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Grid Connection Guide for Biogas Projects

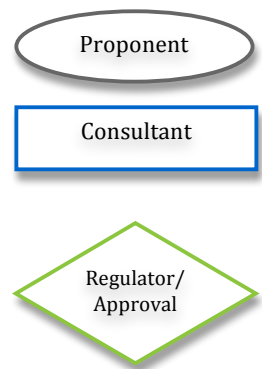
This document has been developed as an overview of the grid connection process for biogas projects both on and off the farm, and is meant to act as a tool to guide a project through the steps of connecting.

Grid Connection Guide for Biogas Projects: Steps for Connecting

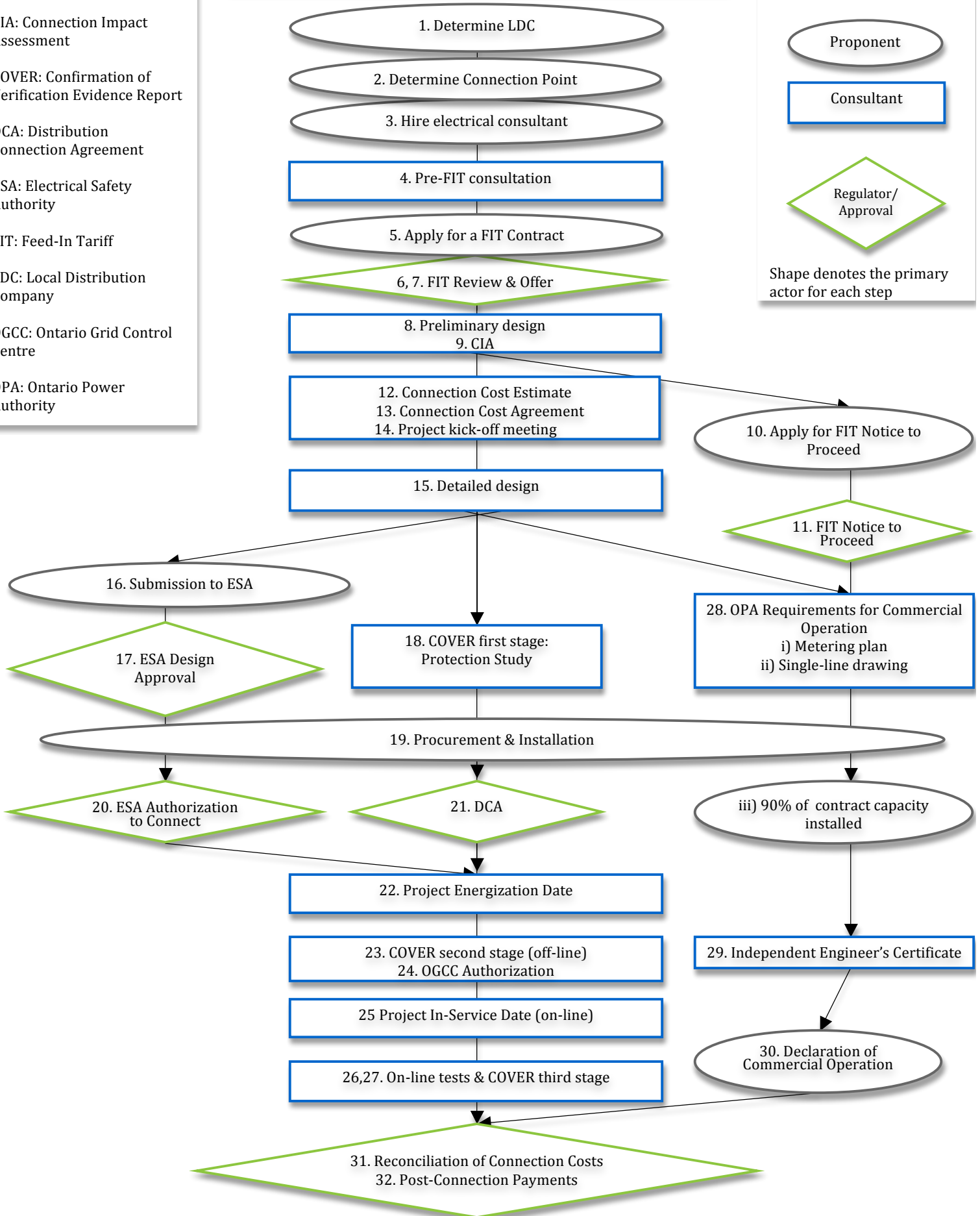
Glossary

CIA: Connection Impact Assessment
 COVER: Confirmation of Verification Evidence Report
 DCA: Distribution Connection Agreement
 ESA: Electrical Safety Authority
 FIT: Feed-In Tariff
 LDC: Local Distribution Company
 OGCC: Ontario Grid Control Centre
 OPA: Ontario Power Authority

Legend



Shape denotes the primary actor for each step



Grid Connection Guide for Biogas Projects: Guidance Notes

This section explains in more detail the grid connection steps shown in the diagram, which are numbered to correspond to the headings below. The shapes in the diagram indicate the primary actor for each step, though in many cases the parties work together.

A glossary of acronyms can be found at the end of these steps.

Estimated response times from the applicable regulatory body are given for each step, if available. Proponents should be aware that the overall process can be expected to take **a minimum of 15 months**, and in most cases longer if delays are experienced on approval steps. The grid connection and protection requirements are complex for biogas installations given the mode of generating electricity (i.e. synchronous generation).

There are three (or potentially four) main bodies from which approval must be obtained for connecting to the grid:

- i) the Ontario Power Authority (OPA) for the Feed-In Tariff (FIT) contract.
- ii) the Electrical Safety Authority (ESA) for Ontario safety requirements.
- iii) the local electricity distribution system provider – Hydro One and potentially another Local Distribution Company (LDC) at the connection point.

*All rules and processes are subject to change based on the FIT Review process; please refer to the appropriate regulatory body for additional clarity and direction.

1. Determine Local Distribution Company (LDC)

In most rural areas, Hydro One is the electricity distributor, but there may also be another local distribution company (LDC) that supplies electricity in the area. To determine the LDC, enter the postal code of the site at this webpage:

<http://fit.powerauthority.on.ca/local-distribution-company-locator>

2. Determine potential connection point relative to site location

To determine the location of the potential connection point, the proponent can request a Distribution Operating Map (DOM) for the area from Hydro One, which requires emailing the location's GPS Coordinates to dxgenerationconnections@hydroone.com and filling out a confidentiality agreement. The DOM shows the locations and voltages of electrical lines in the area.

Hydro One states that for the following generator sizes, connection to lines of the following capacity is optimal:

1. Projects up to 100 kW: single-phase or 3-phase line, any voltage
2. Projects up to 250 kW: 3-phase line, any voltage
3. Projects up to 500 kW: 3-phase line, voltage greater than 15 kV

It should be noted that certain Local Distribution Companies may have different rules and allowances, so it is advisable to get in touch with them to confirm the connection point.

3. Choose and procure a consultant

Although this could also be done after applying for the FIT contract, it can be a key factor in assessing the impact of the electrical connection on the economics and feasibility of the project, and it is therefore highly recommended to retain a consultant in advance of the Pre-FIT consultation.

4. Pre-FIT consultation

In most rural areas, Hydro One is either the sole electricity distributor or the secondary LDC. A Pre-FIT Consultation is offered by Hydro One to help proponents identify the details of connecting a project to the grid such as: station capacity, station names, feeder designation, voltage, and potential point of connection. This information is used for the application for a FIT contract with the OPA and can help in identifying any potential connection issues.

This is why it is important to have the electrical consultant at the meeting, because a knowledgeable consultant will know the right questions to ask, potentially saving the proponent time and money, and minimizing the likelihood of unpleasant surprises during the Connection Impact Assessment.

Hydro One has supplied an online/faxable form (Form A) at <http://www.hydroone.com/Generators/Pages/Pre-FITConsultation.aspx> to apply for the consultation.

Hydro One will respond and meet with the applicant within 15 days of submission, according to their website.

5. Apply to the OPA for a FIT contract

Register for an account with the OPA and complete an Application for a FIT contract, which can be found here:

<http://fit.powerauthority.on.ca/welcome-fit-program-registration>

The steps in the FIT process are also explained on a document at the APAO's website:

http://www.apao.ca/apaoExp/images/uploads/documents/2010/faq/FIT_Process_Milestones_Timelines_and_Payments-Oct_7.pdf

For projects that are *not* Capacity Allocation Exempt, the application requires an Application Fee of \$500, or \$500 per MW (whichever is greater), plus an Application Security of \$5,000 per MW for Community and Aboriginal projects or \$10,000 per MW for other projects. This fee is not applicable for projects that are CAE.

The OPA timestamps all applications received and processes them in order.



6. Review of the Application

At this stage, non-CAE projects may require a Transmission Availability Test (TAT) conducted by the OPA, and a Distribution Availability Test (DAT) conducted by the LDC. If the project does not pass either one of these tests, it will be placed in the FIT Production Line or FIT Reserve, depending on whether it passes the Economic Connection Test (ECT). More details for these can be found at

<http://fit.powerauthority.on.ca/connection-availability-assessment>.

Most projects under 500 kW will be CAE and will not require these two tests.

The OPA's time for review of the FIT Application is estimated at 60 days, according to their website. However, it has been much longer in practice.

7. Offer of a FIT Contract by the OPA

When the offer is made, the proponent then accepts it and provides the Completion and Performance Security of \$5,000 per MW for Community and Aboriginal projects, or \$20,000 per MW for other projects.

Offer acceptance and payment of the Security must be completed by the proponent within 10 days of receipt of the offer.

8. Preliminary Design and Protection Philosophy

After the Offer of a Contract has been received from the OPA, and the initial plant design is complete, the preliminary design of the generation and electrical connection can proceed. This includes the electrical protection philosophy, which needs to have sufficient detail to satisfy Hydro One's information needs for the Connection Impact Assessment (CIA), the next step in the process.

9. Apply for Connection Impact Assessment

At this stage, the preliminary design and protection philosophy is submitted to Hydro One and/or the LDC, and will be used to assess its impact on the system at the connection point.

The fee charged by Hydro One is in the range of \$3,000-\$10,000 if Hydro One is the lone distribution company involved in the project. If there is another LDC involved, Hydro One charges a further \$10,000.

The projected time for completion of the CIA by Hydro One is 60 days, according to their website, although in some cases this has been longer.

From the time the CIA is completed, the proponent has 4.5 months (6 months less 45 days) to apply to Hydro One for a Connection Cost Agreement (CCA).



10. Apply for FIT Notice to Proceed

The proponent may apply for a Notice to Proceed with the OPA with the following eligibility criteria satisfied, where applicable: i) completed and approved CIA, ii) environmental approval (Renewable Energy Approval or other), and iii) financing plan.

11. FIT Notice to Proceed

After the OPA receives the application, and is satisfied that the criteria have been met, it will issue a Notice to Proceed, allowing the proponent to proceed with installation and commercial operation submission requirements.

12. Connection Cost Estimate (CCE)

The proponent has the option of requesting a detailed Connection Cost Estimate (CCE) from Hydro One, before proceeding to the Connection Cost Agreement. Applying for this is advised, especially if the project requires a new line to be built, as the connection costs can potentially have a large impact on the project. A Class A estimate is fairly broad, while a Class C estimate is more definitive. The CCE study agreement and cost are included as part of the CIA package.

Hydro One should provide the CCE within 90 days of the receipt of a completed CCE study agreement from the proponent.

13. Connection Cost Agreement

At this stage, the proponent is required to pay all of the utility's predicted costs for making the connection, plus 50% for contingency. In practice this has ranged from \$30,000 to as much as \$500,000 – depending on a number of factors including generating capacity, the protections required, and the distance to the connection point. Payment is due upon execution of the CCA at 75% of the estimate .

Hydro One requires 45 days for this step, according to their website.

14. Project Kick-Off Meeting

The project in-service date will be determined at the project kick-off meeting, which takes place between the proponent and Hydro One.

This meeting will take place no later than 45 days after the CCA has been executed, according to Hydro One's website.

15. Detailed Design

After the CCA has been completed and payment made, the detailed design of the project and electrical system can proceed. This detailed design then feeds into the next steps for approval from the appropriate bodies.

The cost and timeline for this stage is dependent on the electrical consultant's work and depends on factors such as the size of the project and complexity of connection

requirements. The consultant should be able to estimate the cost and time when initiating work.

16. Submission to Electrical Safety Authority

The detailed design must be submitted to the ESA, which executes an examination and approval process to ensure compliance with applicable safety standards.

17. Approval of Design by Electrical Safety Authority

The time for ESA approval has not usually had a significant impact on project timelines, as the procurement and installation can start during this time; however, in cases where equipment specifications have had to be changed after submission (e.g. due to lack of availability of originally specified equipment) the ESA approval has taken up to ten weeks and may require a second round of design inspection. For this reason, it is advisable to base the design on the 'worst case' design (e.g., the one that has the greatest grid impact).

The fee is generally less than \$2,000.

The turnaround time for design approval from the ESA varies from 4-13 weeks.

18. Confirmation of Verification Evidence Report (COVER) First stage: Protection Study

Hydro One's approval process requires the completion of the Confirmation of Evidence Report (COVER), consisting of a number of stages. The first stage is the submission of a complete detailed project design, verifying that the design meets all of its requirements. This can be submitted to Hydro One at the same time as the detailed design is submitted for ESA approval.

A detailed protection study must be submitted, showing that the proposed protection is adequate and viable. As noted in the introduction, protection requirements are more involved for biogas generation than some other types of distributed generation.

19. Procurement and Installation

After approval of the detailed design and protection study by ESA and Hydro One, equipment procurement and installation can proceed, by a licensed electrical contractor with oversight by the electrical consultant.

20. ESA Connection Authorization

ESA inspectors will conduct site visits for thorough inspection and testing of the installation, before it is approved for connection.

21. Distribution Connection Agreement (DCA)

The Distribution Connection Agreement (DCA), between the proponent and Hydro One, outlines the technical and operating requirements of the connection, documents asset ownership and outlines the roles and responsibilities of each of the parties involved.

The DCA must be executed prior to the project energization date, and at least 30 days before the in-service date.

22. Project Energization Date

This date, also known as the Load Date, is the date that the project site is connected to the grid, as a load only, before connecting as a generator. This facilitates the further testing steps for the next stage of the COVER.

23. COVER Second stage: Off-line Testing

Upon successful completion of the off-line testing the second stage of the COVER is submitted.

From the time of submission of the second stage of the COVER, Hydro One has a turnaround time of 5 days to authorize connection to synchronize to the grid.

24. Ontario Grid Control Centre (OGCC) Authorization

It's also necessary to verify the communication link between the project and the Supervisory Control and Data Acquisition (SCADA) system at the Ontario Grid Control Centre (OGCC). Authorization to connect to the OGCC is needed for going online as a generator.

25. Project In-Service Date

The project in-service date, also known as the Ready for Service Date, is the date the project is approved to generate electricity onto the grid.

26. On-line Tests

This is the last stage of testing, in which the plant is connected to the grid.

This testing can potentially be completed in two weeks, however in the case of biogas this has been longer in many instances. For example, in one case the biogas plant was still ramping up biogas production to reach full generation capacity, and therefore on-line testing was completed six months after off-line testing.

27. COVER Final stage

The last section of the COVER report, evidencing successful completion of the on-line tests, is submitted to Hydro One.

28. OPA Requirements for Commercial Operation

The Commercial Operation Date (COD) is established once the DCA is executed, and a declaration of commercial operation submitted to the OPA.

To reach commercial operation, the project must satisfy the following requirements:

- the OPA has issued a notice to proceed
- a metering plan has been submitted and approved by the OPA



- a single-line electrical drawing that identifies the connection point, the transmission and distribution facilities, including the transformer station(s), that are close to the project has been submitted to the OPA
- at least 90 percent of the FIT contract capacity must be installed
- the OPA has received an Independent Engineer's Certificate (see below).

29. Independent Engineer's Certificate

The proponent must retain an independent engineer, to confirm that the project is in compliance and complete the Independent Engineer's Certificate, available here: <http://fit.powerauthority.on.ca/requirements> (click for Exhibit F and scroll down).

30. Declaration of Commercial Operation

A declaration of commercial operation must be submitted in the form prescribed by the OPA, available here: <http://fit.powerauthority.on.ca/rules-exhibits-and-forms>.

Both the first and second security payments made to the OPA will be returned once the project has achieved commercial operation.

31. Reconciliation of Project Connection Costs

Occurring after the project has gone in-service and all relevant project costs have been posted, the Hydro One project manager will determine if there is a difference between payments made by the proponent and the actual connection cost.

If there is a difference, a refund or invoice will be issued within 180 days of the COD.

32. Post-Connection Initiation of Payments

After the connection, the OPA will provide a letter of direction to Hydro One for payment of the generator at the specified contract price, effective from the COD. Payments are then made monthly for the specified contract term.



Glossary of Terms and Acronyms

1. CAE: Capacity Allocation Exempt, generally small projects connected to the distribution system. The Ontario Energy Board (OEB) Distribution System Code defines these projects as:
 - a. projects with no more than 250 kilowatts of rated generating capacity where the facility is connected to a less than 15 kV line
 - b. projects of 500 kW or less of rated generating capacity where the facility is connected to a 15 kV or greater line.
2. COD: Commercial Operation Date, date at which the project is selling power into the grid.
3. COVER: Confirmation of Verification Evidence Report, documentation required for connection approval by Hydro One.
4. DAT: Distribution Availability Test, conducted by the LDC at the time of application for a FIT contract, if the project first passes the transmission availability test. This test will determine if there is sufficient connection availability on the distribution system to connect the project. CAE projects do not require this test.
5. DCA: Distribution Connection Agreement, between the proponent and Hydro One, outlining the technical and operating requirements of the connection, documenting asset ownership and outlining the roles and responsibilities of each of the parties.
6. DOM: Distribution Operating Map, a map produced by Hydro One and other local distribution companies showing the locations of electricity transmission and distribution lines and stations.
7. ECT: Economic Connection Test, conducted by the OPA, to determine whether the ratepayer investment for the required grid upgrades to allow the project to connect is justifiable and can be included in grid expansion plans.
8. ESA: Electrical Safety Authority, the regulatory body which inspects all electrical installations in Ontario for safety.
9. FIT Contract: Feed-In Tariff Contract, under which an independent energy generator can sell power to the grid at a secure price for a contract term of 20 years.

10. FIT Production Line: If the project passes the economic connection test, it will wait in the FIT Production Line until the required grid upgrades have received the necessary approvals and the OPA is reasonably certain that they will be completed by the milestone date for commercial operation.
11. FIT Reserve: If the project does not pass the economic connection test, it will wait in the FIT Reserve and serve as input to future expansion plans.
12. LDC: Local Distribution Company, responsible for the distribution of electricity within an area.
13. NTP: Notice to proceed, the second major milestone in the OPA's Feed-in Tariff contract process.
14. OEB: Ontario Energy Board, the provincial body responsible for regulating the electricity and natural gas sectors.
15. OGCC: Ontario Grid Control Centre, the central facility for monitoring, managing, and troubleshooting the provincial hydro network (distribution grid). The facility serves as the central hub for coordinating assets and resources for both planned and unplanned service interruptions.
16. OPA: Ontario Power Authority, the body administering the Feed-In Tariff program.
17. SCADA: Supervisory Control and Data Acquisition, the computer systems that monitor and control infrastructure processes such as electricity distribution.
18. TAT: Transmission Availability Test, conducted by the OPA at the time of application for a FIT contract to determine if there is sufficient transmission capacity available to connect the project. CAE projects do not require this test.

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