CHP
EPA COMBINED HEAT AND POWER PARTNERSHIP

Standardized Interconnection Rules

An Effective Policy to Encourage Distributed Generation

A standardized interconnection rule is one of several tools that states can adopt to increase the amount of clean distributed generation (DG) in their state. Standardized interconnection rules, which are generally developed and administered by a state's public utility commission, establish clear and uniform processes and technical requirements for connecting DG systems to the electric utility grid. These rules are an important mechanism for improving the market conditions for clean DG.

Utility interconnection can be a critical component of a successful DG project. Connecting to the grid enables the facility to:

- Purchase power from the grid to supply supplemental power as needed, for example, during periods of planned system maintenance.
- Sell excess power to the utility.
- Maintain grid frequency and voltage stability, as well as utility worker safety.

The primary objective of a standard interconnection rule is to obtain the benefits that clean DG can provide without comprising grid safety or reliability.

This topic is of particular interest as the Energy Policy Act of 2005 (EPAct 2005) directs states to consider upgrading their standards for interconnecting small generators within one year of enactment.

Why Is Standard Interconnection Needed?

Standard interconnection rules encourage the application of clean DG by reducing uncertainty. They establish clear and uniform processes and requirements for connecting to the electric utility grid. These uniform requirements ensure that the costs of interconnection are the same throughout the state and are commensurate with the nature, size, and scope of the DG project. They also help DG project developers accurately predict

What Is Clean DG and What Are Its Benefits?

Distributed generation is the generation of electricity at or near the energy end-user. Clean energy technologies include renewable energy sources such as solar, wind, geothermal, biomass, biogas, and low-impact hydroelectric, as well as combined heat and power (the simultaneous generation of electric and thermal energy from a single source).

Clean DG projects yield numerous public benefits, including:

- Spurring economic development
- Reducing peak electrical demand on the grid
- Reducing grid congestion in targeted load pockets, potentially deferring or displacing more expensive transmission and distribution infrastructure investments.
- Reducing the environmental impact of power generation
- Reducing fuel price volatility

the time and costs involved in the application process and the technical requirements for interconnection. Finally, standard rules ensure that the project interconnection meets the safety and reliability needs of both the energy end-user and the utility.

What Are the Key Elements of a Standard Interconnection Rule?

Standard interconnection rules address the application process and the technical requirements for interconnecting DG projects of a specified type and size with the electric grid.

Application Process - Includes some or all parts of the interconnection process, starting from when a potential customer considers submitting an application up to the time when the interconnection agreement is finalized. For example, rules may specify application forms, timelines, fees, dispute resolution processes, insurance requirements, and interconnection agreements.

Technical Interconnect Requirements - Includes technical protocols and standards that govern how generators must interconnect with the electric grid. Rules generally specify the type of generation technology that may be interconnected, the required attributes of the electrical grids where the system will be connected, the types of equipment and protocols required for the physical interconnection, and the maximum system size that is eligible for the interconnection process.

These requirements may specify that DG must conform to industry or national standards (such as IEEE 1547 and UL 1741), and may include protection systems designed to minimize degradation of grid reliability and performance as well to maintain worker and public safety.

Which States Have Adopted Interconnect Standards?

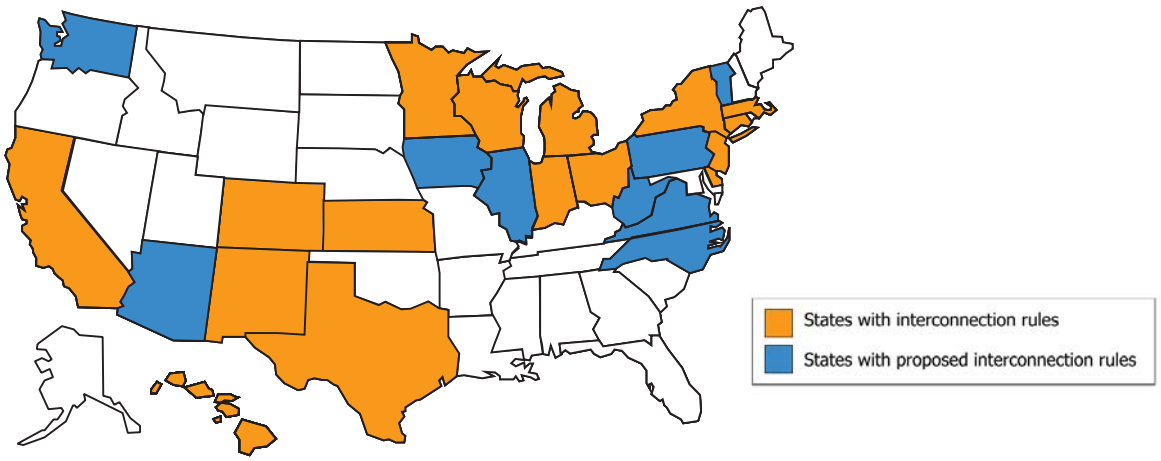
As of June 2006, 16 states have adopted standard interconnect rules for DG (Figure 1). Nine additional states are in the process of developing their rules.

In addition to interconnection requirements, many states have adopted net metering provisions. Net metering occurs when a DG project output exceeds the site's electrical needs and the utility either pays the customer for excess power supplied to the grid or allows the net surplus to carry over to the next month's bill. Net metering provisions streamline interconnection standards but are often limited to specified sizes and types of technologies.

As of July 2005, 39 states plus the District of Columbia have adopted net metering rules (Figure 2). In some of these states, net metering provisions are limited in scope (e.g., limited to small systems, specified technologies, or particular fuels of local interest). For current net metering information, visit the Interstate Renewable Energy Council at *www.irecusa.org*.

Some state net metering rules lack detailed specifications and procedures for utilities and customers to follow and vary across utilities within in the state. Several states, however, have implemented net metering provisions and interconnection rules that provide a complete range of interconnection processes and requirements (e.g., New Hampshire and New Jersey have developed standard interconnection processes and requirements as part of their net metering provision).

Figure 1
States with DG Interconnection Standards



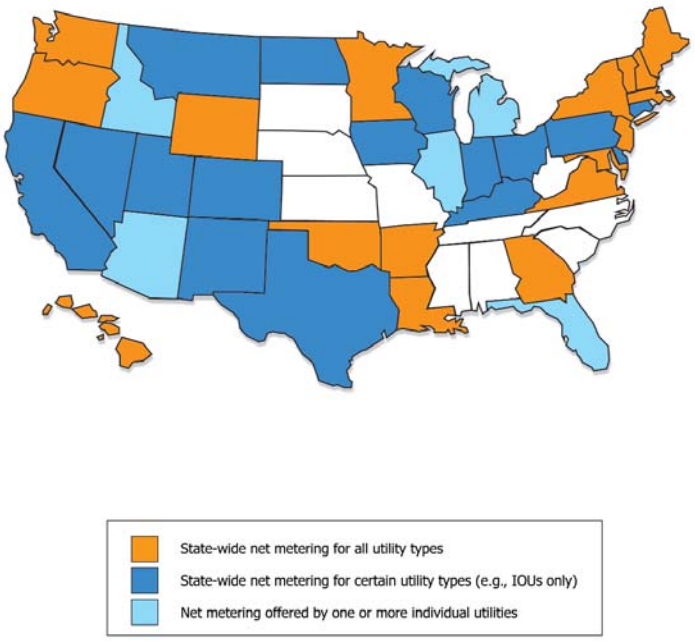
Current as of June 15, 2006

Elements of a Successful Policy

Based on the experiences of states that have developed rules for standard interconnection, a number of best practices have emerged for designing effective interconnect standards that balance the needs of the utility company, DG owners and the public. States considering interconnection standards can use the best practices that follow as models as they develop their own interconnection rules:

- Work collaboratively with interested stakeholders to develop clear, concise interconnection rules that are applicable to all potential DG technologies. Key stakeholders include:
    - Electric utilities
    - State public utility commissions
    - Developers of CHP and renewable energy systems
    - Third-party technical organizations (e.g., the Institute of Electrical and Electronic Engineers [IEEE 1547] and Underwriters Laboratory, Inc. [UL Standard 1741])
    - Regional transmission organizations (RTOs)
    - Other government agencies, such as the Federal Energy Regulatory Commission (FERC) or state environmental and public policy agencies.
- Tailor rules to address specific issues faced by different project sizes. Consider overlaying a screen mechanism to determine which procedure a particular system must go through.
- Develop standards that cover the scope of the desired DG technologies, generator types, sizes, and distribution system types.
- Address all components of the interconnection process, including issues related to both the application process and technical requirements.
- Consider making the application process and related fees commensurate with generator size.
- Create a streamlined process for small and simpler systems that are certified compliant to IEEE 1547 and UL Standard 1741.
- Consider using existing rules and models as templates, including the National Association of Regulatory Utility Commissioners, Interstate Renewable Energy Council, FERC, and rules of other states. (See Additional Resources below)
- Try to maximize consistency between the Regional Transmission Organization and the state standards for large generators.
- Where possible, be consistent with other states' rules, to help reduce compliance costs for project proponents.
- After adopting a standard, monitor effectiveness and update as needed based on rule effectiveness, feedback from utilities and applicants, changes in DG/CHP and electric utility technologies, and changes in consensus standards of third-party technical organizations.

Figure 2
States with Net Metering Rules



EPA Assistance Available

The EPA Combined Heat and Power Partnership is a voluntary program that seeks to reduce the environmental impact of power generation by promoting the use of cost effective CHP. The Partnership assists state policy makers and regulators to evaluate opportunities to encourage CHP through the implementation of policies and programs. *www.epa.gov/chp*

Additional Resources

EPA has created The Clean Energy-Environment Guide to Action. The Guide provides an overview of clean energy supply technology options and, in addition to interconnection standards, presents a range of policies that states have adopted to encourage continued growth of clean energy technologies and energy efficiency. The Guide is available at *www.epa.gov/cleanenergy*.

The National Association of Regulatory Utility Commissioners (NARUC) Model Interconnection Procedures and Agreement for Small Distributed Generation Resources. *www.naruc.org/associations/1773/files/dgiaip_oct03.pdf*

The Interstate Renewable Energy Council (IREC) model interconnection rule and guide to connecting DG to the grid. *www.irecusa.org/connect/model_interconnection_rule.pdf* *www.irecusa.org/pdf/guide.pdf*

The Regulatory Assistance Project's Distributed Resource Policy Series supports state policy efforts. *www.raponline.org*

The U.S. Combined Heat and Power Association (USCHPA) has been an active stakeholder in development of standard interconnection rules in various states. *www.uschpa.admgt.com*

State Examples

In developing interconnection requirements, states can review standards already developed by other states. For example, Texas, New York, and Massachusetts serve as good examples. Although each has different interconnection application and review processes regarding fees, timelines, and eligibility criteria, they contain many of the elements of successful interconnection policies highlighted on page 3. Other examples are available on the Web sites of states with DG interconnection standards in place. (See Figure 1.)

New York's Standard Interconnection Requirements can be viewed or downloaded at *www.dps.state.ny.us/distgen.htm.*

Information on Texas's interconnection standards can be found in the Distributed Generation Interconnection Manual, available at *www.puc.state.tx.us/electric/business/dg/dgmanual.pdf.*

Massachusetts created a stakeholder DG Collaborative (which includes utilities, DG developers, customers, and public interest organizations) charged with developing a Model Interconnection Tariff. The Model Tariff clearly specifies each step within the interconnection process and the maximum permissible time frames for each step.

Although the existing standard has been successfully used by many applicants, the DG Collaborative nevertheless has determined that it should review the application process and screening criteria in the Model Interconnection Tariffs to further improve the process. The DTE DG interconnection proceedings can be found at *http://www.mass.gov/dte/restruct/competition/distributed_generation.htm*

For more information, contact:

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