



Report to the Legislature on the Development of Distributed Electric Generation in Wisconsin

Docket 05-EI-122, December 2000

Available at:

<http://www.psc.state.wi.us/ind-elec.htm>





Recommendations:

1. Establish STAKEHOLDER collaborative group.
2. Establish uniform, simplified STANDARDS.
3. Establish precertification and standardized testing
 - For interconnection equipment – IEEE and UL
 - Efficiency and emissions at point of manufacture

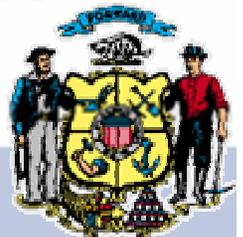




Recommendations:

4. Establish tariffs that:

- Expand “Net Energy Billing.” Buy-back rates depending on environmental and grid benefits and dispatchability.
- Utility should cover interconnection costs where there is a demonstrated benefit to the grid





Recommendations:

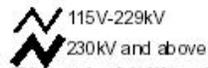
5. **Establish statewide, standardized CONTRACTS.**
 - **Single, all inclusive interconnection fee.**
 - **Standard formula for determining cost of distribution upgrades.**

6. **Require all generators to register with the utility and PSCW.**



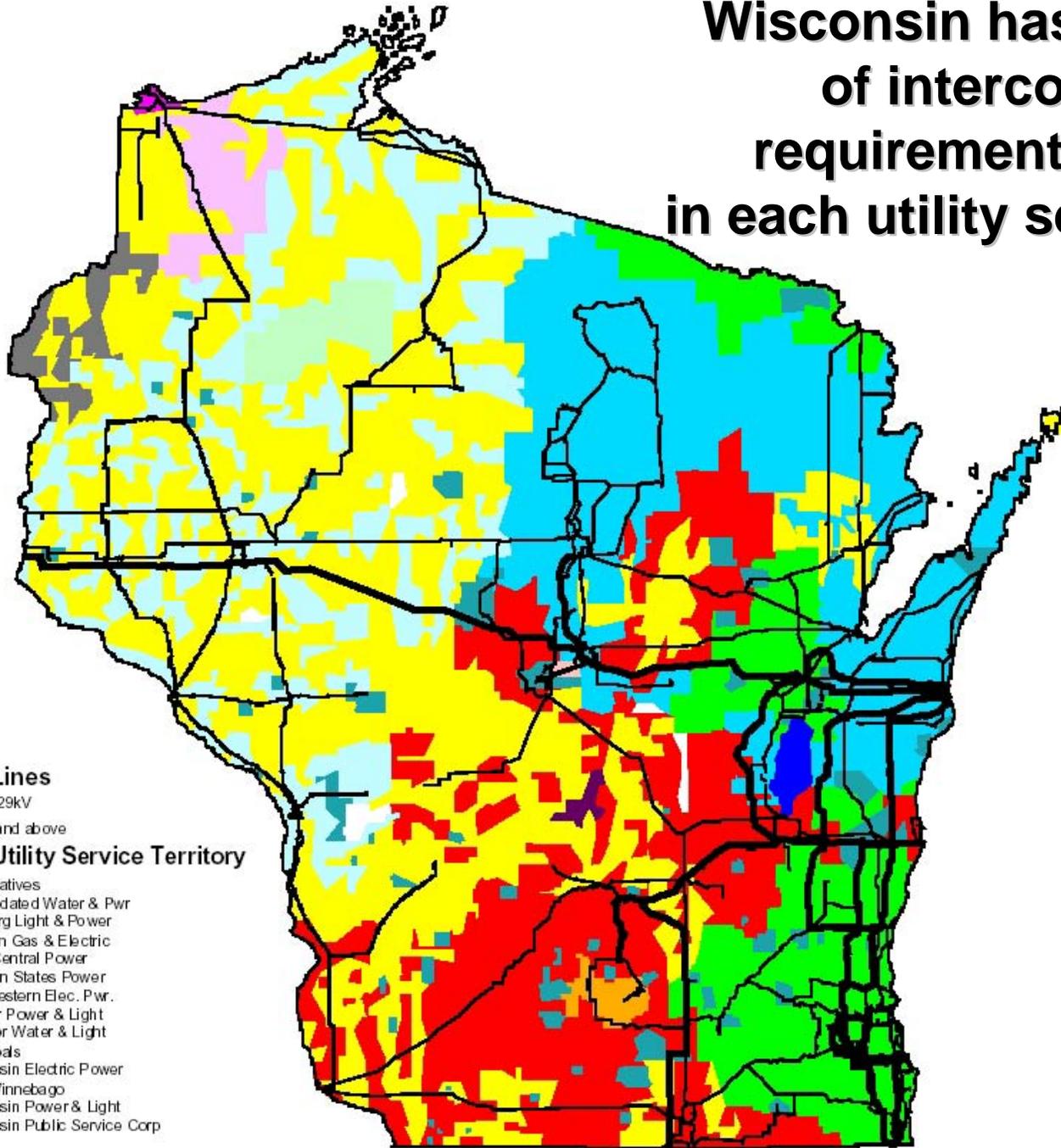
**Wisconsin has a patchwork
of interconnection
requirements that differ
in each utility service territory.**

Electric Lines



Electric Utility Service Territory

- Cooperatives
- Consolidated Water & Pwr
- Dahlberg Light & Power
- Madison Gas & Electric
- North Central Power
- Northern States Power
- Northwestern Elec. Pwr.
- Pioneer Power & Light
- Superior Water & Light
- Municipals
- Wisconsin Electric Power
- Lake Winnebago
- Wisconsin Power & Light
- Wisconsin Public Service Corp





Wis. Admin. Code § 113.0207,

**“Requirements for Utility Rules for
Interconnection of Small Customer-Owned
Generation Facilities with the Utility
System”,**

**has been in effect since October 1, 1982
and does not address current needs.**

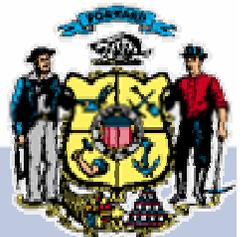




Legislation 2001

§ 196.496 Distributed Generation Facilities

- Capacity of no more than 15 MW
- Located at a point where electricity will be used OR at a location that will support the electric distribution grid
- Develop rules establishing standards for interconnection
- Standards shall be uniform and promote distributed generation [where technically feasible and cost effective]
- Standards shall address engineering, electric reliability safety concerns, and methods for determining the charges to interconnect
- Formation of advisory committee





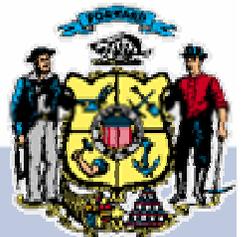
OBJECTIVE AND WORKPLAN

Wis. Admin. Code ch. PSC 119

Objective:

To establish interconnection rules that are uniform across the state and promote development of distributed generation.

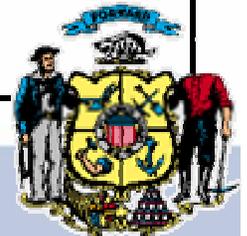
The rules will address engineering, electric reliability, safety concerns and the methods of determining charges for interconnection.





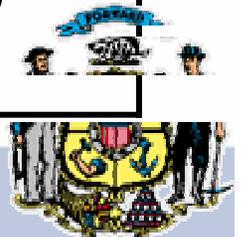
Workplan:

Tentative Schedule	Action
August 8, 2001	Open docket 1-AC-207
October 11, 2001	Commission approval of Statement of Scope
January 2002	Establish Advisory Committee
February to June 2002	Hold meetings of Advisory Committee
April to July 2002	Prepare draft rules and submit to Commission for review



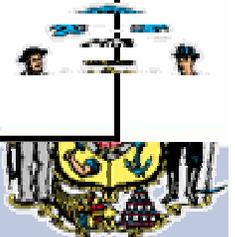


Tentative Schedule	Action
August 2002	Submit draft rules to Legislative Council
August 2002	Prepare Notice of Investigation and Hearing on proposed rules and environmental review
August 29, 2002	Issue Notice of Investigation and Hearing on proposed rules
September 1, 2002	Hearing noticed in the Wis. Admin. Register (at least 10 days before hearing)





Tentative Schedule	Action
Sept. / Oct. 2002	Hold Public Hearing (one day in Madison)
October 2002	Close record; summarize comments. Prepare final draft to submit to legislature
November 2002	PSC order adopting final rules
January 2003	Review by Legislative committee (30 days)





Tentative Schedule	Action
February 2003	Rules filed.
March 2003	Publication in Wis. Admin. Register
April 15, 2003	New rules become effective





Consensus Based Distributed Generation Interconnection Guidelines





Process Lead By Renew Wisconsin Funding by Joyce Foundation

www.renewwisconsin.org





Wisconsin DR Interconnection Group

- **RENEW Wisconsin, L & S Technical Associates, MSB Energy Associates**
- **Wisconsin Electric Power Co.**
- **Alliant Energy Co.**
- **Wisconsin Public Service Co.**
- **Xcel Energy Co.**
- **Madison Gas & Electric Co.**
- **WPPI: reps. many cooperatives and municipal utilities**
- **WI state agencies: Depts. of Administration, Revenue, Commerce, Natural Resources, Public Service Commission**
- **Equipment manufacturers including: S&C, Kohler, Caterpillar, Waukesha/Cummins**
- **American Transmission Co.**



Interconnection Guidelines Include:

- **Application process**
- **Technical design requirements**
- **Contract requirements:**
 - **application form**
 - **interconnection agreement**



Guidelines and rules will apply to utility distribution system interconnections at 50 kV or less.





Pre-certification (Type testing)

Pre-certified equipment:

UL 1741 Box: Accepted without a study of what's in the box or how it functions

Non-certified equipment:

Complete system must be reviewed to assure minimum protection requirements



**Interconnection design requirements
will conform to:**

IEEE 1547

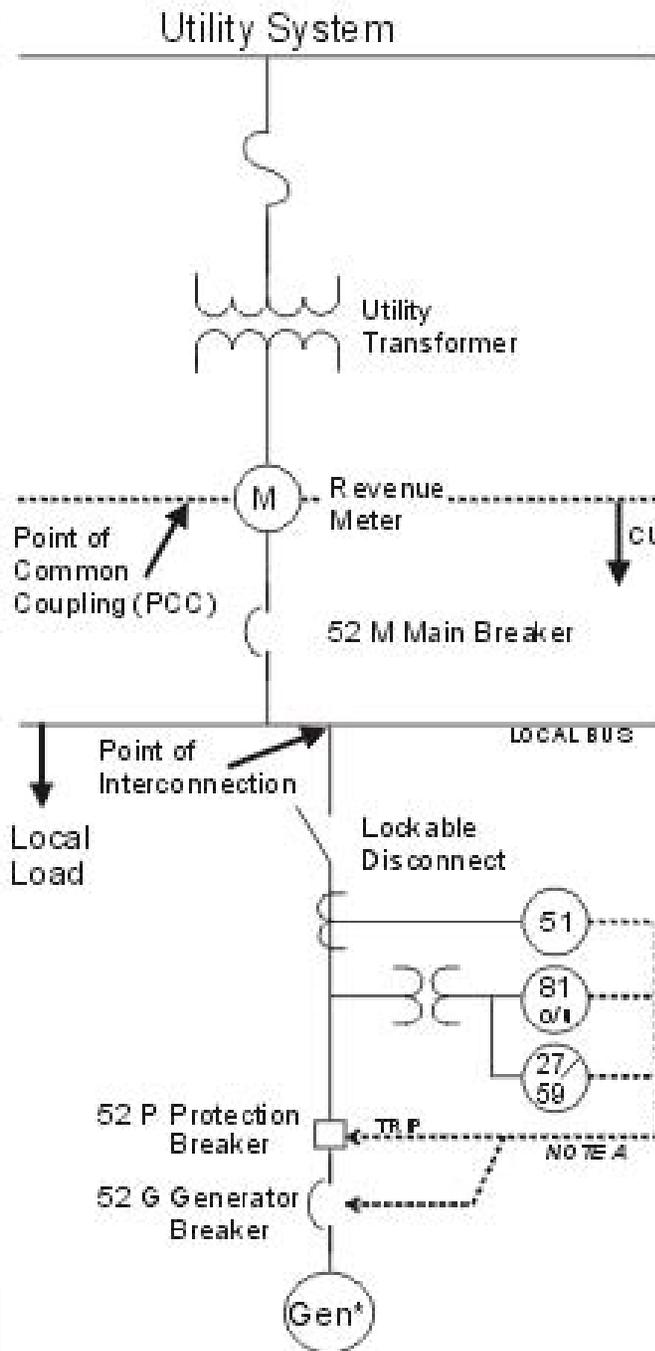
**Standard for Distributed Resources
Interconnected with Electric Power Systems**



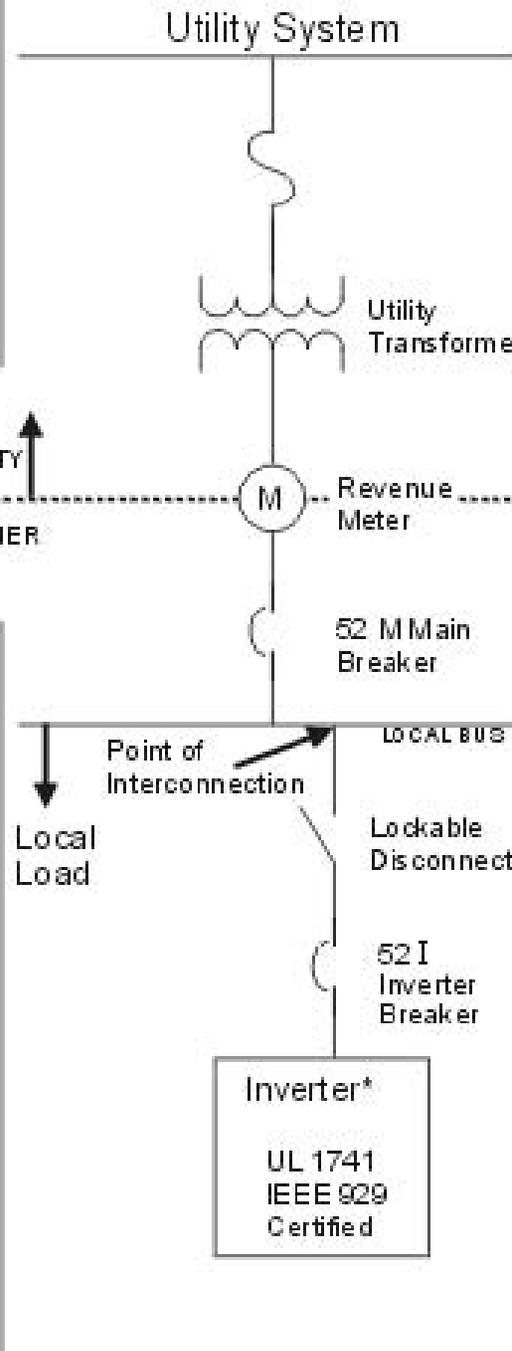
- **Manual disconnect switch (with air gap)**
- **Continuous ground connection**
- **Operating limits: islanding / power quality**
 - IEEE 929 (UL 1741) for pre-certified equipment
 - IEEE 1547 for non certified equipment
- **Minimum protection function requirements**
 - over/under frequency function
 - over/under voltage function
 - over-current function
 - negative sequence current function (3-phase only)
- **One-line schematic diagram**



(Generator Interconnection Example)



(Inverter Interconnection Example)



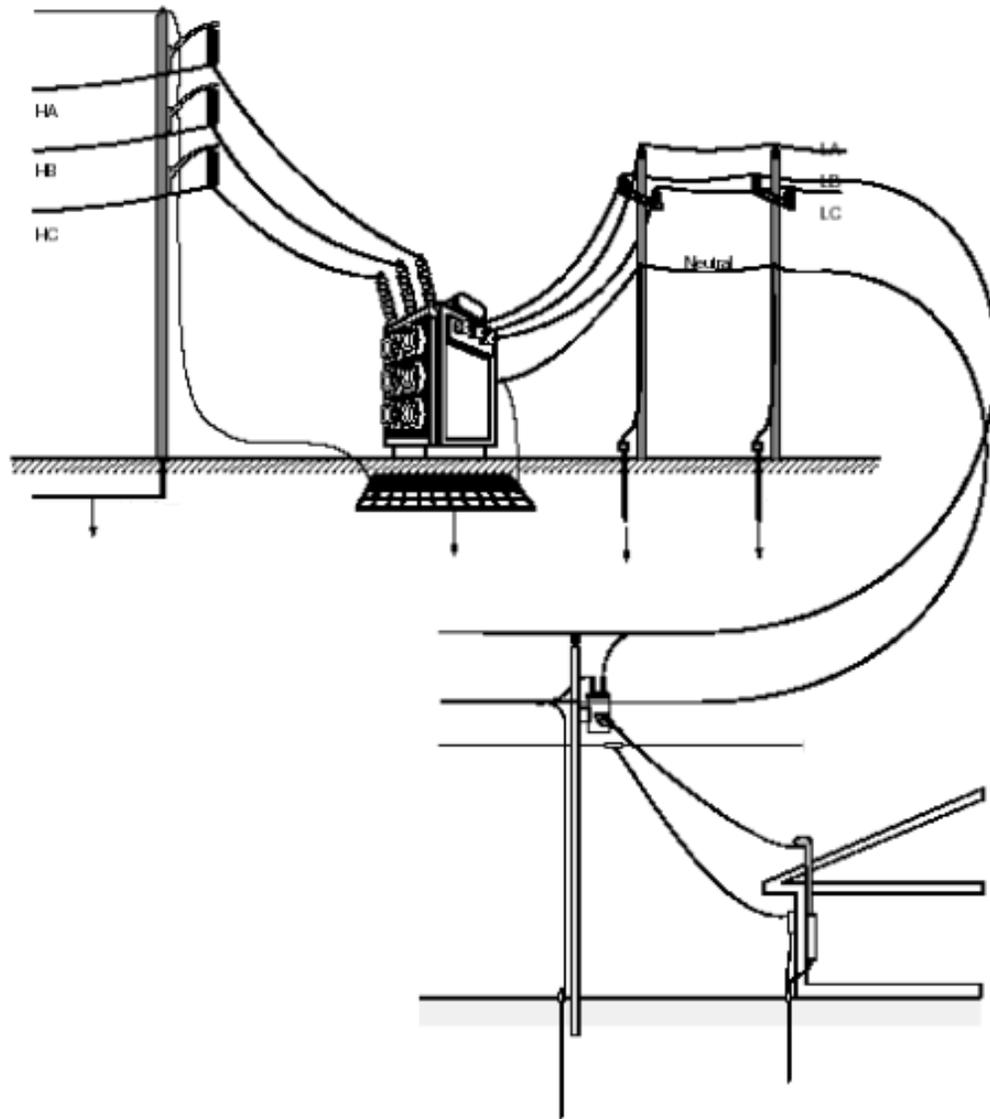
**Example
one-line
schematic
diagram
for DG
≤ 20 kW**



- **General liability insurance:**
 - \$300,000 per occurrence or
prove financial responsibility
- **Mutual indemnification**
- **Disconnection policies**
- **No review fees for DG 20 kW or less**



- **Process for pre-certifying DG equipment**
- **Study fee costs**
- **Commissioning tests**
- **Insurance requirements**
- **Additional protection functions**
- **Distribution system voltage constraints**
- **Local distribution system capacity constraints**
- **Maximum short circuit current on distribution system feeders**



Stray Voltages and Currents



Requirements will be specific to distributed generation size categories:

- **Distributed generation \leq 20 kW**
with simplified application process
- **Distributed generation $>$ 20 kW**
and \leq 1 MW
- **Distributed generation $>$ 1 MW**
and \leq 15 MW

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Business Practice Barriers **to Distributed Generation**

- **Liability insurance**
- **Indemnification**
- **Tariffs & net metering limitations**
- **Service infrastructure**
- **Engineering study & review fees**



Technical

- **Lack of uniform interconnection standards**
- **Safety - islanding**
- **Power quality**
- **Local distribution system capacity constraints**
- **Maximum short circuit current on distribution system feeders**
- **Equipment certification and testing**

