signed and sealed by a licensed Ontario Professional Engineer.

  Kitchener-Wilmot Hydro Inc. may have additional requirements and will clarify when signing the Connection Cost Agreement.

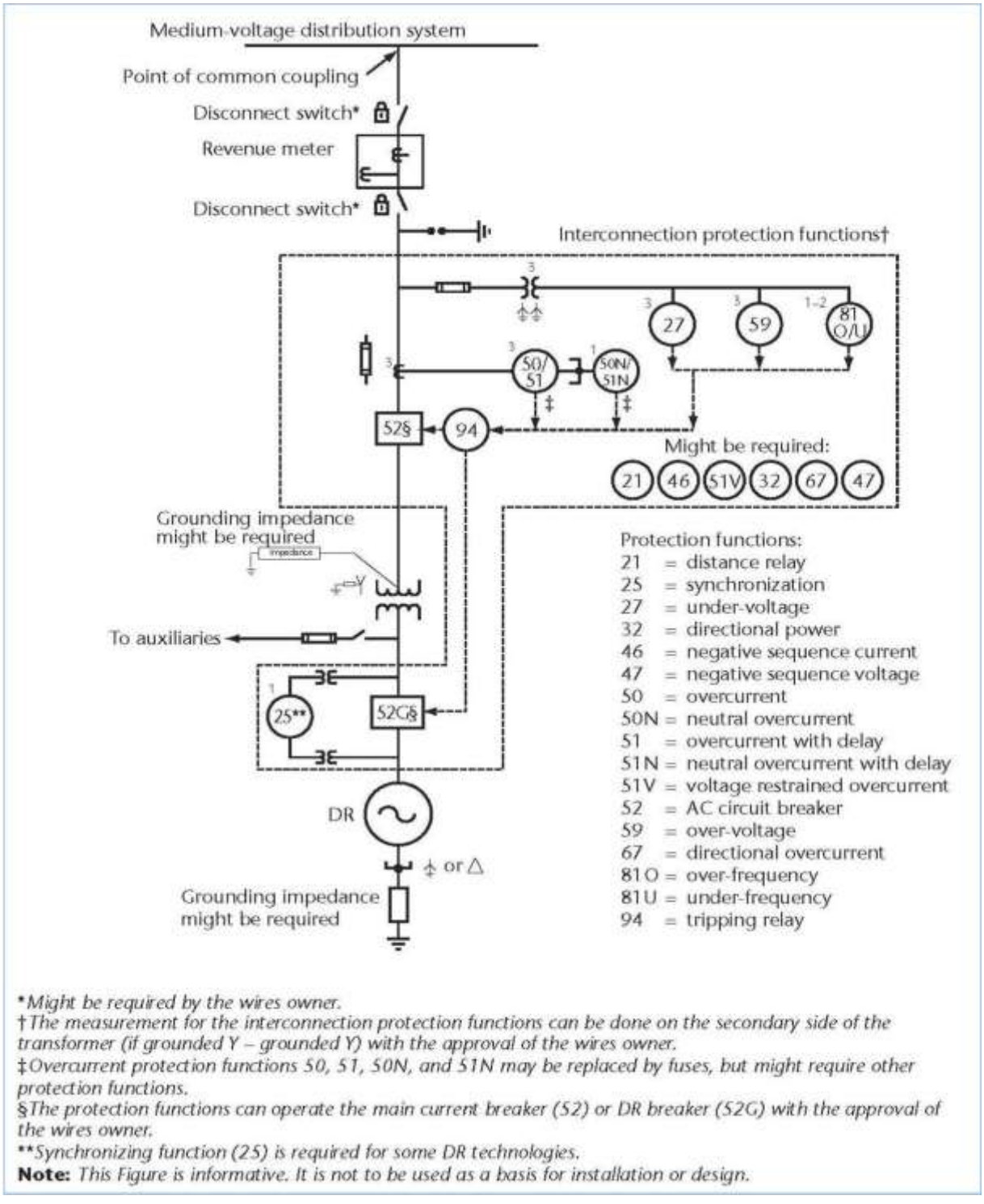
- ***Design Review Criteria***

  Kitchener-Wilmot Hydro Inc. will review the detailed DG protection/control system design and relay settings under various normal operating or faulty conditions and ensure the DG protection system can automatically isolate the generation facility from the distribution system when required.

  In general, the following interface protections will be reviewed by Kitchener-Wilmot Hydro Inc. following the Criteria in Table 3.

ANSI No.	**Description**
25	Synchronization check
27/59	Under/Over voltage (3 phase)
81U/O	Under/Over frequency (1 phase)
50/51	Instantaneous/Timed overcurrent
67	Directional overcurrent
21	Distance (if required)
85	Transfer trip or other anti-islanding device (if required)
DGEO	DG end open (if required)

87	Transformer differential (if equipped)
89	DG isolation device
94	Tripping relay
52BF	Breaker failure

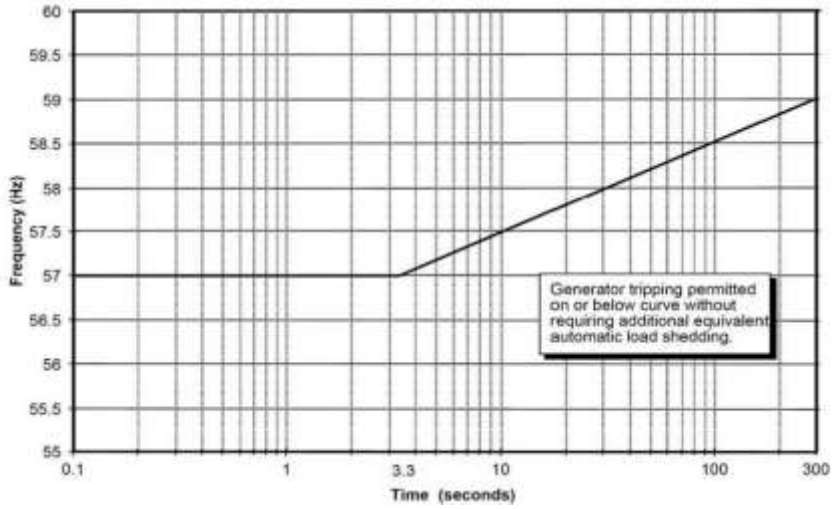


Might be required by the wires owner.
†The measurement for the interconnection protection functions can be done on the secondary side of the transformer (if grounded Y – grounded Y) with the approval of the wires owner.
‡Overcurrent protection functions 50, 51, 50N, and 51N may be replaced by fuses, but might require other protection functions.
§The protection functions can operate the main current breaker (52) or DR breaker (52G) with the approval of the wires owner.
***Synchronizing function (25) is required for some DR technologies.*
Note: *This Figure is informative. It is not to be used as a basis for installation or design.*

Figure 1: Typical single line diagram (Copy of CSA C22.3 No.9 Figure A.3)

Table 3: Design Review Criteria by Kitchener-Wilmot Hydro Inc.

<table>
<tr><th>Criteria</th><th>Reference</th></tr>
<tr><td>3.1 Isolation Device Verification
Kitchener-Wilmot Hydro Inc. will review the isolation device design and ensure the requirements of Criteria 2.1 have been met.</td><td>DSC Appendix F.2 Sec. 1
OESC rule 84-026
IEEE 1547 Item 5.3.2</td></tr>
<tr><td>3.2 Grounding Integration Verification
Kitchener-Wilmot Hydro Inc. will review the DG grounding system design and ensure the requirements of Criteria 2.2 have been met.</td><td>OESC rule 84-026
IEEE 1547 Item 5.3.1</td></tr>
<tr><td>3.3 DG Protection Design Verification
Kitchener-Wilmot Hydro Inc. will review the DG protection/control system design under various faulty conditions and ensure the DG protection system can automatically isolate the generation facility from the distribution system at
- internal faults within the generation facility; and
- external phase / ground faults within the distribution system
All protection devices at the generation facility shall be utility grade. The protection selectivity and sensitivity shall remain over the range of maximum and minimum system fault currents with fault contribution from the generation facility. Relay setting adjustment / relay replacement at both the generation facility and Kitchener-Wilmot Hydro Inc.’s station may be recommended.</td><td>OESC rule 84-014
IEEE 1547 Item 5.3.4
CSA C22.3 No.9 Item 7.4.4</td></tr>
<tr><td>3.4 Reclosing Coordination Verification
Kitchener-Wilmot Hydro Inc. will review the DG disconnection time at faults and ensure the generation facility ceases to energize prior to the auto-reclosure of Kitchener-Wilmot Hydro Inc.’s distribution feeder breaker / recloser.
Typically, the reclosing happens 2 seconds after the feeder breaker trips in 27.6kV / 13.8kV system or 0.67 seconds after the recloser trips in 8.3kV system.</td><td>DSC Appendix F.2 Sec. 6
IEEE 1547 Item 5.3.4</td></tr>
<tr><td>3.5 Over/Under Voltage Protection Verification
Kitchener-Wilmot Hydro Inc. will review the settings of over/under voltage protection. The settings shall follow the requirements in IEEE 1547, as listed below:
<table>
<tr><th>Voltage range (% of base voltage *)</th><th>Clearing time(s)**</th></tr>
<tr><td>V< 50</td><td>0.16</td></tr>
<tr><td>50 ≤ V< 88</td><td>2.00</td></tr>
<tr><td>110 < V < 120</td><td>1.00</td></tr>
<tr><td>V ≥120</td><td>0.16</td></tr>
</table>
*Base voltages are the nominal system voltages stated in ANSI C84.1-1995.
** DR ≤ 30 kW, maximum clearing times; DR > 30kW, default clearing times.</td><td>DSC Appendix F.2 Sec. 6.5
IEEE 1547 Item 4.2.3
CSA C22.3 No.9 Item 7.4.7</td></tr>
<tr><td>3.6 Over/Under Frequency Protection Verification
Kitchener-Wilmot Hydro Inc. will review the settings of over/under frequency protection. The settings shall follow the requirements in IEEE 1547, as listed below:
<table>
<tr><th>DG size</th><th>Frequency range (Hz)</th><th>Clearing time(s)*</th></tr>
<tr><td rowspan="2">≤ 30 kW</td><td>> 60.5</td><td>0.16</td></tr>
<tr><td>< 59.3</td><td>0.16</td></tr>
<tr><td rowspan="3">> 30 kW</td><td>> 60.5</td><td>0.16</td></tr>
<tr><td>< {59.8 – 57.0} (adjustable set point)</td><td>Adjustable 0.16 to 300</td></tr>
<tr><td>< 57.0</td><td>0.16</td></tr>
</table>
*DG ≤ 30 kW, maximum clearing times; DR > 30 kW, default clearing times.
The low frequency settings of the DG facility larger than 250kW shall also meet the low-frequency tripping requirements set in Northeast Power Coordinating</td><td>DSC Appendix F.2 Sec. 6.5
IEEE 1547 Item 4.2.4
CSA C22.3 No.9 Item 7.4.6</td></tr>
</table>

Criteria	Reference
Council (NPCC), "Regional Reliability Reference Directory #12" – Under frequency Load Shedding Program Requirements, as shown in the graph below:  	
3.7 Reconnection Verification Kitchener-Wilmot Hydro Inc. will review the automatic reconnection settings of DG facility. After a disturbance on the distribution system, no reconnection shall take place until the distribution system voltage and frequency are restored within the normal limits, i.e., voltage within ±6% at the Point of Connection and frequency between 59.3 Hz and 60.5 Hz. The generator facility shall include an adjustable delay or a fixed delay of 5 minutes that may delay the reconnection for up to 5 minutes after the power restoration.	DSC Appendix F.2 Sec. 6 CSA C22.3 No.9 Item 7.4.10, 7.4.11, 7.4.20.3
3.8 Monitoring and Information Exchange Verification Kitchener-Wilmot Hydro Inc. will review the DG design and ensure all monitoring and information exchange requirements in Criteria 2.12 have been incorporated into the system design.	DSC Appendix F.2 Sec. 9 IEEE 1547 Item 5.3.3
3.9 Anti-Islanding Protection Verification Kitchener-Wilmot Hydro Inc. will review the DG anti-islanding design and anti-islanding requirements in Criteria 2.9 have been met.	DSC Appendix F.2 Sec. 6.1.2, 6.1.3 CSA C22.3 No.9 rule 7.4.8, 7.4.12 IEEE 1547 Item 4.4.1
3.10 Protection Failure Scheme Verification Kitchener-Wilmot Hydro Inc. will review the DG protection failure scheme and ensure the failure of the interface protection at the generation facility will not disrupt the distribution system. In case of interconnection protection failure, like breaker trip coils fail, auxiliary power is lost, the protection relay is not functional, the generation facility shall cease to energize the distribution system and isolate from the distribution system without delay. If the transfer trip communication function fails, the generation facility shall cease to energize the distribution system in 5 seconds. The affected generation facility shall not return to normal service until the protection failure is resolved and Kitchener Wilmot Hydro Inc. is informed. The DG proponent shall demonstrate in the protection and control philosophy how to cease to energize the distribution system and isolate	Kitchener-Wilmot Hydro Inc. requirements. IEEE C37.119 CSA C22.3 No.9 rule 7.4.20,

Criteria	Reference
the generation facility from the distribution system in case of the protection failure. For generators larger than 200 kW, breaker failure protection shall be considered for HVI and LVI.	

4. ADDITIONAL POWER QUALITY REQUIREMENTS AFTER DG IN SERVICE

The DG proponent shall also consider the power quality requirements listed in Table 4 when designing and testing the generation facility and ensure that the generation facility does not significantly impact the power quality. Kitchener-Wilmot Hydro Inc. will not be able to evaluate the power quality requirements at the design stage. However, if there are negative impacts on the distribution system or other customers once the generation facility is in service, the DG proponent will be required to disconnect the generation facility until the power quality issue is resolved.

Table 4: Power Quality Criteria by Kitchener-Wilmot Hydro Inc.

<table>
<tr><th>Criteria</th><th>Reference</th></tr>
<tr><td>4.1 Flicker
The generation facility shall not cause objectionable flicker for other customers serving by Kitchener-Wilmot Hydro. Indicative values of planning levels for Pst and Pit in Kitchener-Wilmot Hydro's distribution system are shown below following IEEE 1453 (IEC 61000-4-15). The values of Pst and Pit should be measured by an approved flicker-meter in compliance with IEEE 1453 (IEC 61000-4-15).
<table>
<tr><th></th><th>27.6/13.8/8.32kV</th></tr>
<tr><td>Pst</td><td>0.9</td></tr>
<tr><td>Pit</td><td>0.7</td></tr>
</table>
</td><td>DSC Appendix F.2 Sec. 10.1
IEEE 1547 Item 4.3.2
CSA C22.3 No.9 Item 7.2.2
IEEE 1453 Item 4.2.2</td></tr>
<tr><td>4.2 Harmonics
The generation facility shall not inject harmonic current such that it causes objectionable voltage distortion on the distribution system. The distortion at the Point of Connection caused by generation facility shall not exceed the limits below:
<table>
<tr><td>Individual harmonic order, h</td><td>h < 11</td><td>11 ≤ h < 17</td><td>17 ≤ h < 23</td><td>23 ≤ h < 35</td><td>35 ≤ h</td><td>Total demand distortion (TDD)</td></tr>
<tr><td>Distortion, percentage of current*†</td><td>4.0</td><td>2.0</td><td>1.5</td><td>0.6</td><td>0.3</td><td>5.0</td></tr>
</table>
*The current specified in this Table is the greater of
(a) the distribution system maximum load current integrated demand (15 or 30 min) without the DG;or
(b) the DG unit rated current capacity, transformed to the PCC when a transformer exists between the DG unit and the PCC.
†The maximum distortion values specified in this Table are for odd harmonics. To obtain maximum distortion values for even harmonics, the value in the corresponding h-range shall be multiplied by 25%.
</td><td>DSC Appendix F.2 Sec. 10.2 IEEE 1547 Item 4.3.3
CSA C22.3 No.9 Item 7.2.1</td></tr>
<tr><td>4.3 Limitation of DC Injection
The generation facility shall not inject at the point of DR connection a dc current greater than 0.5% of the generator rated output current.</td><td>DSC Appendix F.2 Sec. 10.3
IEEE 1547 Item 4.3.1
CSA C22.3 No.9 Item 7.2.7</td></tr>
<tr><td>4.4 Resonance and Self Excitation
The generation facility shall avoid the potential effects of resonance, including
(a) Ferro-resonance in the interface transformer;
(b) Sub-synchronous resonance due to the presence of distribution capacitor banks or large rotating machines; and
(c) Harmonic resonance with other customers when capacitors are being added as part of the installation.</td><td>CSA C22.3 No.9 Item 7.2.6</td></tr>
</table>

Criteria	Reference
The DG proponent shall assess and address the potential resonance when designing the DG system. Kitchener-Wilmot Hydro Inc. will provide the relevant system information upon request. When induction generators are used, the DG proponent shall also assess and address the potential for self-excitation.	

D. REQUIREMENTS FOR DG COMMISSIONING AND VERIFICATION

After DG installation is completed, the DG proponent shall perform the commissioning of the DG equipment. The commissioning process shall conform to the requirements of IEEE 1547 Section 5 and IEEE 1547.1 - Standard Conformance Test Procedures for Equipment Interconnecting Distributed Resources with Electric Power Systems. The commissioning plan shall be reviewed and approved by Kitchener-Wilmot Hydro Inc. before the commissioning.

The DG proponent shall apply for ESA electrical inspections and provide Kitchener-Wilmot Hydro Inc. the Authorization to Connect once all requirements are satisfied.

Kitchener-Wilmot Hydro Inc. will require the DG proponent complete the Confirmation of Verification and Evidence Report (COVER) following the COVER instruction in Appendix F2: Form DG06. The purpose of COVER is to verify the DG interface protection and control equipment meets the design requirements and the DG is ready to connect to the grids. Kitchener-Wilmot Hydro Inc. may also request site witnessing and verification during commissioning if Kitchener-Wilmot Hydro Inc. feels necessary.

E. WARNING SIGNS AND DIAGRAMS

The following warning sign shall be posted on the Point of Connection, generator feeder cell and switch room door as a warning of the presence of DG:

WARNING
TWO POWER SOURCE
PARALLEL SYSTEM

A single line, permanent and legible diagram of the switching arrangement shall be placed at the generation facility's control room and the switch room to indicate the position of the DG(s) and isolation points with the interlocking arrangements.

Operating designations will be assigned to the switching equipment of the generation system in the Connection Agreement as required by Kitchener-Wilmot Hydro Inc. The DG 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.

F. MAINTENANCE AND REPORTING REQUIREMENTS

More maintenance and reporting requirements will be clarified in the Connection Agreement:

Appendix B2: Kitchener-Wilmot Hydro's Transmission and Distribution System Information for DG Proponents

Kitchener-Wilmot Hydro Inc. owns 8 transformer stations and 7 Distribution Stations to support its own power distribution system. Kitchener-Wilmot Hydro Inc.'s distribution system delivers power to end users through about 100 distribution feeders from these stations. All distribution feeders in K-W Hydro Inc.'s distribution system are supplied radially from each station. K-W Hydro Inc.'s distribution feeders operate at the following voltages (Phase-to- Phase/Phase-to-Neutral): 27.6/16kV, 13.8/8kV, 8.32/4.8kV.

The 27.6kV feeders and 8.32kV feeders cover the vast rural area in the Township of Wilmot; and the 13.8kV feeders cover the City of Kitchener and a small portion of Wilmot Township (Mannheim area). K-W Hydro Inc. has plans to convert the 8.32kV distribution system into 27.6kV distribution system in the next 15 years.

In general, the maximum total generation capacity of all DG connected to K-W Hydro Inc.'s feeders will be limited to:

- 27.6 kV Feeders: 10MW
- 13.8 kV Feeders: 5MW
- 8.32kV Feeders: 0.5MW

The 27.6 kV feeders also supply all distribution stations. The permissible generation at 27.6kV feeders may be reduced by the cumulative DG on the connected distribution stations with all connected 8.32kV feeders. The above maximum allowable DG capacity presumes 3-phase feeder with sufficient conductor size and load levels to permit the DG. The actual ability of K-W Hydro Inc.'s feeders to accept a specific DG may only be determined through a detailed engineering review at the Connection Impact Assessment stage.

For the system service areas of K-W Hydro Inc. transformer stations and distribution stations and the system capacity available to the potential renewable generation, check Kitchener-Wilmot Hydro Inc.'s website below or contact Kitchener-Wilmot Hydro Inc.

www.kwhydro.ca/transmission_and_distribution_system_information.asp

K-W Hydro Inc.'s distribution system typically operates as multi-grounded system (3 phase 4 wire system). The transformer neutral at the station is either solidly grounded (distribution stations supplying 8.32kV feeders) or effectively grounded through a low reactance at the station (transformer stations supplying 27.6kV and 13.8kV feeders) to limit the ground fault level. The fault levels on K-W Hydro Inc. system vary from location to location and from time to time. The maximum allowable fault levels are listed in Table 1. The actual fault levels at a certain DG site will be provided at the Connection Impact Assessment stage. Both the actual fault levels and the maximum system fault levels shall be considered by the DG proponent.

Table 1: Maximum fault levels on K-W Hydro Inc. Distribution System

Nominal Voltage (kV)	Max. 3-Phase Fault	Max. Single-Phase Ground Fault
27.6/16 kV	17kA	8kA
13.8/8 kV	21kA	8kA
8.32/4.8 kV	4kA	4kA

K-W Hydro Inc. uses voltage regulating devices in the distribution system in order to maintain an adequate voltage profile along the feeders under various operating conditions. These voltage regulating devices include the under-load tap changers at the transformer stations and the voltage regulators or under-load tap changers at the distribution stations.

K-W Hydro Inc. uses automatic reclosing to quickly clear the temporary faults on the distribution feeders in order to quickly restore the power supply. 27.6kV and 13.8kV feeders use single-shot reclosing. 8.32kV feeders use multiple-shot reclosing. The DG proponents shall consider the auto-reclosing while designing the DG facility. The DG protection shall coordinate with the auto-reclosing to prevent DG damage.

Abnormal system conditions and normal system maintenance may cause power interruptions or power outages on K-W Hydro Inc.'s distribution feeders. The DG owner shall consider all possible disturbances while designing the protection system to ensure both the DG and other K-W Hydro Inc.'s customers are protected. The DG shall also consider the DG revenue loss due to the power interruptions or power outages. K-W Hydro Inc. is protected from any claims and demands for loss, damage or injuries to persons or property resulting from the power interruptions and outages.

Appendix C2

Print Form

FORM DG02
Application for Preliminary Review of a request to connect Embedded Generation to Kitchener-Wilmot Hydro Inc.'s Electrical Distribution System

1. Applicant's Contact Information (the party that will be contractually obligated for this generating facility)

Name _____

Company (if any) _____

Mailing Address _____

Phone Number (Main) _____ Ext. _____ Cell _____

Fax Number _____ E-Mail _____

2. Location of Interest for Embedded Generation

Street Address or Closest Location _____

Description _____

3. Generator Information

Generation Type: (Check One) ☐ Synchronous ☐ Induction ☐ Inverter ☐ Other _____

Number of Phases: (Check One) ☐ Single Phase ☐ Three Phase

Primary Energy Source: Renewable: _____ Non Renewable: _____

Type: _____

Do you intend to participate in any IESO programs? ☐ Yes ☐ No

Details: _____

Output capacity: _____ kW

Load displacement? ☐ Yes ☐ No Existing or New Load? _____

4. Other Information that may be relevant or assist in preliminary review. Use additional sheet if more information is required.

Return this form to: Kitchener-Wilmot Hydro Inc., 301 Victoria Street South, Kitchener, ON N2G 4L2. Attn: Shaun Wang, P.Eng., System Planning & Projects Engineer

E-Mail: swang@kwhydro.ca

Phone: (519) 745-4771 ext. 6312

Print Form

Appendix D2

Print Form

FORM DG03
Request for a Connection Impact Assessment Review / Update To Connect Embedded Generation to Kitchener-Wilmot Hydro Inc.'s Electrical Distribution System

Please highlight in yellow any information below that has changed since previously providing the information.

Section 1: General Connection Information

Note: ALL of the information in *"Section 1: General Connection Information"* must be completed in full. Failure to provide complete information may delay the processing of the data.

All technical documents must be signed and sealed by a licensed Ontario Professional Engineer.

Date: _____

1. **Project Name:** _____
2. **Project Dates:** Proposed Start of Construction: _____
   Proposed In-Service: _____
3. **Project Size:** Number of Units _____
   Nameplate Rating of Each Unit _____ kW
   Number of Phases (1 or 3) _____
   Proposed Total Capacity _____ kW
4. **Project Location:** Address: _____
5. **Kitchener-Wilmot Hydro Account Number (if applicable):** _____
6. **Project Information:**

   Project Developer:

   Company / Person: _____
   Contact Person: _____
   Mailing Address: _____
   Telephone Number: _____
   Fax Number: _____
   E-Mail: _____

Project Owner (if not same as Project Developer:

Company / Person: _____

Contact Person: _____

Mailing Address: _____

Telephone Number: _____

Fax Number: _____

E-Mail: _____

Engineering Consultant (Electrical):

Company / Person: _____

Contact Person: _____

Mailing Address: _____

Telephone Number: _____

Fax Number: _____

E-Mail: _____

7. Project Type:

☐ Wind Turbine ☐ Hydraulic Turbine ☐ Steam Turbine ☐ Solar

☐ Diesel Engine ☐ Gas Turbine ☐ Fuel Cell ☐ Biomass

☐ Co-generation/CHP (Combined Heat & Power)

☐ Other (Please Specify): _____

8. Mode of Operation:

☐ 24 Hour or Base Load ☐ Peak Period Only ☐ Load Displacement ☐ Emergency Backup

Will Emergency Backup generator be synchronized to Kitchener-Wilmot Hydro Inc.'s system at any time?

☐ Yes ☐ No ☐ Other (Please Specify): _____

9. Intent of Generation:

☐ IESO FIT Program, Contract # _____ ☐ Net Metering

☐ Load Displacement ☐ Other (Please Specify): _____

10. Location and Site Plan

Provide Site Plan with approximate line routings for connection to nearby Kitchener-Wilmot Hydro Inc. facilities. The Site Plan should include roads, concession and lot numbers and nearby power lines.

Drawing / Sketch No. _____ Rev. _____

11. Proposed connection voltage to Kitchener-Wilmot Hydro Inc.'s distribution system (if known): _____ kV

Section 2: Connection Impact Assessment Information

Note:

(a) It is important that the Generator provide ALL the information requested below, if applicable. All information is required to complete the impact assessment process. Indicate "Not Applicable" where appropriate.

(b) In certain circumstances, Kitchener-Wilmot Hydro Inc. may require additional information to conduct the Connection Impact Assessment. Should this be the case, the Generator will be duly advised.

Provide detailed and updated SLD of the EG facility including the interface point to the Kitchener-Wilmot Hydro Inc.'s distribution system. This drawing shall include as a minimum:

- Electrical equipment at EG's facilities, their principal ratings, impedances, winding configurations, neutral grounding methods, etc.
- Protective relaying, synchronizing and revenue metering arrangements. The device numbers should be in accordance with those adopted in the ANSI / IEEE Standard C37.2 - 1979: IEEE Standard Electrical Power System Device Function Numbers.

The SLD shall include the following, as applicable:

- Disconnecting device at the interface (connection) point with the Kitchener-Wilmot Hydro Inc.'s distribution system
- Load break switches
- Fuses
- Circuit breakers
- Interface step-up transformer
- Intermediate transformer(s)
- CT's and VT's (quantity, location, connection, ratio)
- Generators (rotating / static)
- Power factor correction capacitors and their switching arrangements (particularly for induction units)
- Motors
- Power cables
- Surge arresters
- Any other relevant electrical equipment.

- SLD Drawing Number: _____ Rev. _____

  ☐ Attached

  ☐ Mailed Separately

1. Generator Facility Fault Contributions for Faults at the Interface Point/PCC

All values to be at the nominal connection voltage to Kitchener-Wilmot Hydro Inc.'s distribution system, i.e. the high voltage side of the Facility Interface (step-up) transformer.

Maximum Symmetrical (all generators online)

- Three-phase fault _____ kA
- Phase-to-phase fault _____ kA
- Single-Phase to ground fault _____ kA

2. Generator Characteristics:

a. Number of generating unit(s): _____

b. Manufacturer / Type or Model No. _____ / _____

c. Rated capacity of each unit

Gross	_____ kW	_____ kVA
Net	_____ kW	_____ kVA

If unit outputs are different, please fill in additional sheets to provide the information.

d. Type of generating unit:

☐ Synchronous ☐ Induction ☐ Static Power Converters (SPC) / Inverters

☐ Other (Please Specify) _____

e. Rated frequency _____ Hz

f. Number of phases ☐ One ☐ Three

g. **For Synchronous Units:**

i) Generation voltage _____ kV

ii) Rated current _____ A

iii) Rated power factor of generating unit(s) _____ p.u.

iv) Type and characteristics of exciter

_____

_____

v) Minimum power limit for stable operation

vi) Unsaturated reactances on:

Direct axis synchronous reactance, Xd			kW
Direct axis transient reactance, Xd'	_____	kVA base	_____ kV base
Direct axis subtransient reactance, Xd"			p.u.
Negative sequence reactance, X2			p.u.
Zero sequence reactance, X0			p.u.

vii) Limits of range of reactive power

Lagging (over-excited)		kVAR
Leading (under-excited)		kVAR

viii) Provide a plot of generator capability curve (MW output vs. MVAR)
Document Number: _____ Rev. _____

h. **For Induction Units:**

i) Generation voltage		kV
ii) Rated design power factor		p.u.
iii) Rated speed		RPM
iv) Slip regulation interval		%
v) Rated Slip		%
vi) Actual power factor at delivery point (after p.f. correction):		
- Full output		p.u.
- No output		p.u.
vii) Generator reactive power requirements:		
- Full output		kVAR
- No output		kVAR

viii) Total power factor correction installed _____ kVAR

- Number of regulating steps _____

- Power factor correction switched per step _____ kVAR

- Power factor correction capacitors are automatically switched off when generator breaker opens ☐ Yes ☐ No

ix) Starting inrush current limited to (multiple of full load current) _____ p.u.

x) Locked rotor current (at rated voltage) _____ p.u.

xi) Fault current vs. time curves (for various types of faults near the generator) _____ Dwg. No.

i. For SPC / Inverter type units:

i) Terminal voltage _____ V

ii) Line - interactive type (i.e. intended for parallel operation with electric utility) ☐ Yes ☐ No

iii) Power factor _____

iv) Battery backup provided ☐ Yes ☐ No

v) Maximum fault current for terminal faults _____ A

vi) Standards according to which built _____

vii) Provide Manufacturer's technical brochure and specification sheet _____ Doc. No.

j. Kitchener-Wilmot Hydro Inc. uses distribution modeling software for Impact Assessments. Describe how your equipment should be modeled for load flow, voltage study and short circuit analysis.

3. Interface Step-up Transformer Characteristics:

a. Transformer rating _____ kVA

b. Manufacturer _____

c. Nominal voltage of high voltage winding _____ kV

d. Lightning impulse level of high voltage winding, full wave _____ kV

e. Nominal voltage of low voltage winding _____ kV

f. Number of phases _____

g. Construction (core or shell) _____

h. Number of legs _____

i. Impedances on: _____ kVA base _____ kV base

R: _____ p.u. X: _____ p.u.

j. High voltage winding connection ☐ Delta ☐ Star

Grounding method of star connected high voltage winding neutral

☐ Solid ☐ Ungrounded ☐ Impedance: R _____ X _____ ohms

k. Low voltage winding connection

Grounding method of star connected low voltage winding neutral

☐ Solid ☐ Ungrounded ☐ Impedance: R _____ X _____ ohms

l. Tapping range, location and type of tap changer _____

m. Expected tap settings HV _____ kV LV _____ kV

Note: The term 'High Voltage' refers to the connection voltage to LDC's distribution system and 'Low Voltage' refers to the generation or any other intermediate voltage.

4. Intermediate Transformer Characteristics (if applicable):

a. Transformer rating _____ kVA

b. Manufacturer _____

c. Nominal voltage of high voltage winding _____ kV

d. Nominal voltage of low voltage winding _____ kV

e. High voltage winding connection ☐ Delta ☐ Star

Grounding method of star connected high voltage winding neutral

☐ Solid ☐ Ungrounded ☐ Impedance: R _____ X _____ ohms

f. Low voltage winding connection ☐ Delta ☐ Star

Grounding method of star connected low voltage winding neutral

☐ Solid ☐ Ungrounded ☐ Impedance: R _____ X _____ ohms

g. Impedances on: _____ kVA base _____ kV base

R: _____ p.u. X: _____ p.u.

h. Tapping range, location and type of tap changer _____

i. Expected tap settings HV _____ kV LV _____ kV

Note: The term 'High Voltage' refers to the connection voltage to LDC's distribution system and 'Low Voltage' refers to the generation or any other intermediate voltage.

Note:

(a) The term "High Voltage", used above, refers to the intermediate voltage that is input to the interface step-up transformer, and "Low Voltage", used above, refers to the generation voltage.

5. Generating Facility Load Information

a. Maximum continuous load:

- Total: _____ kVA _____ kW
- Generator Auxiliary Load Only: _____ kVA _____ kW

b. Maximum start up load: _____ kVA _____ kW

c. Largest motor size that would be started: _____ HP _____ kW

d. Maximum inrush current of the motor (multiple of full-load current): _____ p.u.

e. For load displacement generators:

- Max. present load at Generator's facility: _____ kVA _____ kW
- Max. future load at Generator's facility (excluding Auxiliary Loads): _____ kVA _____ KW
- Indicate the means by which injection of power into Kitchener-Wilmot Hydro Inc.'s system will be prevented:

_____

6. Operation Information:

- Annual Capacity Factor: _____ %
- Prospective number of annual scheduled starts / stops, and timing: _____

7. Expected Monthly Generation, Consumption and Output From the Facility:

Expected	Total Generation (a)		Total Internal Consumption (b)		Total Output (To Kitchener- Wilmot Hydro Inc.'s Distribution System) (a-b)*	
	kWh	Peak kWh	kWh	Peak kW	kWh	Peak kW
January						
February						
March						
April						
May						
June						
July						
August						
September						
October						
November						
December						

* This value would be negative when the generators are not in operation or when the internal consumption exceeds generation.

8. Protection Design, Philosophy and Logic:

- Provide a document describing the protection philosophy for detecting and clearing:
  - Internal faults within the EG facility;
  - External phase and ground faults (in LDC's distribution system;
  - Certain abnormal system conditions such as over / under voltage, over / under frequency, open phase(s);
  - Islanding

Document Number: _____ Rev. _____

Include a tripping matrix or similar information in the document

Note: EG shall install utility grade relays for the interface protection. The protection design shall incorporate facilities for testing and calibrating the relays by secondary injection.

Please do not feel inhibited by the space provided here. Use as much space and as many additional sheets as are required to describe how the Generator protection will deal with faults, outages, disturbances or other events on the distribution system and for the generator itself.

Protective Device	Range of Available Settings	Trip Time	Trip Set Point	Describe operation for disconnecting the generator or inverter in the event of a distribution system outage	Describe operation for disconnecting the generator or inverter in the event of a distribution system short circuit (three-phase and single-phase to ground)
27 Phase Undervoltage Instantaneous					
27 Phase Undervoltage					
50 Phase Instantaneous Overcurrent					
50G Ground Instantaneous Overcurrent					
51 Phase Time Overcurrent					
51G Ground Time Overcurrent					
50 Phase Overvoltage Instantaneous					
59 Phase Overvoltage					
81 Under Frequency					
81 Over Frequency					
87 Transformer Differential					
Other					

9. Connection and Operation Information:

a. Synchronizing and paralleling scheme / procedure _____ Doc. / Dwg. No.

b. The generator is designed with auto-connection scheme ☐ Yes ☐ No

10. Document List:

Item No.	Description	Reference No.	No. of Pages
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			

11. Drawing List:

Item No.	Description	Reference No.	No. of Pages
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

12. Other Comments, Specifications and Exceptions (attach additional sheets if needed)

13. Applicant and Project Design / Engineering Signature

To the best of my knowledge, all the information provided in this Application Form is complete and correct.

Applicant Signature _____ Date _____

Project Design / Engineering Signature _____ Date _____

Return this form to: Kitchener-Wilmot Hydro Inc., 301 Victoria Street South, Kitchener, ON N2G 4L2. Attn: Shaun Wang, P.Eng., System Planning & Projects Engineer

E-Mail: swang @kwhydro.ca
Phone: (519) 745-4771 ext. 6312

Print Form

Appendix E2 DG05

Distributed Generation New Account Application

KITCHENER WILMOT HYDRO INC.

P.O. BOX 9010
301 VICTORIA STREET SOUTH
KITCHENER, ONTARIO
N2G 4L2
TEL: (519) 743-3600
FAX: (519) 745-3631
WEB: www.kwhydro.on.ca
CustomerService@kwhydro.on.ca

Applicant:

Account Number

Effective Date — Month / Day / Year

Telephone Number

IESO Registrant Name

Other Registrant Name

Work Telephone Number

IESO Reference Number

IESO Registration Number

Tenant

Tax Registration Yes ☐ No ☐

Driver's License Number

Service Address:

Street Number Suffix

Street Name

Street Type

Direction

Unit / Apartment

City

Postal Code

Billing Address:

Line 1

Line 2

Line 3

Line 4

Postal / Zip Code

Initial Charges:

Account Set Up Fee: 2000

Service Information: (Office Use Only)

Class | Heat | Hot W. | Mloc. | Key Number | Meter Walk - Sequence Number

KITCHENER-WILMOT HYDRO INC. (The "Corporation")

I, the owner or tenant make application for electric service at the above referenced service address. I agree to pay, jointly and severally, for all rates and charges for said service supplied to the service address and agree to be bound by the Rules and Regulations of the Corporation.

If the Applicant is a company, the signing officer(s) warrants that he/she has authority to bind the company.

The undersigned acknowledges that a Contract will exist upon acceptance of this Application by the Corporation.

Applicant's Name (Printed) ☐ Owner ☐ Tenant

Applicant's Signature

Company Name ☐ Incorporated ☐ Limited ☐ Other

Today's Date

Time

Witness

Employee

THIS CONTRACT INCLUDES THE RULES AND REGULATIONS OF THE CORPORATION (SEE REVERSE SIDE)

Kitchener-Wilmot Hydro Inc.

Rules and Regulations

1. The Corporation's Conditions of Service as approved by the Ontario Energy Board form a part of this Contract.
2. Notwithstanding anything in this Contract to the contrary, all rates and charges are subject to change from time to time on order of either the Ontario Energy Board or the Provincial Government.
3. This Contract shall not be binding upon the Corporation until accepted by it through its signing authority, and shall not be modified or affected by any unwritten promise, agreement or representation by any agent or employee of the Corporation.
4. The Applicant agrees to provide convenient and safe space for the Corporation's meters (for which no charge will be made), wires and all other equipment in said service address, and further agrees that no one who is not an agent of the Corporation or otherwise lawfully entitled to do so, shall be permitted to remove, inspect or tamper with the same, and that the properly authorized agents of the Corporation shall at all reasonable hours, have free access to the said service address for the purpose of reading, examining, repairing or removing the Corporation's meters, wires and other equipment.
5. Meters and all other equipment of the Corporation in said service address shall be in the care and at the risk of the Applicant and if destroyed or damaged, other than by ordinary wear and tear, the Applicant shall pay to the Corporation the value of such meters and equipment, or the cost of repairing or replacing same.
6. The Corporation agrees to use reasonable diligence in providing a regular and uninterrupted supply of electricity but does not guarantee a constant supply of electricity and will not be liable for damages to the Applicant for failure to supply electricity to said service address.
7. The Applicant will maintain its equipment from the point of delivery from the Corporation in accordance with the requirements of the Electrical Safety Authority.
8. The Applicant hereby expressly authorizes and empowers the Corporation at its option to remove the meters and all other equipment and to cut off the supply of electricity and terminate this agreement whenever any bills for said service are in arrears or upon violation by the Applicant of any of the terms and conditions of this Contract. Services terminated for non-payment shall not be re-established until payment is made in full, including a charge for the cost of reconnecting. Such discontinuance of service does not relieve the Applicant of the liability for arrears. The Applicant agrees to pay an interest charge to the Corporation if the account is not paid in full on or before the due date.
9. It is agreed that the Applicant will provide a Security Deposit as may be requested by the Corporation from time to time.
10. The Applicant acknowledges that the Corporation has a requirement to collect and use certain personal information, the nature of which may include:

    - Information we receive from you such as your name, address, contact information and general financial, credit and reference information;
    - Facts about your historical and current consumption of electricity;
    - Information about your transactions with the Corporation, such as meter number, account number, account balances, payment history and account activity;
    - Identifying information, such as a driver’s license.

    The Corporation uses the information we collect for the following purposes:

    - To provide you with continuous electric service and to bill you for that service;
    - To assist us in the collection of accounts;
    - To respond to your inquiries about energy use and billing;
    - To prevent fraud with respect to both you and our company;
    - To meet legal and regulatory requirements.

    Because of the structure of the electricity sector in Ontario, it may be necessary to share your billing and consumption information with third party billing and settlement agencies. Your information may also be disclosed or shared with other agencies or organizations as required by law or regulation.

    The Corporation’s Privacy Policy protects the confidentiality and security of your personal information. At any time, you have the right to request access to the personal information we have collected and to request amendments to such personal information to ensure its accuracy and completeness.

    The Applicant consents to the collection, use and disclosure of personal information for the purposes stated above.

Kitchener-Wilmot Hydro Inc.
301 Victoria Street South
Kitchener, Ontario, Canada N2G 4L2

Appendix F2:
Form DG06

CONFIRMATION OF VERIFICATION EVIDENCE REPORT (COVER)
[Distribution Connected Generation – (DCG)]

(Instructions provided on last Page)

Section 1	FACILITIES INFORMATION
NAME OF CUSTOMER	
NAME OF FACILITY	
PROPOSED ENERGIZATION DATE	
KITCHENER-WILMOT HYDRO OPERATING DESIGNATION	
CLAIM NOTIFICATION (Investment Planning #)	
SUPPLY FEEDER DESIGNATIONS	

Section 2	CONTACT INFORMATION

CUSTOMER CONTACT	KITCHENER-WILMOT HYDRO COVER COORDINATOR CONTACT
Print Name:	**Print Name: Shaun Wang**
Title:	**Title: System Planning & Projects Engineer**
Date:	**Date:**
Tel. #:	**Tel. #:519-745-4771 x 6312**
Email:	**Email: swang@kwhydro.n.ca**

Section 3	VERIFICATION-PROTECTION & CONTROL

Protection Group to verify: A, B, or A&B Legend: C = Confirm Results: P = Pass, F = Fail, N/A = Not Applicable	Protection Group To verify	Legend	Results	Initials	Date mm/dd/yyyy	Note #
• Is commissioning in compliance with the submitted Commissioning plans?						
• Are reviewed relay settings applied?						
Confirm that the following protection systems, as applicable, have been verified to function as per the design: NOTE: Tests marked with an asterisk (*) require K-W Hydro Inc. staff coordination						
• Line Protection						
• HV Breaker Failure Protection and Reclose						
• LV Breaker Failure Protection and Reclose						
• Transformer Differential						
• Transformer Backup Protection						
• Under and Over Frequency						
• Under and Over Voltage						
• Transfer Trip / Remote Trip *						
• Pilot Wire Protection *						
• Blocking Scheme Circuits *						
• Generation Rejection & Load Rejection Circuits *						
• Reverse Power						
• Gen. Prot. That trip HV Sync Breakers						
• Instrument Transformer (e.g. CTS + CCVTs, etc.)						
• Monitoring Equipment (e.g. DFR, SER, etc.)						
• Other (Specify)						

Section 4A	TELEMETRY TESTS BEFORE ENERGIZATION AT CUSTOMER OWNED TS

Confirm the following SCADA telemetry quantities, where applicable: Test Needed: D = to be Done Legend: C = Confirm; Results: P = Pass, F = Fail All Parts: N/A = Not Applicable	Test Needed	Legend	Results	Initials	Date mm/dd/yyy	Note #
• HV MW per transformer	N/A					
• HV MVAR per transformer	N/A					
• HV Phase to Phase Voltages (R, W, B)	N/A					
• LV MW per LV Bus	N/A					
• LV MVAR per LV Bus	N/A					
• LV Phase to Phase Voltages (R, W, B)	N/A					
• HV Under-Load Tap Changer Positions	N/A					
• HV Disconnect Switches/HV Circuit Switchers/Breakers Open/Close Status	N/A					
• LV Transformer & Bus Tie Breakers Open/Close Status	N/A					
• LV Capacitor Breakers Open/Close Status	N/A					
• Common Protection Trip Alarm each HV Circuit	N/A					
• Other (specify)	N/A					

Section 4B	TELEMETRY TESTS BEFORE ENERGIZATION AT CUSTOMER OWNED GS

Confirm the following SCADA telemetry quantities, where applicable Test Needed: D = to be Done Legend: C = Confirm; Results: P = Pass, F = Fail All Parts: N/A = Not Applicable	Test Needed	Legend	Results	Initials	Date mm/dd/yyyy	Note #
• MW Flows and Directions						
• MVAR Flow and Directions						
• Phase to Phase Voltages						
• HV switchers/HV breakers/Bus Tie Breakers Open/Close Status						
• HV Line Disconnect Switches Open/Close Status						
• Synchronizing Breakers Open/Close Status						
• AVRs, PSSs status						
• Generation Rejection Selection Status						
• LV Breakers/Switchers, Open/Close Status						
• LV Synchronizing Breakers, Open/Close Status						
• Protection Trip Alarms						
• Other (specify)						

Section 5 CONFIRMATION OF VERIFICATION-POWER EQUIPMENMT

Legend: C = Confirm, W = Witness Result: P = Pass, F = Fail All Parts: N/A = Not Applicable *Note, some of the following verification may require Kitchener-Wilmot Hydro Inc. witnessing.*	Legend	Result	Initial	Date mm/dd/yyyy	Note #
• **Verify the HV disconnect switches/circuit switchers are suitable as an isolation point per Utility Work Protection Code?** NOTE: Any future modifications to the isolation device(s) used to provide supporting guarantees to Kitchener-Wilmot Hydro Inc. staff under the Utility Work Protection Code must be re-witnessed by Kitchener-Wilmot Hydro Inc. personnel.					
• Confirm correct operation of the HV disconnect switches/circuit switchers/breakers					
• Is closing time within manufacturer's specification?					
• Is opening time within manufacturer's specification?					
• Are the specified HV surge arrestors installed?					
• Confirm the power transformer Doble test results are within					
• Confirm power transformers connected correctly as per the design.					
• Confirm the DC system installed (i.e. battery, charger, dc panel, dc monitoring)? Verified					
• Does the HV equipment (i.e., disconnect switches, circuit switchers, breakers, CVTs, CTs) have the appropriate voltage class and current ratings as per the submitted Single Line Diagram?					
• Other (specify)					
• **Name of Kitchener-Wilmot Hydro Inc. Witness**:					

Section 6 ELECTRICAL SAFETY

Legend: SD = Supporting Document, N/A = Not Applicable

• 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**.		
• Prior to final in-service of new or modified customer or generator facilities, ESA must provide Connection Authorization (Code Article 2-012). **Attach document**.		
• 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**.		

NOTES: (For Sections 3, 4A or 4B, 5 & 6)

#:	Comments:	COVER Coordinator Concurrence To Connect:	Date Action Resolved: (dd/mm/yyyy)
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			

By signing* this form, the customer acknowledges that all required verifications specified under this COVER document have been completed and that the customer facility design and operation meets the minimum standards for customer facilities connected to a distribution system, as per the Distribution System Code.	_____ Signature of Customer Representative (Note : Must be P. Eng) Print Name: _____ Title: _____ Date: _____
☐ **Part I Completed** **COVER Coordinator Initials** _____	
*After signing the COVER, the customer shall submit 2 signed copies to the COVER coordinator.	

The COVER Coordinator has reviewed the customer's Certified COVER document and the customer's facility may be connected to the grid, subject to Controlling Authority's final review.	_____ Signature of COVER Coordinator Print Name: _____ Title: _____ Date: _____
▪ The COVER coordinator shall forward (scan/fax) the completed document to the Controlling Authority to initiate the connection (for OGCC controlled distributed generators, the OGCC is the controlling authority. For other feeders the controlling authority will be Provincial Lines). The COVER coordinator shall contact (phone) the Controlling Authority, to notify him/her of the completed COVER.	

Section 7	CONFIRM ON POTENTIAL/ON LOAD CHECKS AT RATED SYSTEM VOLTAGE

Legend: C = Confirm, W = Witness Result: P = Pass, F = Fail All Parts: N/A = Not Applicable	Legend	Result	Initial	Date mm/dd/yyyy	Note #
Are phasor (X-Watt meter) readings completed and analyzed by the customer for Protection listed in **Section 3**?					
Are phasor (X-Watt meter) readings completed and analyzed by the customer for SCADA quantities listed in **Section 4**?					
On Load SCADA Values confirmed consistent with test(s) performed in Section 4A or 4B?					

NOTES: (For Section 7)

#:	Comments:	COVER Coordinator Concurrence:	Date Action Resolved: (dd/mm/yyyy)
1.			
2.			
3.			
4.			

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

_____

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

Print Name: _____

Title: _____

Date: _____

Section 8	TEST SUMMARY REPORTS

In accordance with the Distribution System Code, Appendix F, for a Generation facility of Small size (pg.13), Mid-size (pg.21), and Large size (pg.28), the Customer shall, at Kitchener-Wilmot Hydro's request, provide Kitchener-Wilmot Hydro with a summary of testing results, including any certificates of inspection or other applicable authorizations or approvals certifying that any of the Customer'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 (7) years by the Customer.

DISTRIBUTION LIST (WHEN ALL SECTIONS ARE COMPLETED):

☐ Kitchener-Wilmot Hydro Inc. COVER Coordinator

Customer Instructions for Completing the COVER form (DCG)

PART 1: PLAN

Step 1: Customer Information

- Complete Facility and Customer Contact Information of the COVER Form by completing the highlighted portions of Sections 1 & 2.

Step 2: Identify the Tests that the Customer Intends to Conduct

- Complete Highlighted portions (Protection Group and Legend columns) of Sections 3, where applicable
- Complete Highlighted portions of Section 4A or 4B (Test Needed and Legend columns)
- Complete Highlighted portions of Sections 5 (Legend column) and 6 (Date Received column)

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

Step 3: Kitchener-Wilmot Hydro's COVER Coordinator Review

- Return COVER Form by email to the Kitchener-Wilmot Hydro COVER Coordinator listed in Section 2
- The COVER coordinator will review the proposed commission plan 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, 4A or 4B, 5 & 6.
- Sign off the COVER, in section 6, by a Customer P. Eng Representative, and submit it to the COVER Coordinator.
- The COVER coordinator will review the certified COVER and recommend to Kitchener-Wilmot Hydro Inc. Operations Department for connection to the grid by signing section 6.
- Section 7 testing can only proceed when all salient comments have been resolved and tests completed for Sections 3 to 6.

PART 3: POST-ENERGIZATION

Step 5: Final Potential and On-load Checks

- Kitchener-Wilmot Hydro Inc. will provide authorization to connect to the grid.
- 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 7 years by the Customer (as indicated by IESO Market Rules, Chp.4, 5.1.3). Kitchener-Wilmot Hydro Inc. may require this information, on an exception basis.

KITCHENER WILMOT HYDRO INC.
P.O. BOX 9010
301 VICTORIA STREET SOUTH
KITCHENER, ONTARIO
N2G 4L2

Appendix G2: DG07 Application for Direct Deposit of Payments to Vendors

Important Notes

Kitchener-Wilmot Hydro Inc. can pay vendor invoices by direct deposit to the vendor's chosen corporate bank account with any financial institution in Canada.

- Care should be taken in completing your application. Incorrect information could cause delays in processing your payment.
- Complete a new form if you change the account information or stop the direct deposit.
- Do **not** close your old account until the next new payment deposits into your new account.

Instructions

- Use this form to have your vendor invoice payments deposited directly into the account you identify in Part B **or**, to change direct deposit information.
- Complete section "A" (please print clearly).
- Have section "B" completed by your financial institution **or**, attach a blank cheque with the banking information encoded on it and write "VOID" across the front.

Mail or fax the completed form (including the "VOID" cheque, if required) to the following address:

Kitchener-Wilmot Hydro Inc.
PO Box 9010
301 Victoria St S
KITCHENER ON N2G 4L2

Fax: 519-745-3631

Section A – Vendor Identification (please print clearly)

☐ **New Direct Deposit Application** ☐ **Change of Direct Deposit Information**

Company Name:				
Service Address: Street:	Unit:	City:	Province: **ON**	Postal Code:
Contact Person: Last Name:		First Name:		
Mailing Address: Street:	Unit:	City:	Province: **ON**	Postal Code:
Business Phone Number:		Email Address:		

Section B – Banking Information

Branch Number	Institution Number	Account Number

Name of Account Holder:			Type of Account:	
Name of Financial Institution:			Branch:	
Branch Address: Street:	Unit:	City:	Province: **ON**	Postal Code:
Bank Official (please print) Last Name:	First Name:		Position:	
Business Phone Number:	Signature:		Date (yyy/mm/dd):	

Section C – Authorization

Until further notice, I authorize direct deposit of vendor invoice payments in the account designated above.

Controller/Owner (please print) Last Name:	First Name:	Middle Name:
Signature:	Date (yyy/mm/dd):	

Appendix H2:

Distributed Generation Financial Settlement Options