

# State Interconnection Regulations: Scope and Screens

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## Introduction and Disclaimer

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The codes of regulations for the following states were assessed for this document: Delaware, Illinois, Indiana, Maryland, Michigan, New Jersey, Ohio, Pennsylvania, Virginia, and Washington, D.C.

PJM does not claim to interpret these state codes, but merely offers excerpts to support PJM stakeholders in better understanding the interconnection process for DER participation in wholesale markets. The excerpts and summaries documented here are based on a snapshot of state administrative codes from Q4 2018 and Q1 2019—such codes are constantly updated, and so readers of this document should understand it will be out of date immediately upon publication. PJM does not have plans to update this document. For these reasons, this document should not be construed as guidance (legal or otherwise) for interconnection customers with specific projects or for any other entity, but rather as an overall policy review. Moreover, PJM does not have authority over state-jurisdictional interconnections, and PJM does not administer, review, or enforce state policies on DER interconnection.

PJM does not take any position on these or any other state administrative codes, nor on retail rates or tariffs. This document should not be construed as a PJM position on state policies, but rather as context for understanding and discussing PJM's FERC-jurisdictional policies and procedures.

## Scope of Local Regulations on Interconnection Procedures

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Many local regulations outlining DER interconnection procedures are limited, for instance to net metered DER or to DER that are Class I renewables.

In particular, many state regulations have provisions to exclude from their scope DER that interconnect under FERC or PJM authority. In some cases this is expressed with language similar to “this local code does not apply to DER that are subject to the interconnection requirements of PJM Interconnection.” Since DER that seek to make wholesale sales must come through the PJM queue, regardless of whether they interconnect under local or FERC authority, such exclusions can be confusing for some stakeholders. PJM offers this statement of clarification:

For a DER wishing to make wholesale sales but connecting to a local distribution facility under state/local jurisdiction, the PJM Tariff does not govern the physical interconnection of the DER. Instead, the state/local authorities have jurisdiction over such physical interconnections. Nonetheless, in order to participate in PJM markets, such DER must meet certain PJM conditions:

- a) Enter the PJM New Services Queue;
- b) Follow through the study process to an executed Wholesale Market Participant Agreement; and
- c) Meet the technical conditions of market participation (including, but not limited to, meeting PJM’s general requirements for operational telemetry and control, as applicable).

As part of the study in the New Services Queue, the DER will be assessed for any thermal, short circuit, or stability related impacts to the FERC-jurisdictional transmission system, and the DER will be responsible for the costs of any necessary transmission upgrades prior to participating in the PJM markets.

In sum, DER wishing to make wholesale sales but connecting to a local distribution facility under state/local jurisdiction are not subject to the physical interconnection requirements of the PJM Tariff, but they nonetheless must apply to the New Services Queue and be assessed for impacts as a condition of participation in wholesale markets, as well as meet the technical conditions of market participation.

The following are excerpts of the relevant state codes.

### **Delaware (Delaware Code, Title 26. Public Utilities, Chap. 1 Public Service Commission)**

#### **Del.C., Title 26, Chap. 1, § 1014 Public purpose programs and consumer education.**

(e) The rules and regulations promulgated for net energy metering by the Commission, municipal electric companies, and electric cooperatives during any period of exemption under § 223 of this title shall: ...

(5) An electric supplier’s interconnection rules shall be developed by using as a guide the Interstate Renewable

Energy Council's Model Interconnection Rules and best practices identified by the U.S. Department of Energy. Municipal electric companies shall establish interconnection rules no later than July 24, 2008.

**PJM-related or FERC-related exclusion:** None identified

**Indiana (Indiana Administrative Code, Title 170, Rule 4.3 "Customer-Generator Interconnection Standards" 170 IAC 4-4.3-1 Definitions, Sec. 1—**(d) "Customer-generator facility" means an arrangement of equipment for the production of electricity that is owned and operated by: (1) an eligible customer; or (2) a third party at the eligible customer's site. (e) "Eligible customer" means any: (1) person; (2) firm; (3) corporation; (4) municipality; or (5) other government agency; that has agreed, orally or otherwise, to pay for electric service received from an investor-owned electric utility and is in good standing with that utility.

**170 IAC 4-4.3-2 Applicability, Sec. 2—**This rule shall apply to any investor-owned electric utility, subject to the jurisdiction of the commission, that may now or hereafter be engaged in the: (1) production; (2) transmission; (3) sale; or (4) distribution; of electric service and all customer-generator facilities that apply for interconnection with such utilities on or after the effective date of this rule.

**PJM-related or FERC-related exclusion:** None identified

**Illinois (IL Administrative Code, Title 83, Chapter I, Subchapter c, Part 466)**

**Section 466.10 Scope—**The Illinois Distributed Generation Interconnection Standard applies to generation facilities operated in parallel with an electric public utility distribution company in Illinois and meeting the following criteria:

- a) The nameplate capacity of the distributed generation facility is equal to or less than 10 MVA; and
- b) The distributed generation facility is not subject to the interconnection requirements of either the Federal Energy Regulatory Commission (FERC) or the applicable Regional Transmission Organization (RTO) (either Midwest Independent Transmission System Operator, Inc. (MISO) or PJM Interconnection, LLC (PJM)).

**Section 467.10 Scope—**The Illinois Large Distributed Generation Interconnection Standard applies to any generation facility operated in parallel with an electric public utility distribution company in Illinois and whose nameplate capacity is greater than 10 MVA (large distributed generation facility), provided that the distributed generation facility is not subject to the interconnection requirements of either the Federal Energy Regulatory Commission (FERC) or the applicable Regional Transmission Organization (RTO) (either Midwest Independent Transmission System Operator, Inc. (MISO) or PJM Interconnection, LLC (PJM)).

**PJM-related or FERC-related exclusion:** see above provisions.

**Maryland (Code of Maryland, Title 20, Subtitle 50, Chapter 20.50.09)**

**COMAR 20.50.09.01 Scope –** This chapter applies to a small electricity generator facility seeking to interconnect to the electric distribution system that meets the following criteria:

- A. The small generator facility is not subject to the interconnection requirements of PJM Interconnection, LLC; and
- B. The small generator facility is designed to operate in parallel with the electric distribution system.

**PJM-related or FERC-related exclusion:** see item A above.

**Michigan (Public Service Commission, "Electric Interconnection and Net Metering Standards")**

**Part 1. General Provisions, R 460.601a Definitions; A-I.—**

(n) "Customer" means a person who receives electric service from an electric utility's distribution system or a person who participates in a net metering program through an alternative electric supplier or electric utility.

(o) "Customer-generator" means a person that uses a project on-site that is interconnected to an electric utility distribution system.

**R 460.615 Electric utility interconnection procedures.—**Rule 15. (1) Each electric utility shall file applications for approval of proposed interconnection procedures and forms within 90 days of the effective date of these rules...

**R 460.642 Net metering application and fees—**Rule 42. (1) A uniform net metering application form and process shall be used by all electric providers and alternative electric suppliers. The uniform net metering application form shall be approved by the commission.

**PJM or FERC exclusion:** none identified

**New Jersey (NJ Administrative Code, Title 14, Chapter 5)**

**Subchapter 5: "Interconnection Of Class I Renewable Energy Systems"**

**§ 14:8-4.2 Net metering definitions—**"Customer-generator" means an electricity customer that generates electricity on the customer's side of the meter, using a class I renewable energy source.

**§ 14:8-1.2 Definitions—**"Class I renewable energy" means electric energy produced from solar technologies, photovoltaic technologies, wind energy, fuel cells powered by renewable fuels, geothermal technologies, wave or tidal action, small scale hydropower facilities with a capacity of three megawatts or less and put into service after July 23, 2012, and/or methane gas from landfills or a biomass facility, provided that the biomass is cultivated and harvested in a sustainable manner. Types of Class I renewable energy that qualify for use in meeting the requirements of this subchapter are set forth at N.J.A.C. 14:8-2.5

**PJM or FERC exclusion: § 14:8-5.2 General interconnection provisions (g)** If the interconnection of a customer-generator facility is subject to interconnection requirements of FERC or PJM, the provisions of this subchapter that apply to interconnection apply to that facility only to the extent that they do not conflict with the interconnection requirements of FERC or PJM.

**Ohio (OH Administrative Code, Title 4901, Chapter 22)**

**§ 4901:1-22-0. Definitions –** (A) "Applicant" means the person requesting interconnection service and may be any of the following:

- (1) A customer generator as defined by division (A)(29) of section 4928.01 of the Revised Code.
- (2) A self-generator as defined by division (A)(32) of section 4928.01 of the Revised Code.
- (3) The owner or operator of distributed generation as defined in paragraph (K) of this rule.

Paragraph (K) "**Distributed generation**" is a general term for all or part of a system of a distributed electrical generator or a static inverter either by itself or in the aggregate of twenty megawatts or less in size together with all protective, safety, and associated equipment installed at a point of common coupling on the EDU's distribution system in close proximity to the customer load.

Ohio Revised Code 4928.01 division (A)(29) "**Customer-generator**" means a user of a net metering system.

Ohio Revised Code 4928.01 division (A)(31) "Net metering system" means a facility for the production of electrical energy that does all of the following:

- (a) Uses as its fuel either solar, wind, biomass, landfill gas, or hydropower, or uses a microturbine or a fuel cell;
- (b) Is located on a customer-generator's premises;
- (c) Operates in parallel with the electric utility's transmission and distribution facilities;
- (d) Is intended primarily to offset part or all of the customer-generator's requirements for electricity.

Ohio Revised Code 4928.01 division (A)(32) "**Self-generator**" means an entity in this state that owns or hosts on its premises an electric generation facility that produces electricity primarily for the owner's consumption and that may provide any such excess electricity to another entity, whether the facility is installed or operated by the owner or by an agent under a contract.

**PJM or FERC exclusion:** none identified.

### **Pennsylvania (PA Code Title 52, Chapter 75)**

**§ 75.21. Scope** –This subchapter sets forth the interconnection standards that apply to EDCs which have customer-generators intending to pursue net metering opportunities in accordance with the act.

**PJM or FERC exclusion:** The interconnection procedures apply to customer-generators with small generator facilities that satisfy the following criteria:

- (1) The electric nameplate capacity of the small generator facility is equal to or less than 5 MW.
- (2) The small generator facility is not subject to the interconnection requirements of an RTO.
- (3) The small generator facility is designed to operate in parallel with the electric distribution system.

### **Virginia (VA Administrative Code, Title 20, Agency 5, Chapter 314)**

**§10. Applicability and scope; waiver.**—A. These regulations are promulgated pursuant to § 56-578 of the Virginia Electric Utility Regulation Act (§ 56-576 et seq. of the Code of Virginia). They establish standardized interconnection and operating requirements for the safe operation of electric generating facilities with a rated capacity of 20 megawatts (MW) or less connected to electric utility distribution (and in certain cases transmission) systems in Virginia.

**PJM or FERC exclusion:** These regulations do not apply to customer generators operating pursuant to the Virginia State Corporation Commission's Regulations Governing Net Energy Metering (20VAC5-315) or those that fall under the jurisdiction of the Federal Energy Regulatory Commission (FERC).

### **Washington, District of Columbia (D.C. Municipal Regulations, Title 15, Chapter 40)**

**§4000.1**— This Chapter establishes the District of Columbia Small Generator Interconnection Rules ("DSGIR") which apply to facilities satisfying the following criteria:

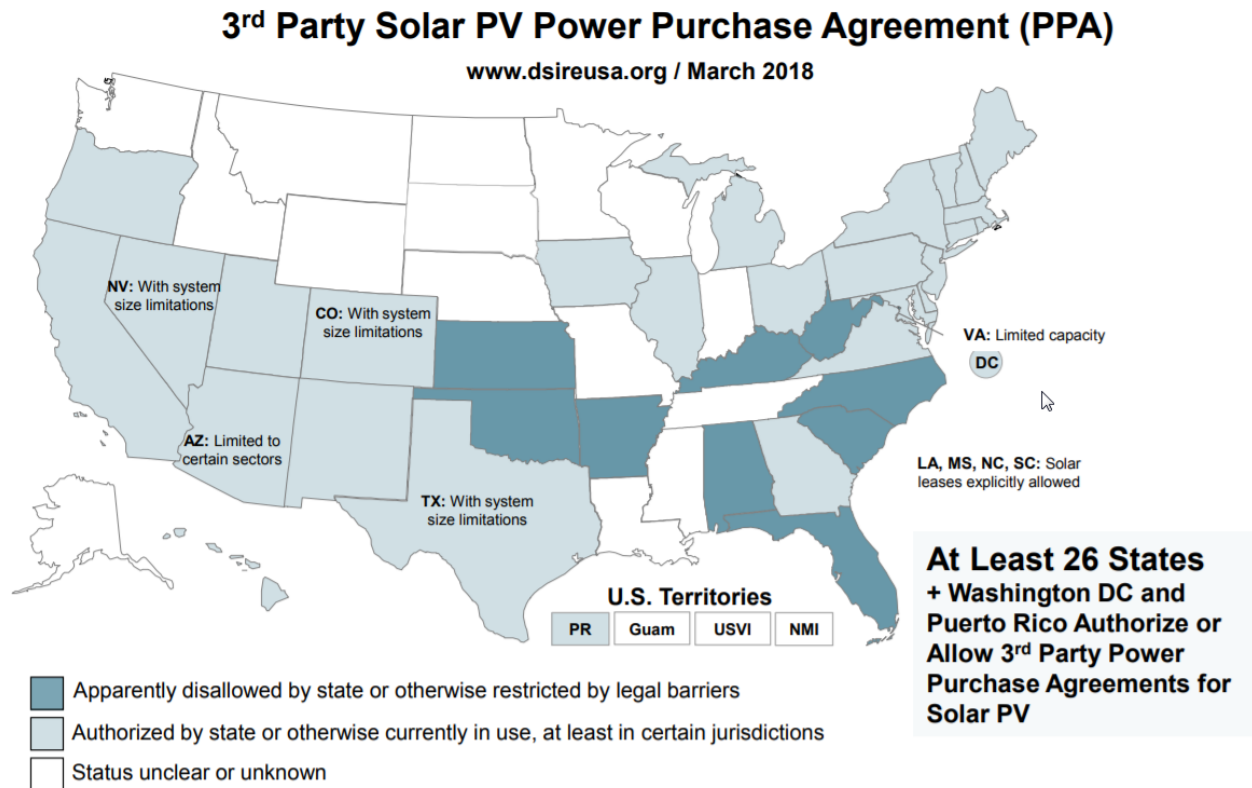
- (a) The total nameplate capacity of the small generator facility is equal to or less than 20 megawatts ("MW").
- (b) The small generator facility is not subject to the interconnection requirements of PJM Interconnection.
- (c) The small generator facility is designed to operate in parallel with the Electric Distribution System.

**PJM-related or FERC-related exclusion:** see item (b) above.

## Regulations and Policies Regarding Third Party Ownership of Local DER

Several local jurisdictions in PJM have explicit regulations pertaining to third-party ownership of DER. These usually are limited to the context of net metering.

The DSIRE database maintains a list of states that allows third-party owners of on-site solar to offer power purchase agreements to co-located end-use customers.



Map courtesy DSIRE and N.C. Clean Energy Technology Center at N.C. State University. Accessed January, 2019 from <http://www.dsireusa.org/resources/detailed-summary-maps/>

The following is a non-exhaustive list of examples of such statutes, regulations, and policies in PJM states.

### Delaware (Delaware Code, Title 26, Chapter 10)

**§ 1014 Public purpose programs and consumer education—** (d) The Commission, municipal electric companies, and electric cooperatives during any period of exemption under § 223 of this title shall each promulgate rules and regulations that provide for net energy metering for customers who own and operate, lease and operate, or contract with a third party that owns and operates an electric generation facility...

(i) Nothing in this section is intended in any way to limit eligibility for net energy metering services based upon direct ownership, joint ownership, or third-party ownership or financing agreement related to an electric generation facility, where net energy metering would otherwise be available.

**Indiana (Indiana Administrative Code, Title 170, Rule 4.1)**

**170 IAC 4-4.3-1 Definitions**—(d) "Customer-generator facility" means an arrangement of equipment for the production of electricity that is owned and operated by:

- (1) an eligible customer; or
- (2) a third party at the eligible customer's site.

**Maryland (Code of Maryland Statutes, Public Utilities Article, §7–306.)**

"Eligible customer-generator" means a customer that owns and operates, leases and operates, or contracts with a third party that owns and operates a biomass, micro combined heat and power, solar, fuel cell, wind, or closed conduit hydroelectric generating facility that:

- (i) is located on the customer's premises or contiguous property;
- (ii) is interconnected and operated in parallel with an electric company's transmission and distribution facilities; and
- (iii) is intended primarily to offset all or part of the customer's own electricity requirements.

**Public Utilities Article, §7–306.1**--A person who is negotiating a contract with an eligible customer-generator to install a solar electric generating facility on the customer-generator's property that the customer-generator owns and operates, leases and operates, or contracts with a third party that owns and operates and that requires interconnection with an electric company's distribution facilities:

- (1) shall submit to the customer-generator's electric company a completed application for interconnection of the solar electric generating facility with the electric company's distribution facilities;...

**New Jersey (NJ Administrative Code, Title 48, Chapter 8, Subchapter 7)**

**§ 14:8-7.2 Definitions**—"Third-party contract" means a contract between an eligible customer and a third party, which provides for ownership and/or operation of the eligible customer's solar electric generation system by the third party for the purpose of net metering aggregation.

**§ 14:8-7.4 Third-party contracts**—(a) An eligible customer may contract with a third party to own and/or operate a solar electric power generation system for the purpose of net metering aggregation. (b) Any third-party contract shall include contractual protections that provide for adequate performance and provision for construction and operation for the term of the contract, including any appropriate bonding or escrow requirements.

**Pennsylvania (PA Code, Title 52, Chapter 75, Subchapter C. Interconnection Standards)**

**Final Order in PA PUC Docket No. M-2011-2249441**

It is ordered:

1. That it be the policy of the Commission that the term "operator," as found in the definition of "customer-generator" in Section 2 the AEPS Act, 73 P.S. § 1648.2, shall be interpreted as including customer-generators with distributed alternative energy systems that contract with a third-party to perform the operational functions of the alternative energy system.

**Section 2 the AEPS Act, 73 P.S. § 1648.2**

"Customer-generator." A nonutility owner or operator of a net metered distributed generation system with a nameplate capacity of not greater than 50 kilowatts if installed at a residential service or not larger than 3,000 kilowatts at other customer service locations, except for customers whose systems are above three megawatts and up to five megawatts who make their systems available to operate in parallel with the electric utility during grid emergencies as defined by the regional transmission organization or where a microgrid is in place for the primary or secondary purpose of maintaining critical infrastructure, such as homeland security assignments, emergency



services facilities, hospitals, traffic signals, wastewater treatment plants or telecommunications facilities, provided that technical rules for operating generators interconnected with facilities of an electric distribution company, electric cooperative or municipal electric system have been promulgated by the Institute of Electrical and Electronic Engineers and the Pennsylvania Public Utility Commission.

**Virginia (Code of Virginia, Title 56, Chapter 23, § 56-594 – Net energy metering provisions)**

"Eligible customer-generator" means a customer that owns and operates, or contracts with other persons to own, operate, or both, an electrical generating facility that (i) has a capacity of not more than 20 kilowatts for residential customers and not more than one megawatt for nonresidential customers on an electrical generating facility placed in service after July 1, 2015; (ii) uses as its total source of fuel renewable energy, as defined in § 56-576; (iii) is located on the customer's premises and is connected to the customer's wiring on the customer's side of its interconnection with the distributor; (iv) is interconnected and operated in parallel with an electric company's transmission and distribution facilities; and (v) is intended primarily to offset all or part of the customer's own electricity requirements. In addition to the electrical generating facility size limitations in clause (i), the capacity of any generating facility installed under this section after July 1, 2015, shall not exceed the expected annual energy consumption based on the previous 12 months of billing history or an annualized calculation of billing history if 12 months of billing history is not available.

## Local Screening: Timing, Cost, and Size Thresholds

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Most local jurisdictions in PJM (as well as the PJM tariff itself) provide for an expedited “screening” process for DER below a certain size threshold.

### Screens for Very Small DER (“Level 1”)

These screens are often applicable for DER that are co-located with mass market residential or small commercial customers. Many state codes provide a fixed application fee regardless of size, and utilities offer a simplified application form. In many cases, they are limited to inverter-based DER only.

**Table 2: Small DER Interconnection Summary**

	Size threshold	Inverter only?	Fee	Duration <sup>1</sup>
Delaware		IREC <sup>2</sup>		
Illinois	25 kW	Yes	\$50	27d
Indiana	10 kW	Yes	Free	25d
Maryland	20 kW	Yes	Free	20d
Michigan	20 kW	Yes	\$75	30d
New Jersey	10 kW	Yes	Free	16d
Ohio	25 kW	Yes	<\$50	30d
Pennsylvania	10 kW	Yes	\$100	25d
Virginia	500 kW	No	\$500	25d
Washington, D.C.	20 kW	Yes	Free	10d

<sup>1</sup> Duration in business days from receipt of complete application until executable agreement tendered, assuming screens are passed

<sup>2</sup> Delaware code cites the model interconnection procedures of IREC, the Interstate Renewable Energy Council.

The functional screens for Level 1 tend to group along similar lines, as summarized below.

**Table 3: Small DER Screening Criteria<sup>3</sup>**

	Aggregate DER <sup>4</sup>	Aggregate fault current	Aggregate short circuit interrupting capability	New construction
<b>Delaware</b>			IREC <sup>5</sup>	
<b>Illinois</b>	<15% of peak	N/A	N/A	N/A
<b>Indiana</b>	< 10% of peak	<10% of maximum	N/A	N/A
<b>Maryland</b>	<15% of peak	N/A	N/A	Fail
<b>Michigan</b>			N/A <sup>6</sup>	
<b>New Jersey</b>	<10% or <15% solar	< 10% of maximum	N/A	N/A
<b>Ohio</b>	<15% of peak	< 10% of maximum	N/A	N/A
<b>Pennsylvania</b>	<15% of peak	N/A	N/A	Fail
<b>Virginia</b>	VA does not specify Level 1 non-net-metering screens			
<b>Washington, D.C.</b>	<15% of peak	N/A	N/A	Fail, except +15d if only new tie in

Interconnection of small and medium DER often proceeds via administrative “screens”, rather than power flow studies. There are multiple screening criteria, and they vary slightly, however most screens are shared across states. The **aggregate DER** screen has the distribution utility sum the total megawatts of DER installed on a section of a feeder (including all DER installed at any point in time, not just those in a particular queue window), add to that the interconnection customer’s DER, and compare that total quantity to the peak load on the feeder section. The **aggregate fault current** screen measures the total fault current contribution from all DER on a feeder and compares it to the maximum expected fault current. The **aggregate short circuit interrupting capability** screen assesses whether the DER will cause any distribution protective devices and equipment to exceed a threshold quantity of their short circuit interrupting capability. The **no construction** screen looks at whether any construction is required on the utility system in order to accommodate the new DER (usually excluding metering).

**Screens for Medium DER (“Level 2”)**

These screens are often applicable for larger commercial customers and smaller standalone DER. The application fee tends to depend on size, and the application form is more complicated than for Level 1. There is typically no requirement to be an inverter-based resource. The underlying screen is similar to or identical to that for Level 2.

<sup>3</sup> For simplicity, criteria for spot networks, single-phase networks, transient stability, and others are excluded.

<sup>4</sup> Typically percent of peak load on line circuit, either at substation or as bounded by sectionalizers.

<sup>5</sup> Delaware code cites the model interconnection procedures of IREC, the Interstate Renewable Energy Council.

<sup>6</sup> Michigan does not outline specific functional screens, only equipment and basic technical requirements for those projects falling below 20 kW.

In addition, some screens procedures allow for an interconnection agreement to be offered even if screens are failed.

Finally, medium DER screens sometimes feature “supplemental screens”, which specify more complex screens that would apply in the event that initial screens are failed. For example, the PJM tariff provides that, if a DER fails the screens in Section 112A, then a supplemental review shall be offered to the Interconnection customer, as applicable. The supplemental review (detailed in Section 112A subsection 5, Supplemental Review) specifies three more detailed screens, as well as an additional timeline of 75 days.

**Table 4: Medium DER Interconnection Summary**

	Size threshold	Fee	Duration <sup>7</sup>	Supplemental screens?
<b>Delaware</b>			IREC <sup>8</sup>	
<b>Illinois</b>	2 MW or 5 MW <sup>8</sup>	\$100 + \$1/kW	35d	+45d
<b>Indiana</b>	2 MW	\$50 + \$1/kW	35d	+30d
<b>Maryland</b>	2 MW	\$50 + \$1/kW	30d	No
<b>Michigan</b>	2 MW <sup>9</sup>	\$500	75d	No
<b>New Jersey</b>	2 MW	\$50 + \$1/kW	24d	No
<b>Ohio</b>	2MW or 5 MW	\$50 + \$1/kW	35d	+30d
<b>Pennsylvania</b>	2 MW	\$250 + \$1/kW	35d	No
<b>Virginia</b>	2 MW	\$500	30d	+35d <sup>10</sup>
<b>Washington, D.C.</b>	2 - 5 MW	\$500	20d	+20d

<sup>7</sup> Duration from receipt of application until executable interconnection agreement offered, assuming screens are passed

<sup>8</sup> Delaware code cites the model interconnection procedures of IREC, the Interstate Renewable Energy Council.

<sup>9</sup> Michigan code identified 5 categories of project within its interconnection standards, of which Category 5 is greater than 2 MW. Categories 2-4 encompass projects between 20 kW and 2 MW

<sup>10</sup> Virginia code does not specify supplemental screens, but does define timelines.

The functional screens for Level 2 tend to group along similar lines, as summarized below.

**Table 5: Medium DER Screening Criteria<sup>11</sup>**

	Aggregate DER <sup>12</sup>	Aggregate fault current <sup>13</sup>	Aggregate short circuit interruption	New construction
<b>Delaware</b>	IREC <sup>14</sup>			
<b>Illinois</b>	< 15% of peak	< 10% of maximum	<90% of capability	N/A
<b>Indiana</b>	< 15% of peak	< 10% of maximum	<90% of capability	N/A
<b>Maryland</b>	< 15% of peak	< 10% of maximum	<90% of capability	Fail
<b>Michigan</b>	N/A <sup>15</sup>			
<b>New Jersey</b>	<10% or <15% solar	<10% of maximum	<90% of capability	N/A
<b>Ohio</b>	< 15% of peak	<10% of maximum	<90% of capability	Fail
<b>Pennsylvania</b>	< 15% of peak	<10% of maximum	<85% of capability	Fail
<b>Virginia</b>	< 15% of peak	<10% of maximum	< 87.5% of capability	Fail
<b>Washington, D.C.</b>	< 15% of peak	<10% of maximum	< 90% of capability	Fail, except +15d if only new tie in

<sup>11</sup> For simplicity, criteria for spot networks, single-phase networks, and transient stability are excluded

<sup>12</sup> Percent of peak load on line circuit as bounded by sectionalizers.

<sup>13</sup> Percent of the distribution circuit's maximum fault current at the point on the high voltage (primary) level nearest the proposed point of change of ownership.

<sup>14</sup> Delaware code cites the model interconnection procedures of IREC, the Interstate Renewable Energy Council.

<sup>15</sup> Michigan does not outline functional screens, only equipment and basic technical requirements for those projects falling under purview of > 2 MW. These Category 5 projects are required to be studied by the respective distribution utility ("Distribution Study").

## Availability of a Pre-Application

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Some states, as well as PJM, offer Interconnection Customers the option to request a “pre-application”, which reveals information about the capabilities of a certain interconnection point.

**Table 1: Pre-Application Report Summary**

	Pre-application
Delaware	No
Illinois	Yes
Indiana	No
Maryland	Yes
Michigan	No
New Jersey	No
Ohio	Yes
Pennsylvania	No
Virginia	No
Washington, D.C.	Yes