

Business & Technology Report

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Distributed Generation Toolkit: Guidelines for Electric Cooperatives



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Prepared By:

The Transmission & Distribution Engineering Committee (TDEC):
System Planning Subcommittee

Contacts:

Fathalla Eldali

Senior Engineer Distribution Optimization – Integrated Grid
NRECA, Business & Technology Strategies

fathalla.eldali@nreca.coop

Andrew Tickle, P.E.

Manager of Engineering & Operations and TDEC System Planning Subcommittee Chair
Eastern Maine Electric Co-Op

atickle@emec.com

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Introduction

NRECA created this Distributed Generation (DG) Toolkit to help electric cooperatives (co-ops) address various considerations raised by consumer-owned generation and published it in its cooperative.com website in 2014¹. Due to the rapid increase of installing DG units by co-ops consumer-members, the update of DER interconnection standard (i.e., IEEE 1547-2018), and the increase adoption of other technologies, such as battery energy storage, the Transmission and Distribution Engineering Committee (TDEC) represented by the System Planning Subcommittee worked on updating the existing DG Toolkit.

The objectives of updating the DG Toolkit include:

- More generic classification of DG sizes.
- Needed information of the new resources to the application forms (e.g., battery energy storage).
- Relevant updated standards.

This DG Toolkit focuses only on the technical engineering contents and does not focus on the rates design, as this is for the co-ops to decide.

The DG Toolkit includes various sample documents for co-ops to consider. Each co-op should review the DG Toolkit and work with its management, legal counsel, system engineers, and other relevant parties to develop appropriate documents to meet the co-op's unique needs. This document provides guidance on how to classify DG sizes, determine its own valid sizes, and to tailor the documents. It also highlights related topics and provides references to additional resources for co-ops to use.

¹ Existing DG toolkit developed in 2014: <https://www.cooperative.com/programs-services/bts/Pages/Distributed-Generation-Toolkit.aspx>

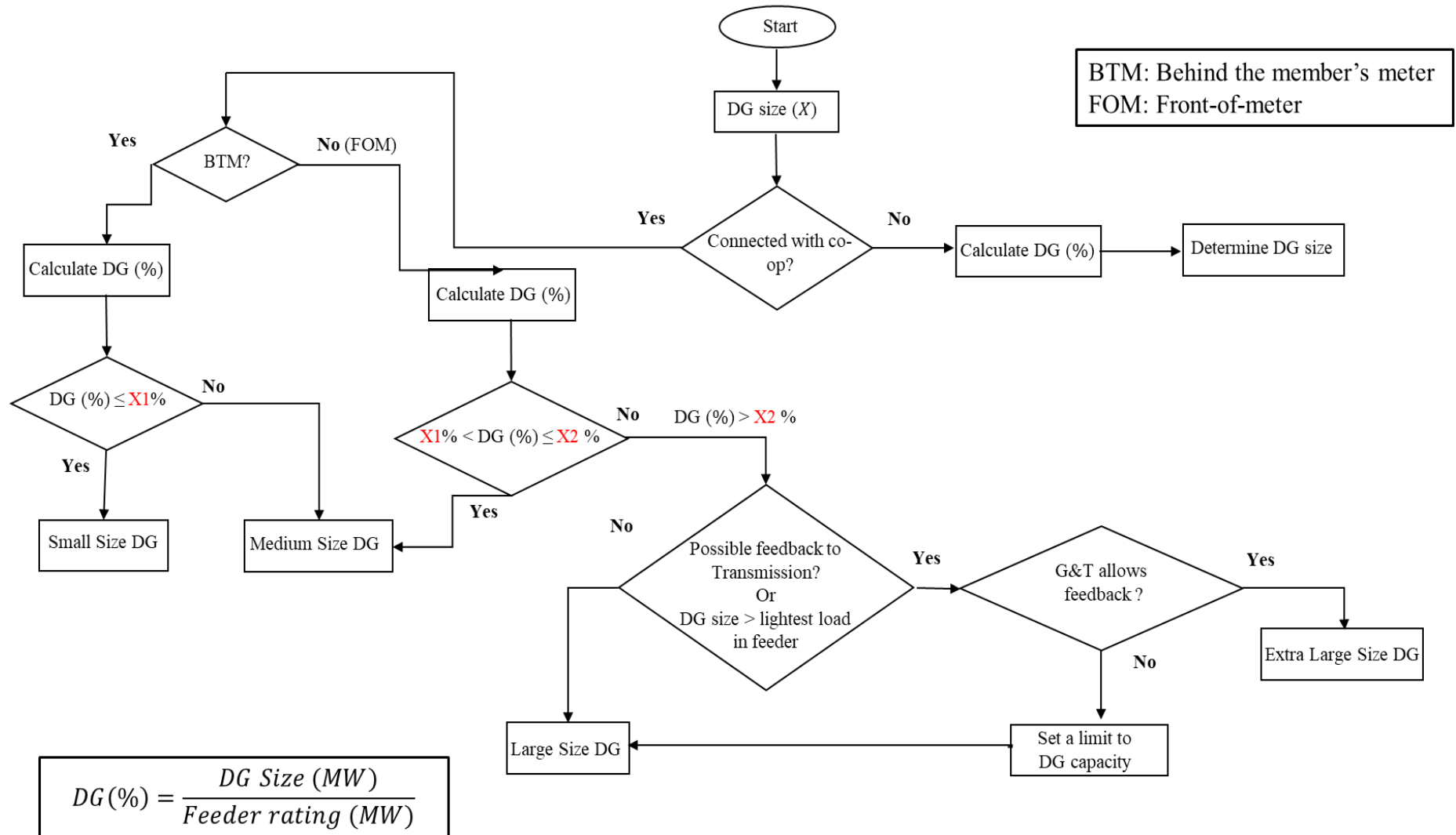
Overview of the DG Size Classifications in the DG Toolkit

How to DG Sizes are Classified

TDEC System Planning Subcommittee surveyed several co-ops to understand how they classify DG sizes. Because the variation on number of consumer-members' meters, system characteristics, and other reasons, co-ops have multiple different ways to classify DG sizes. Therefore, the following decision tree is designed for co-ops to use to define how they can classify the sizes of consumer-members' DG (i.e.; small, medium, large, and extra large). Based on that, they will identify the ranges of DG capacities to include in the table in the document *Consumer-Member Guidelines for Electric Power Distributed Generation Installation and Interconnection*, available in the DG Toolkit to be used by the consumer-members. In the following flowchart, the percentages X_1 , X_2 , and X_3 are for co-ops to decide.

Distributed Generation Size Classification Decision Tree Diagram

DG Size Classification Decision Tree



DG Toolkit Classifications Summaries

Based on the decision tree, a co-op’s technical team identifies and reviews the DG classified to the four different size groups. Each of these groups have its documents within the DG Toolkit. These include the interconnection agreement (contract), application, and the testing and commissioning checklist used by the co-op staff to assess the commissioning process and the recommended process, practice, and standards. An extra large system might need more information regarding the modeling and the system impact studies.

| DG size | Interconnection Agreement (Contract) | Application | Testing Checklist* | Other information/documents |
|-------------|--------------------------------------|-------------|--------------------|---|
| Small | ☑ | ☑ | ☑ | |
| Medium | ☑ | ☑ | ☑ | |
| Large | ☑ | ☑ | ☑ | |
| Extra-large | ☑ | ☑ | ☑ | Generator type datasheets (PV, wind, synchronous generator, or battery) |

** Testing checklist is performed in coordination between the co-op and the consumer-member to ensure safe interconnection.*

Documents Included in the DG Toolkit

The updated DG Toolkit includes the following documents:

Overview Documents:

- Guidelines for Electric Cooperatives
- Consumer-Member Guidelines for Electric Power Distributed Generation Installation and Interconnection

Application Documents:

- For all sizes of DG:
 - A model distribution cooperative agreement for interconnection and operation of distributed generation (which can be used as a template for all sizes with limited modifications)
- Small size applications:
 - Small size DG model interconnection application
 - Shortened small size DG application for residential members (only Solar and/or Storage)
- Medium size applications:
 - Medium size DG model interconnection application
- Large size applications:
 - Large size DG model interconnection application
- Extra-Large applications:
 - Extra Large DER fast-track document
 - Extra Large – Generator Interconnection (GI) Study Data Sheets
 - GI datasheet – Synchronous
 - GI datasheet – Photovoltaic
 - GI datasheet – Wind

Checklists:

- Small and Medium size DG testing and commissioning checklist
- Large and Extra Large size DG testing and commissioning checklist

Safety Considerations of the Co-op Staff Regarding DG

Co-ops may want to consider a review of safety protocols impacted by DG interconnection, such as appropriate measures that are designed to provide maintenance crews with visibility of DG that are connected to the part of the system being serviced. These may, but do not necessarily, include the following:

- When performing the interconnecting procedure, the co-op personnel should pay attention to conduct a simple fail-safe mechanism (transfer switch or relay should be in place) to prevent a back-feed in an outage situation, especially if the DG includes an energy storage system.
- Placing signage that indicates the existence of the DG point of interconnection and warns that the line might be still energized by a DG.

Supplementary and Supporting Documents

Rapid Solar Interconnection Tool Developed by NRECA

There has been a rapid and significant increase in solar generation installations over the recent years. As consumer-members' choices continue to evolve and solar PV installation costs decrease, behind-the-meter solar installations have become more widespread. Consequently, large numbers of solar interconnection requests combined with labor intensive interconnection practices became challenging, especially for small electric co-ops, and automation solutions are still expensive and often difficult to use. NRECA provides electric co-ops and other utilities with an alternative approach to automate the solar interconnection process and how to communicate solar programs to consumer-members. Five cooperative case studies are included. This is a [guidebook](#) on how to use the opensource tool [R3IT](#) for faster and automated handling of interconnection requests.

DER IEEE Standard and Its Impact on DGs in Cooperatives' Service Areas

NRECA is monitoring the IEEE 1547 standard. [This page on cooperative.com](#) has available resources to know more about the standard and what it means if a DG is operating in compliance with the latest version of the standard (IEEE 1547-2018).

Results of Smart Inverter Demonstration Project

Due to the rapid growth of inverter-based distributed energy resources (DER), the DER interconnection standard (IEEE 1547) has been updated and the related IEEE 1547-2018 and test standard IEEE 1547.1-2020 have been released. As they start to be adopted and possibly mandated, cooperatives might be required to perform some advanced functions and services, and DER operators might need to adopt alternative settings for smart inverters to perform these functions. To guide co-ops on how to determine the alternative smart inverter settings to comply with the standard and to achieve the benefits of the grid services, NRECA worked with two co-ops to conduct field tests and shared the findings of these studies in [this page on cooperative.com](#).

An Advisory Providing Details About the FERC Order 2222 for DER Aggregation

In Order 2222, FERC declares jurisdiction over DER aggregation transactions within regional transmission operator (RTO) or independent system operator (ISO) wholesale markets, including resources in front of and behind the distribution customer meter. A small utility opt-in feature allows almost all distribution cooperatives to maintain local control over the decision to allow aggregator access to their consumer-members. Co-ops are encouraged to be involved in RTO stakeholder discussions and stay updated on the market and technical requirements for implementation as they evolve. NRECA provides details about this order in this [advisory](#).

Interstate Renewable Energy Council (IREC)

IREC updated its *Model Interconnection Procedures* for the second time in 2019. This publicly available, complimentary resource has helped guide and inform utilities, including co-ops and other energy DER stakeholders, as they develop and/or refine their DG interconnection process. The objectives of the 2019 Model Procedures are to reorganize the process for safe and reliable interconnection for all consumers' DG, while also helping utilities save time and resources as they address interconnection issues. The document is publicly available [here](#).

For More Information and Questions

For more information about the DG Toolkit, please visit our website at:

<https://www.cooperative.com/programs-services/bts/Pages/Distributed-Generation-Toolkit.aspx>

For any questions or inquiries, please contact:

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Senior Engineer Distribution Optimization – Integrated Grid
NRECA, Business & Technology Strategies

fathalla.eldali@nreca.coop