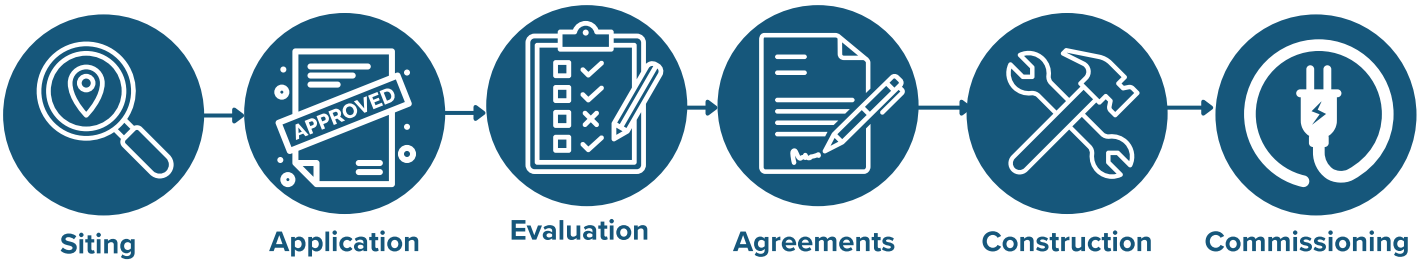
Distribution Interconnection 101

Introduction

Interconnection is the process by which electric generating projects are approved to connect to the electric grid. Distributed energy resources (DER), such as solar and energy storage projects below 20 MW, are typically connected to the distribution system and are reviewed under DER interconnection processes. The process includes a series of administrative and technical steps that electric utilities undertake to evaluate proposed projects to determine whether any grid upgrades are needed for them to safely interconnect. The DER interconnection process is managed by electric utilities, used by DER customers, and regulated by state regulatory bodies. In the U.S., many state governments have established interconnection procedures that prescribe the steps, technical review criteria, and timelines that utilities in their state must follow. When these interconnection procedures are well-designed, they can support faster and more cost-effective DER integration, but when they are outdated or poorly designed they can slow or even halt DER growth.

Why DER Interconnection Matters

DERs are crucial to efforts to rapidly and equitably decarbonize the grid. Without effective interconnection regulations, these projects often face unnecessary obstacles and delays. Currently, almost 60 percent of U.S. states have interconnection rules that fail to provide a basic level of certainty for interconnection customers.[1] In the face of federal policy uncertainty, DER interconnection policy is a powerful state-level tool to support the rapid decarbonization of the grid. State regulators can mandate and standardize effective interconnection procedures across utilities in their state, helping to improve process transparency, slash installation costs for installers and customers, and reduce delays in system operation and project cancellations.



Steps in the DER Interconnection Process

Siting: The customer uses publicly available tools and resources to determine whether DERs are economically viable at a particular location. This applies to customers, like project development companies, that are able to select from multiple locations. Some customers, like homeowners looking to install residential solar on their residence, may not engage in siting.

Application: The customer submits an application to the electric utility with details about the proposed project (e.g., location, size, etc.).

Evaluation: The utility evaluates the proposed project to determine if it could cause any adverse impacts to the grid that require additional study or upgrades.

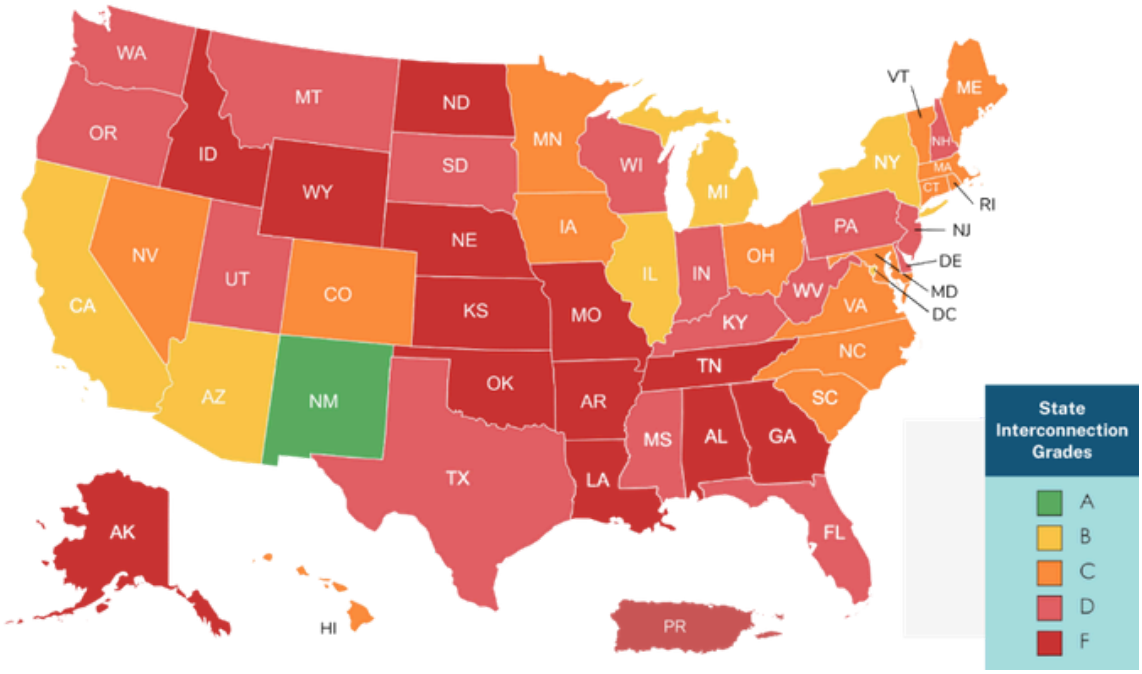
Agreements: The customer and utility agree to the terms of interconnection, including payment for any necessary upgrades, responsibilities of the parties during and after construction, operating requirements, or maintenance.

1. According to IREC and Vote Solar's 2023 Freeing the Grid report, 29 states did not provide clear requirements, steps, timelines, or review criteria for how DERs should be interconnected to the grid

Construction: The customer completes construction of the generation facility and its connection to the grid, and the utility completes any required upgrades.
Commissioning: The utility performs a series of final system checks before authorizing the customer to start generating (permission to operate).

How States Stack Up

According to IREC and Vote Solar's Freeing the Grid state interconnection scorecard,[2] which assesses states' interconnection policies relative to best practices, only one state received an "A" grade. Of the remaining states, 13 received an "F," 16 received a "D," 15 received a "C," and 5 states received a "B."



Guiding Principles for Effective Interconnection Procedures

As states seek to meet clean energy and/or decarbonization goals, the effective and efficient integration of DERs is critical. The following interconnection principles ensure that a state's interconnection procedures enable cost-effective, timely, and transparent processes to connect DERs to the grid:

- Establish efficient timelines for the utility to complete each step in the interconnection process.
- Expand eligibility for streamlined review levels to expedite grid connection for projects unlikely to trigger adverse system impacts.
- Ensure technical review uses up-to-date criteria and assumptions that accurately and efficiently assess DER impacts to the grid.
- Establish robust data sharing and reporting requirements to foster transparency and utility accountability.
- Incorporate the latest technical standards (e.g., IEEE 1547-2018)[3] into the rules to enable DERs' grid-supporting functionalities.
- Implement or strengthen grid transparency tools (e.g., hosting capacity analyses,[4] pre-application reports, etc.) to improve customer siting decisions.
- Create a dispute resolution process and a regular interconnection working group to resolve disputes and facilitate consistent dialogue on challenges and opportunities for improvement.

2. https://freeingthegrid.org/interconnection-key-takeaways/
2. https://irecusa.org/resources/making-the-grid-smarter-primer-on-adopting-the-new-ieee-standard-1547-2018/
3. https://irecusa.org/our-work/hosting-capacity-analysis/
4. https://www.greentechmedia.com/articles/read/bringing-it-all-together-the-importance-of-dispute-resolution#gs.JqGjBCw