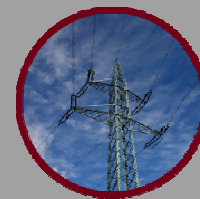




Public Utilities  
Commission



# An Introduction to Interconnection Policy in the United States



Ukraine / Armenian Visit

October 25, 2012

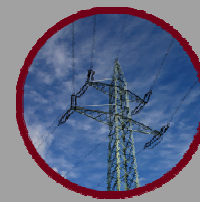
PUCO Staff

Paul Hutchison

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[Public Utilities Commission of Ohio](#)

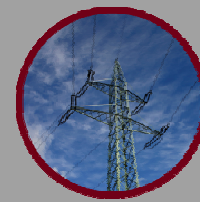
Image source: <http://www.futurity.org/earth-science/how-to-debug-solar-panel-design/>



# Agenda

- I. Introduction to Interconnection Policy
- II. History of Interconnection Policy
- III. Ohio's Interconnection Procedures



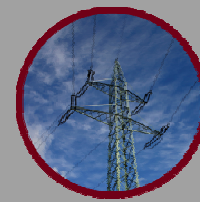


# What are interconnection Rules?



Rules establishing administrative procedures and technical standards for interconnecting Distributed Generation (DG) to the electric power system.



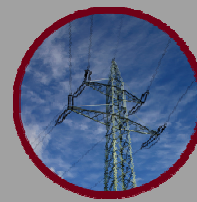


# Why have interconnection Rules?

Balancing two objectives:

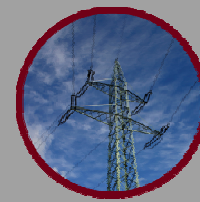
1. Provide a transparent and efficient means to interconnect generators to the electric power system.
2. Maintain the safety, reliability and power quality of the electric power system.





Interconnection procedures consist of three steps:

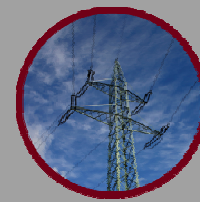
1. Customer submits interconnection application
2. Utility assigns queue position and executes technical review
3. Joint signing of Interconnection Agreement



An **Interconnection Agreement** is a legal contract between the electric utility and customer establishing all terms and conditions associated with operating DG in parallel with the utility's electric power system.



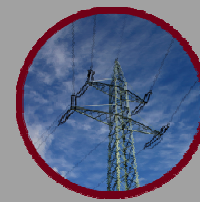




### Interconnection Agreements allow customers to:

1. Operate onsite generation in parallel with the electric utility's distribution system.
2. Sign a net metering contract with utility.
3. Become a certified Ohio Renewable Energy Resource Generating Facility.
4. Generate and sell Renewable Energy Credits.





### In the Beginning...

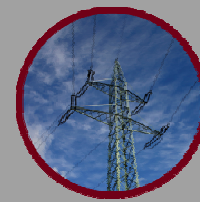
Prior to standardized interconnection policy, interconnection processes were left up to utility discretion.

Discretionary processes were shaped by three factors:

1. The utility's obligation to maintain the safety and reliability of their electric power system
2. General lack of experience with small-scale DG technology
3. The utility's financial disincentive to facilitate DG development







The interconnection process characterized as being opaque, costly, time-consuming, and inconsistent across service territories.

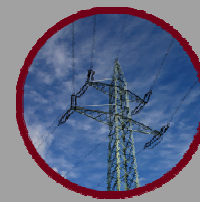


Introduced significant risk to new DG development.



A 2000 survey by the National Renewable Energy Laboratory (NREL) found that virtually all DG projects met some degree of resistance from utilities during the interconnection process.<sup>1</sup>

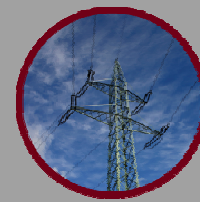




# Path to Reform

Between 2000 and 2006 policymakers began implementing policy reforms to improve the interconnection process.

**The policy goal:** to maintain the safety and reliability of electric power systems while providing developers a transparent, efficient, and cost-effective process that operates on reasonably predictable timeframes.



### December 2000: California Rule 21

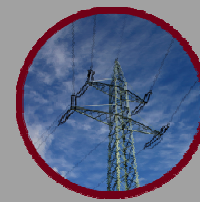
Among the first comprehensive, state-wide interconnection policies in the United States.<sup>2</sup>

Developed two influential innovations:

1. Screening process streamlined review of interconnection applications.

2. Procedural timelines expedited interconnection process.



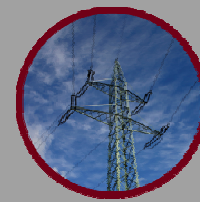


### June 2003: Technical Standards

Institute for Electrical and Electronics Engineers  
(IEEE) 1547 *Standard for Interconnecting  
Distributed Resources with the Electric Power  
System.*

Provides requirements relevant to performance,  
operation, testing, safety, and maintenance of DG  
interconnection with electric power systems.<sup>3</sup>





## May 2005: Federal Rules



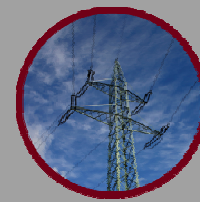
Federal Energy Regulatory Commission (FERC)  
*Small Generator Interconnection Procedures* (SGIP)  
and *Small Generator Interconnection Agreement*  
(SGIA).<sup>4</sup>



1. Applicable to transmission level interconnections.
2. Developed 3 review levels, scaling DG size with technical review scope







### August 2005 Energy Policy Act (Epact)



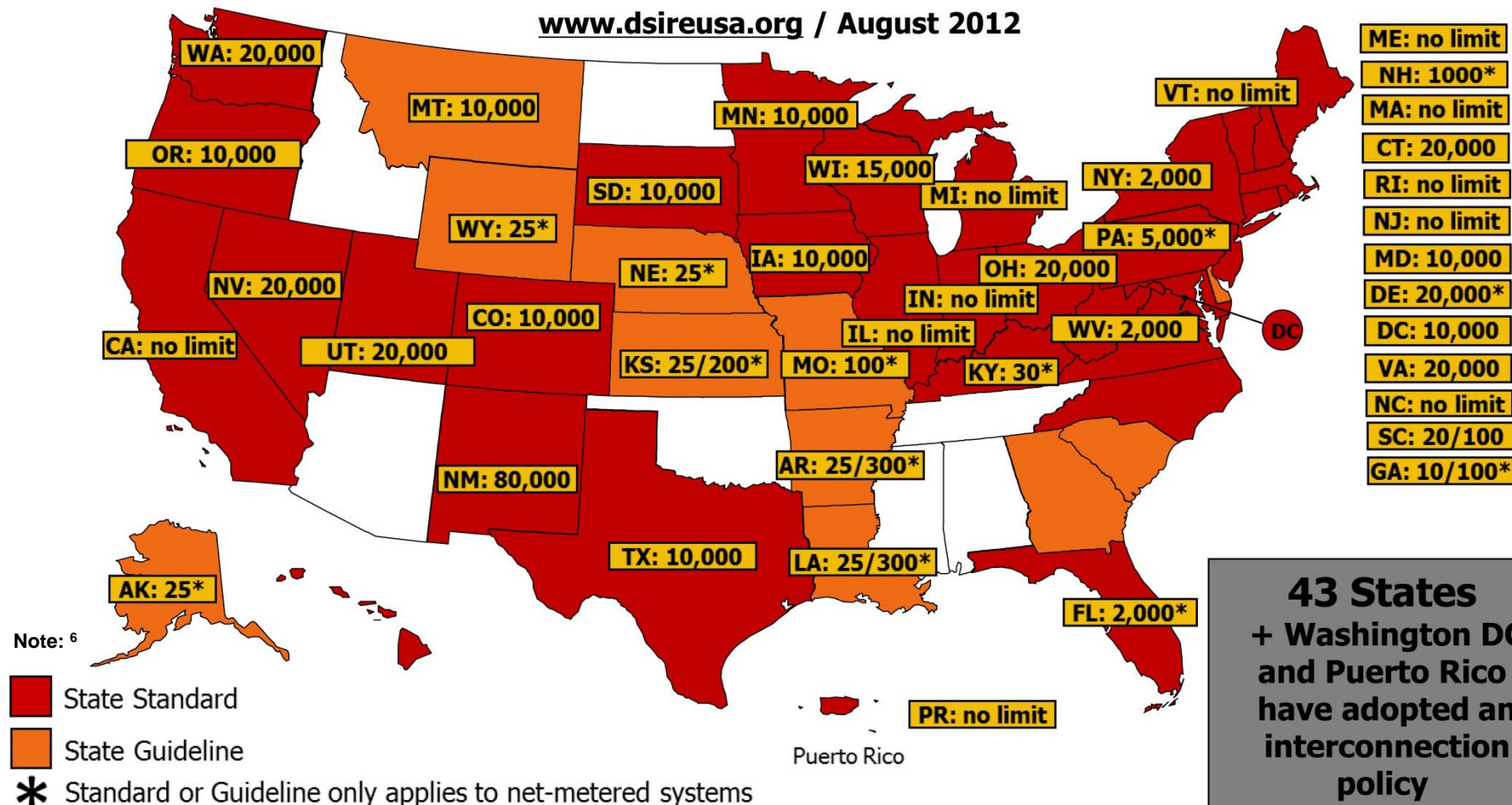
Section 1254 of EPAct required state regulatory commissions and certain non-regulated utilities to consider adopting interconnection procedures based on IEEE 1547 Standard and current 'best practices.'<sup>5</sup>

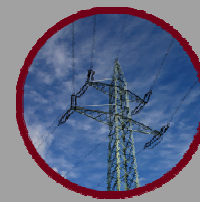




## Interconnection Policies

[www.dsireusa.org](http://www.dsireusa.org) / August 2012





# Interconnection Policy in Ohio



Ohio's Interconnection Rules are designed to:



1. Standardize technical requirements across the state.
2. Streamline development of DG pursuant to Ohio renewable energy policy objectives.
3. Maintain the reliability, safety, and power quality of electric service in the state.

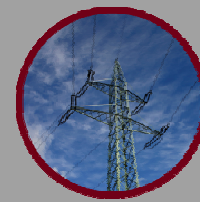


**Applicable to distribution-level interconnections.**





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## Ohio Interconnection Policy Language



Ohio Revised Code: ORC: 4928.02 (K) (statute)

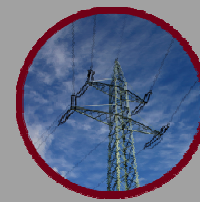
<http://codes.ohio.gov/orc/4928.02>



Ohio Administrative Code: 4901:1-22 (rule)

<http://codes.ohio.gov/oac/4901%3A1-22>





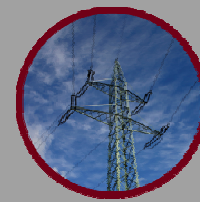
## Rule Jurisdiction

Ohio's interconnection rules apply to distribution-level interconnections only.



Transmission-level interconnections are governed by the FERC SGIP and are adopted and administered by Ohio's regional transmission organization, PJM Interconnection.



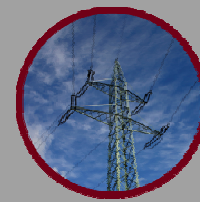


### Ohio's interconnection rules adopt the principle features of the FERC SGIP:

1. Require adherence to the IEEE 1547 and UL 1741 technical standards
2. Similar customized, multi-level approach matching degree of technical review with project characteristics.
3. Establish standard and simplified applications and interconnection agreements
4. Expenses for application processing, technical studies, and system or facility upgrades are the responsibility of the applicant, not the utility.







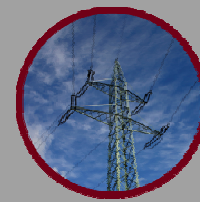
# Application Processing and Queuing

## Interconnection Requests are Interdependent

1. Applications are processed in the order they are received.
2. The utility assigns the application a queue position *in relation to other interconnection requests on the same or nearby distribution system sections.*
3. The queue position is used to determine the cost responsibility of any necessary facility upgrades *in relation to other interconnection requests on the same or nearby distribution system sections.*



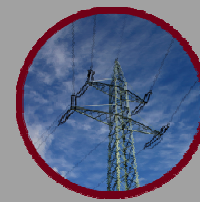




Ohio's procedure consists of five review levels, scaled to system type, size, and configuration.



Review Level	Eligibility	Application / Contract	Application Fees
1	inverter-based systems ≤ 10 kW to radial or spot networks	Short-form applications  Simplified Interconnection Agreement	one tenth an hour of simplified review
1.1	inverter-based systems ≤ 10 kW to the load side of area networks		
1.2	inverter-based systems ≤ 50 kW to an area network		
2	all system types ≤ 2 MW	Standard application  Standard Interconnection Agreement	\$50, plus one dollar per kilowatt of system capacity
3	all system types ≤ 20 MW		\$100, plus two dollars per kilowatt of system capacity



All level 1 and level 2 reviews utilize technical screens largely adopted from the SGIP.



Level 3 review initiates a detailed study process consisting of three tests:



1. Feasibility study



2. System impact study



3. Facilities study

*One or all of these tests can be waived by the utility.*



# Ohio

## Public Utilities Commission

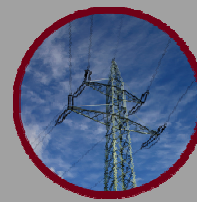
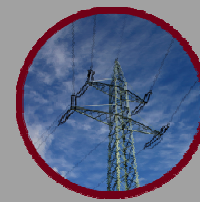


image source: <http://www.lesliehawes.com/wordpress/?p=731>



<sup>1</sup> R. Brent Alderfer, Thomas Starrs, and M. Monika Eldridge, *Making Connections: Case Studies of Interconnection Barriers and their Impact on Distributed Power Projects*, NREL/SR-200-28053 (Revised July 2000), available at [www.nrel.gov/docs/fy00osti/28053.pdf](http://www.nrel.gov/docs/fy00osti/28053.pdf).



<sup>2</sup> See CPUC Decision 00-12-037 (December 21, 2000), available at [http://docs.cpuc.ca.gov/word\\_pdf/FINAL\\_DECISION/4117.pdf](http://docs.cpuc.ca.gov/word_pdf/FINAL_DECISION/4117.pdf).



<sup>3</sup> IEEE Std 1547™ -2003, IEEE Standard for Interconnecting Distributed Resources with Electric Power Systems



<sup>4</sup> See *Standardization of Small Generator Interconnection Agreements and Procedures*, Order No. 2006, FERC Stats. & Regs. ¶ 31,180 (Order 2006), order on reh'g., Order No. 2006-A, FERC Stats. & Regs. ¶ 31,196 (2005)(Order 2006-A), order on reh'g, Order No. 2006-B, FERC Stats. & Regs. ¶ 31,221 (2006)(Order 2006-B).



<sup>5</sup> See *Energy Policy Act of 2005* Public Law 109-58 (August 8, 2005), available at: <http://www.gpo.gov/fdsys/pkg/PLAW-109publ58/pdf/PLAW-109publ58.pdf>

<sup>6</sup> DSIRE, Summary Maps, RPS Policies.

