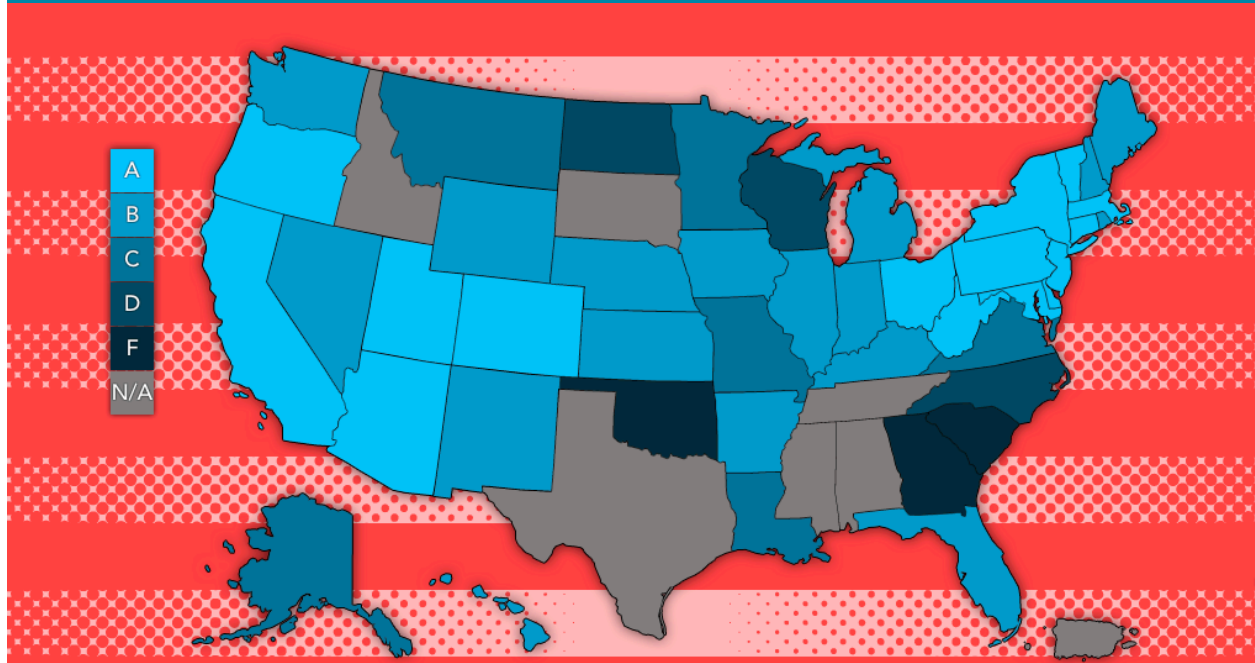




# **FREEING THE GRID 2012**

BEST PRACTICES IN STATE  
NET METERING POLICIES AND  
INTERCONNECTION PROCEDURES



November 2012

Available as a free download & interactive online resource:

[www.freeingthegrid.org](http://www.freeingthegrid.org)

**Interstate Renewable Energy Council (IREC):**

P.O. Box 1156  
Latham, New York 12110-1156  
tel: 518-458-6059  
**www.irecusa.org**

**The Vote Solar Initiative**

300 Brannan St, Suite 609  
San Francisco, CA 94107  
tel: 415-817-5062  
**votesolar.org**

**Authors:**

• **Interstate Renewable Energy Council (IREC):**

Joseph Wiedman  
Thad Culley  
Laurel Varnado

• **The Vote Solar Initiative:**

Rosalind Jackson

**Special thanks:**

**Network for New Energy Choices**

215 Lexington Avenue, Suite 1001  
New York, NY 10016  
tel: 212 726 9161  
info@newenergychoices.org  
**newenergychoices.org**

A program of GRACE

gracelinks.org

© 2011 GRACE All rights reserved

**North Carolina Solar Center & DSIRE project**

1575 Varsity Drive  
North Carolina State University  
Raleigh, NC 27606  
tel: 919-515-3480  
ncsc@ncsu.edu  
**www.ncsc.ncsu.edu**

**Note:** This report was prepared with the best information available at the time of writing. We welcome any new information and comments as we strive to make each edition of *Freeing the Grid* as accurate and up-to-date as possible. Any errors or omissions are the responsibility of the authors. Some of the state data and grades from past years were updated. Thus, the scores and grades in this edition may not always agree with what was published in previous editions of this report. In a reassessment of what constituted “statewide policies,” we determined that some state policies that were graded in the past did not meet regulatory merit. As such, some states that were graded in past editions received an ‘N/A’ as a grade in this edition.

## Table of Contents

Introduction to the 2012 Edition	4
State Grades for 2012	7
Grade Distribution for 2012	8
Metrics of Success	9
Policy Points: Net Metering	10
Policy Points: Interconnection Procedures	16
Grading: From Alaska to Wyoming	24
Worst Practices	
In Focus: SDG&E’s proposed net metering charge	105
Best Practices	
In Focus: Hawaii and California take on interconnection reform	106
In Focus: Assessing the costs and benefits of net metering the right way	107
Appendix A: State Scores/Grade Equivalents	111
Appendix B: IREC’s Model Net Metering Rules & Model Interconnection Procedures	115
Appendix C: Acronyms & Abbreviations	116
About Us	117

## Introduction to the 2012 Edition

Now in its sixth year of production, Freeing the Grid is a guide for improving state net metering and interconnection rules. New this year, the 2012 grades and resource center are both available in a highly interactive online format designed to make it easy to access, understand and share best practices and state progress on these foundational renewable energy policies. Visit: [www.freeingthegrid.org](http://www.freeingthegrid.org)

As the number of customer-sited renewable energy installations continues to surge nationwide, state policymakers have supported net metering for solar and other clean technologies for a variety of reasons:

- To encourage in-state economic development and the creation of jobs
- To enhance the security and reliability of the electric grid
- To reduce air pollution and greenhouse gas emissions
- To increase energy independence

A dozen states are in the vanguard of best practices; they go beyond merely *enabling* customer-sited Distributed Generation (DG) by actively *encouraging* these clean energy systems. Since the 1st edition of *Freeing the Grid*, many more states have embraced standard best practices. The federal Energy Policy Act of 2005 (EPAc 2005) acted as a catalyst to these improvements by modifying the Public Utility Regulatory Policies Act (PURPA) to require state public utility commissions to “consider” standards for net metering and interconnection. Section 1251 of EPAc 2005 required states to consider a *net metering* standard and make a “determination” regarding the standard by August 2008. Section 1254 of EPAc 2005 required states to consider an *interconnection standard* and make a determination regarding the standard by August 2007.<sup>1</sup> Several states took this as an opportunity to implement or upgrade their net metering and interconnection procedures.

Since the sunset of the EPAc 2005 provisions, states have continued to expand and improve their policies. Net metering and interconnection grades are rising, and states are expanding the meaning of what constitutes “best practices.” As such, in 2011 the Interstate Renewable Energy Council (IREC), The Vote Solar Initiative and the Network for New Energy Choices (NNEC) revised the methodology to reflect policy evolution and the current state of best practices.

### Interconnection and Net Metering:

#### What is the Difference?

**Interconnection** – the technical rules and procedures allowing customers to “plug in” to the grid.

**Net Metering** – the billing arrangement by which customers realize savings from their systems where 1 kWh generated by the customer has the exact same value as 1 kWh consumed by the customer.<sup>10</sup>

## Experience Matters

In order to gauge U.S. electric utility perspectives on net metering, the Solar Electric Power Association (SEPA) and IREC published a report in 2008 based on a survey of utilities. Their findings suggest that there is a great deal for some utilities to learn from the experience of those that have developed efficient, flexible systems for net metering as the number of photovoltaic (PV) installations increase, rather than making retroactive fixes as problems arise.

The most successful net metering programs had all been in place for five or more years; did not require a second meter, extra fees or additional insurance; used the IEEE 1547 technical standards for interconnection; and dedicated at least one full-time employee to process applications.<sup>2</sup> Almost all of the utilities that responded to the survey indicated that there were few problems associated with reading the meters—most of which were single electromechanical meters, but with a growing number of time-of-use (TOU) meters and smart meters as well.

The most common problems reported were associated with billing systems and a lack of proper documentation from the customer. Most utilities in the study stated that their billing systems were unable to easily accommodate net-metered customers and adjustments were needed for the system. The cost of upgrading current billing software may be high, but the report advises that future billing systems incorporate net metering capabilities at the onset.

Incomplete documentation from the customer was the most common cause of delay reported in the interconnection process, and the report suggests that more standard requirements, revision of documentation and materials, and clearer communication between the utility, inspectors and the community could solve these problems. The analysis forecasts a rapid increase in the number of PV installations over the next ten years and encourages future research into methods for streamlining and expediting the net metering process.<sup>3</sup>

## Continuing Education

To address remaining issues and concerns with grid-tied solar systems, the U.S. Department of Energy (DOE) created the Solar America Board for Codes and Standards (Solar ABCs), as part of the federal Solar America Initiative. The Solar ABCs was designed in part to “support stakeholders interested in the implementation of new standards—or in the improvement of existing standards—related to interconnection and/or net metering.” The Solar ABCs website hosts additional resources for those interested in net metering and interconnection, as well as other topics and issues surrounding the deployment of solar power.<sup>7</sup>

## Guidebook: *Connecting to the Grid*

IREC’s *Connecting to the Grid Guide* provides a comprehensive introduction to net metering and interconnection policies and technical issues. The 6<sup>th</sup> edition of this guide includes explanations of

IREC’s updated model interconnection procedures, alternative billing arrangements for net metering, energy storage issues and several other emerging issues in the field.<sup>8</sup>

### **How to Drive a Solar Market:**

#### **Net Metering and Interconnection in the Context of a Cost-Effective Solar Policy**

Designing economically sustainable solar markets requires the coordination of complementary policy mechanisms. To illustrate, the Solar Alliance has developed a resource describing the “Four Pillars” of effective state policy. The Four Pillars take into consideration the best practices of net metering (Pillar 2) and interconnection (Pillar 3). Incentives (Pillar 1) and utility rates and revenue policies (Pillar 4) are also crucial components in developing a world-class solar market. While financial incentives are the engine of market development, interconnection and net metering policies are the road. In the current landscape, it is much easier for a market to accelerate on the smooth, finished roads of Colorado, New Jersey and California.<sup>9</sup>

For three decades, states have served as the proving grounds for determining what works for connecting renewable energy to the grid. The best practices have emerged; there is no need for a state to reinvent the wheel.

*“Electric power is everywhere present in unlimited quantities and can drive the world’s machinery without the need of coal, gas, or any other common fuels.”*

*— Nikola Tesla*

## State Grades for 2012

State	Net Metering Grade	Interconnection Grade	State	Net Metering Grade	Interconnection Grade
Alabama	-	-	Montana	C	C
Alaska	C	-	Nebraska	B	-
Arizona	A	-	Nevada	B	B
Arkansas	B	-	New Hampshire	B	D
California	A	A	New Jersey	A	B
Colorado	A	B	New Mexico	B	B
Connecticut	A	B	New York	A	B
D.C.	A	A	North Carolina	D	B
Delaware	A	A	North Dakota	D	-
Florida	B	D	Ohio	A	C
Georgia	F	-	Oklahoma	F	-
Hawaii	B	B	Oregon	A	B
Idaho	-	-	Pennsylvania	A	B
Illinois	B	B	Rhode Island	B	D
Indiana	B	B	South Carolina	F	F
Iowa	B	B	South Dakota	-	B
Kansas	B	-	Tennessee	-	-
Kentucky	B	F	Texas	-	C
Louisiana	C	-	Utah	A	A
Maine	B	A	Vermont	A	C
Maryland	A	A	Virginia	C	A
Massachusetts	A	A	Washington	B	D
Michigan	B	B	West Virginia	A	B
Minnesota	C	F	Wisconsin	C	C
Mississippi	-	-	Wyoming	B	-
Missouri	C	-			

## Grade Distribution for 2012

Net Metering Grade	Number of States
A	16
B	17
C	7
D	2
F	3
N/A	6

Interconnection Grade	Number of States
A	8
B	16
C	5
D	4
F	3
N/A	15

### END NOTES

1 Ward, Joan. (2008) States' Consideration of EAct 2005 Standards. Interstate Renewable Energy Council. July. [http://www.irecusa.org/fileadmin/user\\_upload/ConnectDocs/EActJune08\\_01.doc](http://www.irecusa.org/fileadmin/user_upload/ConnectDocs/EActJune08_01.doc)

(The timing and requirements of EAct 2005 are not straightforward, and this article clarifies both.)

2 The IEEE 1547 standard "establishes criteria and requirements for interconnection of distributed resources with electric power systems" [in order to] "provide a uniform standard for interconnection of distributed resources with electric power systems. It provides requirements relevant to the performance, operation, testing, safety considerations, and maintenance of the interconnection." The standard was approved in 2003. An overview of the IEEE 1547 standards can be viewed at:

[http://grouper.ieee.org/groups/scc21/1547/1547\\_index.html](http://grouper.ieee.org/groups/scc21/1547/1547_index.html).

3 Letendre, Steven, and Mike Taylor. (2008) *Residential Photovoltaic Metering and Interconnection Study: Utility Perspectives and Practices. Report #01-08*. Solar Electric Power Association: March.

[http://www.renewableenergyworld.com/assets/documents/story/2008/SEPA%20 %20Report\\_Final%20March%206.2.pdf](http://www.renewableenergyworld.com/assets/documents/story/2008/SEPA%20%20Report_Final%20March%206.2.pdf).

4 Sherwood, Larry. (2011) *U.S. Solar Market Trends 2010*. Interstate Renewable Energy Council. June. <http://irecusa.org/wp-content/uploads/2011/07/IREC-Solar-Market-Trends-Report-revised070811.pdf>

5 Ibid.

6 Ibid.

7 Solar America Board for Codes and Standards. Website: [www.solarabcs.org](http://www.solarabcs.org).

8 The document is available at [www.irecusa.org](http://www.irecusa.org).

9 For more information on the Four Pillars, visit the Solar Alliance website: [www.solaralliance.org](http://www.solaralliance.org).

10 A kilowatt-hour (kWh) is the unit of energy equal to 1000 watts of power used over the course of an hour. It is also the energy required to run a 100 watt light bulb for 10 hours.

## Metrics of Success

### A Standard Policy Framework

Most states that have created and/or revised their interconnection and net metering policies have done so in pursuit of one or more of the same goals:

- To encourage greater renewable energy generation;
- To promote customer-sited DG;
- To help meet the goals of renewable portfolio standards (RPS);
- To reduce demand on an increasingly strained electric grid;
- To reward investment in renewable technologies;
- To facilitate energy self-reliance;
- To improve air quality and public health;
- To reduce greenhouse gas emissions; and
- To promote in-state economic development and create jobs.

Across the board, the most successful states share certain policy components. Those seeking to achieve success have adopted substantially similar policies. The result is a clear, emerging consensus on best practices in many states, and a patchwork of ineffective and heterogeneous rules—or non-existent rules—in others.

One significant lesson that is apparent upon reviewing the wide variety of existing state standards is that inconsistency is the enemy of clean energy development. It creates confusion among consumers, undermines the ability of businesses to operate efficiently across utility service territories or state lines, and increases costs to all program participants—utilities, consumers, businesses and commission staff—by forcing these stakeholders to master the idiosyncrasies of each individual state’s programs.

To have a chance to attain the goals listed above, successful interconnection and net metering policies must facilitate the installations of thousands of clean energy systems. It is entirely possible to stymie the development of renewable generation in an entire state by allowing one or more counterproductive provisions to be inserted into these policies during development process.

In general, commonly accepted technical standards serve an extremely important purpose in the U.S. economy. By meeting a uniform set of procedures and electrical specifications, a wide variety of products and technologies can be developed at low cost by unleashing innovation and customer choice in the marketplace. Additionally, the use of one consistent engineering standard ensures safe and practical daily application. Standards for net metering and interconnection produce similar results for the renewables industry.

Many states—as well as the Federal Energy Regulatory Commission (FERC)—are approaching a consensus on just this type of standard for interconnection. (The FERC standards and agreements for interconnection were adopted in 2005 by FERC Order 2006, hereafter referred to as the “FERC Standards”.)

The vast majority of state and federal interconnection procedures are based on consensus safety and engineering standards from the IEEE and Underwriters Laboratories (UL).<sup>1</sup> It is important to note that utility interests have had strong, expert representation throughout state and federal proceedings. The

standards relevant to this report have already been negotiated with more than adequate utility representation; there is no need to renegotiate these provisions in dozens of regulatory arenas.

### **Our Scoring Methods**

In this evaluation of statewide interconnection and net metering programs, the authors developed an index that awards points for elements that promote participation, expand renewable energy generation, or otherwise advance the goals sought by net metering. Conversely, the index issues demerits for program components that discourage participation or limit renewable energy generation.

Applying these numerical values to program components allows for separate plotting of the effectiveness of each state’s interconnection and net metering standard, and assignment of letter grades to each.<sup>2</sup>

### **Policy Points: Net Metering**

<b>Individual System Capacity</b>	
Points	Largest System Allowed to Net Meter
+5	2 MW or greater
+4	Greater than 1 MW, but less than 2 MW
+3	Greater than 500 kW, but not greater than 1 MW
+2	Greater than 100 kW, but not greater than 500 kW
+1	Greater than or equal to 50 kW, but not greater than 100 kW
0	Less than 50 kW
-1	Only residential systems allowed and capped at less than 20 kW

In certain cases, statutory or regulatory limits on the size of eligible technologies prevent electric customers from correctly sizing a DG system to meet their own demand, undermining one of the primary drivers of DG. There is no policy justification for limiting system size to an arbitrary level. Customer load and demand should determine the system’s design parameters.

For a couple of examples, the Database of State Incentives for Renewables & Efficiency (DSIRE) notes:

At the upper end of the spectrum, Pennsylvania allows net metering for certain systems up to 5 MW; New Mexico allows net metering for certain systems up to 80 MW; and there is no stated capacity limit in Arizona, Colorado, New Jersey, or Ohio. In many cases, states limit systems to a certain percentage (e.g., 125%) of the customer’s load, so that customers do not intentionally oversize their systems. Furthermore, some states have established individual system capacity limits that vary by utility type, system type or customer type.<sup>3</sup>

### **Total Program Capacity Limits**

Points	Total Program Limit as Percentage of Peak Demand
+2.5	5% or greater; no limit
+2	Greater than 2%, but less than 5%
+1.5	Greater than 1%, but not greater than 2%
+1	Greater than 0.5%, but not greater than 1%
+0.5	Greater than 0.2%, but not greater than 0.5%
0	Greater than or equal to 0.1%, but not greater than 0.2%
-0.5	Less than 0.1%

Bonus +1 For excluding from the aggregate limit generators that do not export electricity, or basing measurement on energy produced, instead of total capacity.

In a nod to utility concerns that customer-sited DG represents lost revenues, many states have limited the total aggregate capacity eligible for net metering, either statewide or for specific utilities. While this argument has some intuitive appeal, it is a shortsighted view of the arrangement.

It makes little sense to limit the total amount of clean energy that customers may generate and contribute to the electric grid. Utilities do not have an inherent right to charge for electricity that customers could otherwise generate more efficiently and more cleanly on their own. Capacity limits artificially restrict the expansion of on-site renewable generation and curtail the market for new renewable energy systems. They are also incompatible with aggressive targets for renewable energy deployment set by a growing number of states.

Capacity limits, usually based on a percentage of peak demand, create uncertainty for customers considering net metering. Since customers have no way of knowing when capacity limits will be met, they cannot effectively plan for future DG installations.<sup>4</sup> This regulatory uncertainty inhibits renewable energy investment.

### **Restrictions on “Rollover”**

Points	Rollover Provisions
+1.5	Indefinite rollover at retail rate.
+1	Monthly rollover at retail rate for one year, annual payment at retail rate
+0.5	Monthly rollover at retail rate for one year, annual payment at wholesale rate or avoided cost
0	Monthly rollover at retail rate for one year, excess energy donated to utility annually
-2	Monthly payment at wholesale rate or avoided cost
-4	No rollover permitted, excess energy donated to utility monthly

When customers generate more electricity than they consume during a monthly billing period, most states allow customers to “rollover” the excess generation. The utility carries forward any excess generation until it is used up. Some of the least effective net metering programs prohibit kWh credit rollover, perhaps only providing a wholesale rate payment for excess electricity generated by customers each month. In these states customers undersize their systems so the systems produce less energy than their monthly minimum load requirements.

Restricting rollover to a single month may be more costly than allowing rollover. In fact, the administrative costs that a utility may incur through the process of paying for small amounts of monthly excess generation, via cutting checks or some other form of payment, may be greater than any perceived loss of revenue associated with rollover credits.

To be successful, a net metering program must facilitate rollover so that customer-generators receive credit for excess energy generated during the seasons when renewable output is highest and apply it toward their consumption when output is lowest, allowing customers to achieve zero net energy consumption from the grid. Indefinite rollover provides the best approach to account for variations among different system technologies and locations. Customer-generators realize the most financial benefit from net metering in this manner.

#### **Metering Issues**

##### Points Metering Provisions

- +2 No meter change required—customer-sited generator uses existing meter
- +2 New meter is provided by the utility at no cost to the customer-sited generator
- +1 Dual meters or dual registers—utility pays for the additional meter
- 0 Dual meters or dual registers—customer pays for the additional meter

##### Points Metering Provisions Under Time-of-Use (TOU) rates

- +2 TOU meters with time bin carryover
- +1 TOU meters with segregated time periods
- 1 Segregated TOU rate disadvantage small generators

Requiring the customer-generator to pay for additional meters singles them out for disparate treatment accorded no other customer of the utility. Special and/or duplicate meters are not necessary for the process of net metering and should not be an extra financial burden to customers with DG.

Some state policies require (or encourage) customers who choose to net meter to switch to a TOU rate, where the customer pays differing rates depending on the time of day. This can either reward generators who produce during peak demand periods, when electricity is most expensive and the grid is strained, or can disadvantage customers by requiring them to pay extra fees or undervalue weekend and off-peak production.

TOU meters track electric usage during specific periods of time. The time periods are tracked by the meter either through “real time” pricing (i.e., over 15 min, 30 min, or 1 hour intervals) or pre-set prices based on segregated time periods (i.e. day-peak/night-off-peak and/or seasonally adjusted). Ideally, if customer generation exceeds consumption in one time period (time bin), the excess generation produced in the peak time bin and not needed in that time bin can carry over to be utilized in other time bins. With segregated time periods and no time bin carryover, excess generation in one time period can only offset consumption in that same time period. This situation is less than ideal as it can leave net metering credits produced during peak time periods unable to be fully utilized – even in the case where offsetting consumption during off-peak times with credits produced during peak time periods. Accordingly, fewer points are awarded where TOU meters are utilized with segregated time periods and no time bin carryover. A negative point is awarded if TOU metering is required and the peak time period disfavors solar generation, such as having a peak period of 6pm-9pm. This would result in a high TOU peak rate with low PV output, thus providing the customer with less of an incentive to net meter.

### Renewable Energy Credit Ownership

Points	Renewable Energy Credit (REC) Ownership
+1	Owned by customer
-1	REC ownership not addressed
-2	REC given to the utility for exported electricity
-5	REC transferred to utility without appropriate incentive

Renewable energy credits (REC) provide another potential stream of revenue for owners of systems that generate electricity with renewable resources. In many areas of the United States, RECs are bought and sold as a commodity in voluntary “green power” markets or are directly used to fulfill a utility’s Renewable Portfolio Standard requirements. Utilities should not be permitted to seize RECs from system owners without paying the market price for them.

### Eligible Technologies

Points	Eligible Technologies
+1	Solar, wind and other renewable and low emission technologies
+0.5	Solar and wind only
0	Excludes solar or wind

With appropriate interconnection procedures, there is no reason to exclude renewable, customer-sited generators, such as PV and small wind, from net metering. Most states include a longer list of eligible technologies, including biomass, landfill gas, small hydroelectric systems and other renewables that are often included in state RPS policies. Recently, there has been a growing trend of state legislation to include Combined Heat and Power (CHP) as an eligible technology in net metering; seven states have included CHP in the past two years alone. Making CHP a part of state net metering policy reflects various intentions depending on the particular state; either to encourage highly efficient and low-emission electricity generation, diversify electric resources, and/or address local grid infrastructure concerns. CHP has several characteristics (flexibility in fuel sources, selective availability, and the ability to capture heat for different onsite applications) which make CHP a somewhat unique technology for net metering. These factors have occasionally warranted special caveats in state net metering policies to account for some of these differences. Some of these caveats include allowing only micro-CHP as an eligible technology (usually systems under 30 kW), different excess generation rollover provisions and fuel restrictions.

### Eligible Customers

Points	Customer Class Eligibility
+2	No eligible class restrictions
+1	Non-residential class permitted to meter up to state capacity limits while residential class limited to no more than 10 kW
0	Residential class only

Some state net metering rules restrict the customer classes eligible to participate. Rules may also exclude commercial customers and/or other non-residential customers that could most greatly reduce

demand on a strained grid and which often enjoy the lowest costs for installed systems. Allowing non-residential customers to net meter is essential to jump-starting new renewable energy markets.

**Bonus for aggregate net metering**

Points Bonus

- +1 A customer may aggregate all meters on his or her contiguous property for the purposes of net metering.

A few states allow aggregation of meters for net metering, sometimes known as “group metering.” This primarily benefits farms and properties that may have multiple meters. Some states allow aggregate metering that combines accounts for net metering across one or multiple property boundaries.

**Bonus for community shared renewables**

Points Bonus

- +1 A customer may receive net metering credits for investing in or subscribing to a renewable energy system that may not be physically located on their property.

For a variety of reasons, customers may be unable to host an on-site renewable energy system. For example, a customer may be a tenant in a multiunit building where the landlord will not allow the installation of a solar system on the roof. Because renewable energy program rules often require a renewable energy system to be located on-site, these customers are prohibited from greening their energy supply despite their willingness to make that investment. Forward looking states are beginning to address this program gap and expand opportunities for customers to participate in renewable energy through shared renewables programs. Under a shared renewables program, customers are allowed to invest in an off-site renewable energy system and still participate in net metering and other state-level incentive programs. A well-designed shared renewables program expands options for customer participation in renewables without weakening successful on-site renewable energy programs.

**Safe Harbor Provisions, Standby Charges, or Other Fees**

Points Fee Treatment

- +3 Safe harbor language protects customers from unspecified additional equipment, fees, requirements to change tariffs, etc.
- 0 Not addressed
- 1 The utility imposes fees or decision on whether to add fees is left to the utility
- 1 Minor additional fees for net metering are imposed
- 5 Significant additional charges or fees are imposed
- 5 Per A per-kWh fee on all production (in addition to other fees) is imposed<sup>5</sup>

Many utilities claim that, in the event that net-metered systems fail, the utility is required to meet the resulting increase in customer demand. As a result, many states allow utilities to impose a “standby charge” on net-metered customers.

Standby charges constitute poor public policy in the context of net metering, especially for owners of small, renewable energy systems. Some researchers have noted that they are “analogous to assigning standby fees to residential customers who purchase high efficiency air conditioning units,”<sup>6</sup> because, in theory, utilities would be required to meet increased demand should the air conditioners fail and need to be replaced by more conventional units. In some cases, standby charges are equal to—or even

exceed—rates for full electrical service, in effect creating an economic disincentive for customers to install renewable energy systems.

Standby charges are particularly burdensome to small generators for whom utilities only need to provide a negligible amount of back-up power. These fees can be so costly that they diminish most, if not all, of the economic incentive net metering was intended to offer smaller generators.

Safe harbor provisions ensure that net-metered customers are treated like any other customer. These provisions explicitly state that the utility may not charge a customer-sited generator any fee or charge, or require additional equipment, insurance or any other requirement—unless the fee or charge also applies to other customers that are not customer-sited generators.

#### **Policy Coverage**

Points	Utilities Covered
+1	Rules apply to all utilities
0	Rules apply to investor-owned utilities only

Net metering policies generally arise from either a statute passed by a legislative body or from a commission decision. Depending on its origin, a policy may cover all utilities in the state (usually those embodied in a statute) or just investor-owned utilities (IOU) (usually those issued by a commission decision). For example, Colorado’s Public Utilities Commission adopted net metering rules that only applied to the state’s IOU. This helped open solar markets in the more densely populated IOU territories, but did little for the windy rural areas that were operated by electric cooperatives (co-ops) or municipal utilities (munis). However, in early 2008, House Bill 08-1160 was enacted, offering net metering to customers of co-ops and munis. This was welcome news to rural customers who want to take advantage of small wind systems.

#### **Third-Party Model**

Points	Third-Party Power Purchase Agreement Treatment
+1	Presumed allowed to net meter
0	Not specified
-1	Presumed not allowed to net meter

Over the past couple of years, the third-party ownership model has emerged as a useful financing solution for solar installations. With this model, instead of buying a solar system, a customer signs a long-term contract with a third-party who installs and owns a solar system on the customer’s roof. This model has proven successful because the host does not have to put up initial capital, available tax credits and incentives are able to be more fully utilized (especially in the case where the property owner has limited tax liability), and the host has zero operations and maintenance costs. Given the success of this approach, it will be an important driver of a sustainable PV market. Faced with the possibility of these third-party owners being regulated as utilities, a few states have investigated the legality of this model. For example, in the summer of 2008, the Oregon Public Utility Commission ruled that third parties are not utilities and therefore are not regulated by the commission. The PUC ruled that, with third-party ownership, the system is installed on the customer’s side of the meter and does not require the distribution system wires or ancillary services.<sup>7</sup>

Creating a metric that weights the amenability of a state toward third-party ownership is sufficiently nuanced and state-specific; therefore relative scoring is impractical. The treatment of the third-party

model may also be outside the net metering regulations themselves. For the purposes of this report, a point is awarded for net metering rules that do not preclude the third-party ownership model within the net metering rules. A negative point is warranted for those states that expressly exclude third-party-owned systems from net metering. For example, where a state’s net metering rule defines a net metering facility as a “customer-owned” facility, instead of using more neutral and flexible “customer-sited” terminology, the state’s rule would be counted as an express exclusion of third-party owned systems from net metering.

## Policy Points: Interconnection Procedures

### Eligible Technologies

Points	Customers that Qualify
0	All customer-sited generators qualify
-1	Only renewable generators permitted

While public policy may emphasize renewable energy, the system and engineering impacts of a system should be evaluated solely on their own merits. To do otherwise introduces complexity and may restrict innovation. If a generator complies fully with the relevant technical standards, there is no operational or safety justification to deny interconnection.

### Individual System Capacity

Points	System Capacity
0	Generators up to 20 MW permitted
-0.5	up to 10 MW permitted
-1	up to 2 MW
-2	up to 1 MW
-4	Less than 500 kW

Interconnection procedures should be less stringent for small, simple systems and more stringent as system size increases. However, standards should also permit systems that are sized to meet even large, on-site loads. Office parks, government buildings, military bases, hospitals or college campuses can potentially accommodate installations of 2 MW or more just to serve a portion of their load. Increasingly, forward-thinking states are facilitating this option.

### “Breakpoints” for Interconnection Process

Points	Levels
+1	Four levels
0	Three levels
-1	Two levels
-2	No breakpoints, one process for all generators regardless of size
Bonus	
+1	Progressive standards that allow larger systems in any category

Many technical considerations and studies are relevant only for relatively large generators. It is most efficient to break a single overall interconnection process into separate “tracks” based on generator

capacity, relieving complexity for the smallest systems while preserving conservative and thorough studies for larger installations. The emerging consensus is to position applicants at four breakpoints in system size: 10 kW, 2 MW, 10 MW (non-exporting systems), and a track for systems 20 MW and larger.

### Timelines

Points	Timelines
+1	Timelines are shorter than the FERC standards
0	Timelines are the same as the FERC standards
-1	Timelines are longer than the FERC standards

Time is money, and for a device like a rooftop PV system, where physical installation may take just two working days, paperwork and permits represent the single largest obstacle to quick installation. The FERC standards establish a timeline for each step of the application process, for each type of generator. There is room for improvement in this area, and some states have elected to trim the amount of time allowed for the different steps. Some states have a shorter time allotted for the read-through of an application with small generators using UL-listed equipment.

### Interconnection Charges

Points	Fees
+3	Fees are waived for net-metered customers and interconnection charges are capped
+2	Fees are waived for net-metered customers
+1	Fees are lower than the FERC standards
+0.5	Scale or “breakpoint” based fees, which are generally lower than the FERC standards
0	Fees are the same as the FERC standards
-1	Fees are greater than the FERC standards
-3	Fees are generally double or more than the FERC standards

Interconnection application fees along with other fees can create challenges, especially if these fees are unknown at the onset of project development. Reasonable fee levels have been established in the FERC procedures and have been subject to an extensive compromise and negotiation process.

### Engineering Charges

Points	Fees
+1	Engineering fees are fixed
0	Engineering fees are not fixed

An interconnection standard may require an engineering review for certain systems; where it does, it is important for the parties involved to know what the fees are beforehand. The engineering charges are commonly a fixed dollar per hour rate or a dollar per study rate.

### External Disconnect Switch

Points	Requirement
+1	Redundant external disconnect switch prohibited for all systems
+0.5	Redundant external disconnect switch prohibited for systems under 10 kW
0	Redundant external disconnect switch not addressed
-1	Redundant external disconnect switch at utility's discretion
-2	Redundant external disconnect switch required

In theory, a grid-tied DG system presents a safety hazard if the grid goes down and the system continues to produce power without the utility's knowledge (a situation utilities call islanding). Potentially, line workers could come into contact with an unexpectedly energized line. Many utilities cite these safety concerns as justification for requiring owners of grid-tied DG systems to install and test an external disconnect switch. However, the practical effect is that, like hidden interconnection fees, requiring an additional external disconnect switch only adds unnecessary costs and discourages customers from investing in renewable energy systems.<sup>8</sup>

External disconnect switches are unnecessary because all inverters that meet IEEE standards have automatic shut-off capabilities integrated within the systems.<sup>9</sup> In the event of grid failure, a DG system's inverter will detect the loss of power and shut themselves off.<sup>10</sup> It is important to note that not one accident resulting from the islanding of net-metered renewable energy systems has been reported.<sup>11</sup> More importantly, utility workers are trained to treat all lines as live, and a variety of other safety precautions are required as part of standard operating procedures.<sup>12</sup> An external disconnect switch represents a fourth or fifth level of redundancy that is only relevant if a utility worker ignores his or her training. If a utility worker is following proper protocol, none of the levels of safety measures preceding an external disconnect switch will ever be used, much less the switch itself.<sup>13</sup>

### Certification

Points	Standard
+1	UL 1741 / IEEE 1547 standards are used in addition to other options (ie:self-certification)
0	UL 1741 / IEEE 1547 standards are used
-1	UL 1741 / IEEE 1547 standards are not used, or modified elements of IEEE 1547 are used
-4	Standard used is in conflict with, or in excess of IEEE 1547

The electrical safety and operation of the grid must be a primary concern in the development of any interconnection procedure, and must remain an *engineering standard*, not a policy determination. Utilities, equipment manufacturers, national laboratories and testing facilities, and governmental representatives have developed the relevant technical standards jointly.

While some states have provided for additional options (e.g., the reuse of certification on equipment individually type-tested by utilities), others have used conflicting technical standards—a critical flaw that may in fact affect the safety and security of the grid. Still others have added idiosyncratic or unspecified blanket clauses that introduce uncertainties. In such cases, potential investors in DG systems do not know when such a clause might arise to disqualify them.

### Technical Screens

Points Screen

- 0 The FERC standards' screens are used
- 1 There is partial adoption of screens
- 2 No screens are used or it is at the utility's discretion

Penalty A more conservative screen(s) than the FERC standards is used = -1 for each

Bonus One or more of the FERC standards' screens that do not affect safety have been dropped, or a more liberal screen element that does not affect safety is used = +1 for each

Every interconnection is different, but all interconnections share some fundamental characteristics. These relate to, among other things, the size of the generator relative to the section of the grid to which it connects and the ratings of the protective equipment installed. These factors determine how complex the interconnection process needs to be.

The FERC standards provide a thorough set of technical screens that has been copied by many jurisdictions; any significant revision to these widely used benchmarks introduces difficulties to the process and may increase system costs, as configurations or programming must be adjusted to comply with novel regulations.

### Network Interconnection

Points Spot/Area Secondary Networks

- +2 Both spot and area network interconnections are allowed with flexible criteria based on customer load characteristics
- +1 Either spot or area network interconnections are allowed at maximum capacity
- 0 Networks are allowed but limited to 50 kW for spot network and/or 500 kW for area network interconnection
  
- +2 Bonus: Networks are allowed provided the generating facility is inverter-based and uses additional non-exporting protective schemes
- +1 Bonus: Networks are allowed with a single protective feature
- 1 Penalty: Spot and/or Area not addressed or allowed

A spot network is designed to serve a large single location, such as a corporate campus or high-rise building; an area network describes the power distribution system in an area dense with users, such as a downtown area. These types of networks are designed to increase reliability by creating more potential paths from generation to load. However, the types of systems that may be connected are usually restricted—often to those that are inverter based, as these networks are less tolerant of exported electricity.

Some jurisdictions have extended this concern to ban network interconnections completely. However, the very area networks that jurisdictions aim to protect are generally those most in need of the relief that DG can contribute. A more appropriate approach would be to create more stringent technical standards for networked systems or simply require that they install specified high-speed equipment that assures that area network generation will not exceed the load on the network at any time.<sup>14</sup>

### **Standard Form Agreement**

Points	Form Style
+1	Standard agreement with friendly clauses
0	Standard agreement with standard clauses
-0.5	No standard agreement
-1	Standard agreement with excessively complex or hostile clauses
<b>Bonus</b>	
+1	Simplified form for all levels of interconnection
+0.5	Simplified form for systems under 10 kW

The point where the rubber meets the road in any interconnection framework is the agreement. Without a standard agreement, the interconnection process is immediately more complex. If the standard is overly complicated or includes clauses hostile to the customer—such as requiring the customer to indemnify the utility for a broad list of potential liabilities with no equivalent protection from the utility—then the standard loses much of its value.

### **Insurance Requirements**

Points	Requirements
+1	No additional insurance required for non-inverter based systems under 50 kW or inverter-based systems under 1 MW
0.5	Additional insurance required, but not more than a typical customer would carry
0	Insurance is not addressed or is left to the development of the standard form agreement
-1	Utility is listed as additional insured or other restrictive requirements
-2	Additional and disproportionately burdensome insurance requirements for smaller systems

Because of potential personal injury and property damage liability risks associated with interconnection, many states allow utilities to impose liability insurance requirements on DG system owners. Some states require customer-sited generators to carry coverage to protect utilities from being held financially responsible for problems caused by interconnected systems.

However, to the authors' knowledge there has never been a documented case of a small, net-metered system causing electrical failure or creating potential personal injury or property damage liabilities for a utility. Renewable energy technologies manufactured and installed in compliance with technical interconnection guidelines significantly reduce the risk of potential safety issues.

Excessive insurance requirements only serve to discourage customers from investing in renewable energy systems and participating in net metering programs. Requiring customer-sited generators—especially those with relatively small DG systems—to obtain and maintain million-dollar insurance policies is impractical, because the high premiums will likely exceed the economic benefits of net metering.

### Dispute Resolution

Points	Dispute Process
+2	Process in place (low or no cost, quick)
0	Not addressed, costly, or administratively burdensome
-1	Utility discretion

Inevitably, some requests for interconnection will result in disputes. The best standards provide a low-cost means of expert resolution, e.g., through a telephone call to a technical master employed by the state public utility commission. Other options are more administratively burdensome and more expensive. Of course, if the standard explicitly states that all disputes will be resolved through or by a utility's discretion, the standard becomes less reliable in the eyes of counter-parties.

### Rule Coverage

Points	Utilities Covered
+1	Rules apply to all utilities
0	Rules apply to investor-owned utilities only

Interconnection procedures may cover all utilities in the state or just investor-owned utilities.

### Miscellaneous

- **Adverse system impact check required for systems under 2 MW = -1.** This type of check is for the potential impact of a customer-sited generator on the grid. It should not be applied to small generators, for which it is largely irrelevant.
- **Provide for local code official refusal when certificate of completion required = -1.** Some states require that a local code official sign or certify documentation associated with the interconnection process. Since these officials do not generally certify documents other than their own inspections, they can be resistant to filling out an unfamiliar form, delaying or complicating the process.
- **Interconnection process is significantly different from the FERC standards = -1.** The overall framework of the FERC standards is well understood and should be the basic underpinning of any standard.
- **Note:** 7.5 points are added to interconnection scores to achieve grading parity with net metering scoring.

### END NOTES

1 UL is a global source for product testing for manufacturers, retailers, consumers and regulating bodies. UL tests products for public safety. [www.ul.com](http://www.ul.com). UL 1741 is the Standard for Inverters, Converters, and Controllers for Use in Independent Power Systems. For further information see: <http://www.ul.com/dge/inverters/index.html>

2 The *Freeing the Grid* methodology has also been adopted for use in the National Renewable Energy Laboratory's annual State of the States report as well as the US Department of Energy's SunShot program.

3 Heinemann, Amy. (2011) DSIRE Solar Policy Guide: A Resource for State Policymakers. DSIRE. August. <http://www.dsireusa.org/solar/solarpolicyguide/?id=17>

4 Pacific Gas and Electric Company, Generator Interconnection Services Department. (2006) Pacific Gas and Electric Company's Position on the Net Energy Metering Enrollment Cap.

5 A per-kWh charge effectively offsets any economic benefit from net metering, will be administratively burdensome and requires more expensive metering than simple net metering, resulting in the significant negative score.

- 6 Wenger, Howard, Tom Hoff, and Jan Pepper. (1996) Photovoltaic Economics and Markets: The Sacramento Municipal Utility District as a Case Study. California Energy Commission. September. <http://www.energy.ca.gov/papers/CEC-999-1996-014.PDF>
- 7 Renewable Energy World. (2008) Third-Party System Ownership Approved in Oregon. August 8. <http://www.renewableenergyworld.com/rea/news/story?id=53273>
- 8 Cook, Christopher. (2003) Interconnection of PV Systems to the Grid - The Utility Accessible External Disconnect Switch: Critical Safety Component or Useless Equipment Requirement? Paper A160, Proceedings of Solar 2003 (The 32nd annual conference of the American Solar Energy Society).
- 9 Institute of Electrical and Electronics Engineers (IEEE). (2003) 1547-2003 IEEE Standard for Interconnecting Distributed Resources with Electric Power Systems.
- 10 Varnado, Laurel and Sheehan, Michael. (2009) Connecting to the Grid: A Guide To Distributed Generation Interconnection Issues. Sixth Ed. Interstate Renewable Energy Council (IREC) and North Carolina Solar Center. [http://irecusa.org/fileadmin/user\\_upload/ConnectDocs/Connecting\\_to\\_the\\_Grid\\_Guide\\_6th\\_edition-1.pdf](http://irecusa.org/fileadmin/user_upload/ConnectDocs/Connecting_to_the_Grid_Guide_6th_edition-1.pdf)
- 11 Coddington, M.H., R.M. Margolis, and J. Aabakken. (2008) Utility-Interconnected Photovoltaic Systems: Evaluating the Rationale for the Utility-Accessible External Disconnect Switch. National Renewable Energy Laboratory. Technical Report: NREL/TP-581-42675. January. Note: followed by citation: Cook, C.; Haynes, R. "Industry Interview." PV News, November 2006.
- 12 Sheehan, Michael (2008) Utility External Disconnect Switch. Solar Americas Board for Codes and Standards. <http://www.solarabcs.org/utilitydisconnect/>
- 13 Cook, Christopher. (2003) Interconnection of PV Systems to the Grid - The Utility Accessible External Disconnect Switch: Critical Safety Component or Useless Equipment Requirement? Paper A160, Proceedings of Solar 2003 (the 32nd annual conference of the American Solar Energy Society).
- 14 Coddington, M., et al. (2009) Photovoltaic Systems Interconnected onto Secondary Network Distribution Systems – Success Stories. National Renewable Energy Laboratory. Technical Report: NREL/TP-550-45061. April.

## Grading

### Net Metering

- A** Full retail credit with no subtractions. Customers protected from fees and additional charges. Rules actively encourage use of DG.
- B** Generally good net metering policies with full retail credit, but there could be certain fees or costs that detract from full retail equivalent value. There may be some obstacles to net metering.
- C** Adequate net metering rules, but there could be some significant fees or other obstacles that undercut the value or make the process of net metering more difficult.
- D** Poor net metering policies with substantial charges or other hindrances. Many customers will forgo an opportunity to install DG because net metering rules subtract substantial economic value.
- F** Net metering policies that deter customer-sited DG.
- N/A** No statewide policy exists

### Interconnection

- A** No restrictions on interconnection of DG systems that meet safety standards. Policies actively facilitate the interconnection of grid-tied customer DG and represent most or all state best practices.
- B** Good interconnection rules that incorporate many best practices adopted by states. Few or no customers will be blocked by interconnection barriers. There may be some defects in the standards, such as a lack of standardized interconnection agreements and expedited interconnection to networks.
- C** Adequate for interconnection, but systems incur higher fees and longer delays than necessary. Some systems will likely be precluded from interconnection because of remaining barriers in the interconnection rules.
- D** Poor interconnection procedures that leave in place many needless barriers to interconnection. A few best practices possibly included, but many excluded. A significant number of systems will experience delays and high fees for interconnection, and a sizable percentage may be blocked because of these rules.
- F** Interconnection procedures include many barriers to interconnection. Few to no generators will experience expedited interconnection, and few to no state best practices are adopted. Many to most DG systems will be blocked from interconnecting because of the standards.
- N/A** No statewide policy exists

Note: The following grade cards contain summaries of states' net metering programs and interconnection procedures using information from the Database of State Incentives for Renewables & Efficiency (DSIRE) and IREC's *Connecting to the Grid* monthly newsletter. Some states graded in past editions may be scored as 'N/A' in this year's edition. The editors believe these "interconnection guidelines" to be insufficient or not comprehensive enough to constitute "state-wide interconnection procedures," thus deserving a grade.

The summaries presented here are based on information available as of November 1, 2012. For further information, details and updates on state net metering policies and interconnection procedures, visit: DSIRE: [www.dsireusa.org](http://www.dsireusa.org)

## Alaska

### Net Metering

2007: N/A

2008: N/A

2009: N/A

2010: B

2011: C

**2012: C**

<b>Eligible Renewable/O Technologies:</b>	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Municipal Solid Waste, Hydrokinetic, Anaerobic Digestion, Small Hydroelectric, Tidal Energy, Wave Energy, Ocean Thermal
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Federal Government, Agricultural, Institutional
<b>Limit on System Size:</b>	25 kW
<b>Limit on Overall Enrollment:</b>	1.5% of average retail demand
<b>Treatment of Net Excess:</b>	Reconciled monthly
<b>Applicable Utilities:</b>	Utilities with annual retail sales of 5,000,000 kWh or more
<b>REC Ownership:</b>	Not addressed
<b>Meter Aggregation:</b>	Not addressed

Recommendations:

- Remove system size limits and allow systems to be sized to meet on-site load
- Carryover NEG indefinitely
- Grant REC ownership to customer-generators

### Interconnection

2007: N/A

2008: N/A

2009: N/A

2010: N/A

2011: N/A

**2012: N/A**

No statewide policy exists.

Recommendation:

- Adopt IREC's model interconnection procedures

In October 2009, the Regulatory Commission of Alaska (RCA) approved net metering regulations. These rules were finalized and approved by the lieutenant governor in January 2010 and became effective January 15, 2010. In May 2011, the RCA approved interconnection guidelines. All utilities subject to Alaska's net metering regulations are required to issue revised tariffs that address interconnection.

## Arizona

### Net Metering

2007: N/A

2008: B

2009: A

2010: A

2011: A

**2012: A**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Municipal Solid Waste, CHP/Cogeneration, Hydrogen, Biogas, Anaerobic Digestion, Small Hydroelectric, Fuel Cells using Renewable Fuels
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Institutional
<b>Applicable Utilities:</b>	Investor-owned utilities, electric co-ops
<b>System Capacity Limit:</b>	No capacity limit specified, but system must be sized to meet part or all of customer's electric load and may not exceed 125% of customer's total connected load
<b>Aggregate Capacity Limit:</b>	No limit specified
<b>Net Excess Generation:</b>	Credited to customer's next bill at retail rate; excess reconciled annually at avoided-cost rate
<b>REC Ownership:</b>	Customer owns RECs (must be relinquished to utility in exchange for distributed generation payments)
<b>Meter Aggregation:</b>	Not addressed

Recommendation:

- Adopt safe harbor language to protect customer-generators from extra and/or unanticipated fees

### Interconnection

2007: C

2008: C  
 2009: C  
 2010: N/A  
 2011: N/A  
 2012: N/A

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, CHP/Cogeneration, Microturbines, Other Distributed Generation Technologies
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential
<b>Applicable Utilities:</b>	Investor-owned utilities, SRP
<b>System Capacity Limit:</b>	Varies by utility
<b>Standard Agreement:</b>	Varies by utility
<b>Insurance Requirements:</b>	Varies by utility
<b>External Disconnect Switch:</b>	Varies by utility
<b>Net Metering Required:</b>	No

Recommendation:

- Make the regulatory requirements uniform, using IREC standard interconnection recommendations, for all utilities.

The Arizona Corporation Commission (ACC) adopted net metering rules in October 2008 which became effective in May 2009. These rules, which apply to investor-owned and cooperative utilities in the state, allow net metering for systems that provide 125% or less of the customer’s peak connected load. Net Excess Generation will be credited monthly at the retail rate and any remaining NEG at the end of the calendar year will be paid to the customer, via check or billing credit, at the utility’s avoided cost payment. The ACC also requires that net metering charges be assessed on a non-discriminatory basis. For interconnection, the Arizona Corporation Commission (ACC) recommends that utilities use draft rules that apply for systems up to 10 MW.

## Arkansas

### Net Metering

2007: C

2008: C

2009: C

2010: B

2011: B

**2012: B**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, Microturbines using Renewable Fuels, Small Hydroelectric, Fuel Cells using Renewable Fuels
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, General Public/Consumer, Nonprofit, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
<b>Applicable Utilities:</b>	All utilities (municipal utilities not subject to commission rules)
<b>System Capacity Limit:</b>	300 kW for non-residential; 25 kW for residential
<b>Aggregate Capacity Limit:</b>	No limit specified
<b>Net Excess Generation:</b>	Credited to customer's next bill at retail rate; granted to utility at end of 12-month billing cycle
<b>REC Ownership:</b>	Customer owns RECs
<b>Meter Aggregation:</b>	Not addressed

### Recommendations:

- Remove system size limitations to allow customers to meet all on-site energy needs
- Adopt safe harbor language to protect customer-generators from extra and/or unanticipated fees

### Interconnection

2007: F

2008: F

2009: F

2010: N/A

2011: N/A

**2012: N/A**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells using Renewable Fuels, Microturbines
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, General Public/Consumer, Nonprofit, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
<b>Applicable Utilities:</b>	All utilities (municipal utilities not subject to commission rules)
<b>System Capacity Limit:</b>	300 kW for non-residential; 25 kW for residential
<b>Standard Agreement:</b>	Yes
<b>Insurance Requirements:</b>	Not addressed
<b>External Disconnect Switch:</b>	Not required for certain inverter-based systems; required for all other systems
<b>Net Metering Required:</b>	Yes

Recommendation:

- Adopt IREC’s model interconnection procedures

The process for interconnection is only partially addressed through net metering provisions and is not sufficient for a grade in this edition. The standards require an external disconnect switch, though this may be waived for inverter-based systems meeting certain requirements. The law also authorizes the APSC to allow utilities to assess additional charges and/or fees for net metering customers. The APSC revised net metering standards in April 2007 to address the rollover of NEG and the treatment of RECs. This resulted in monthly rollover of NEG until the end of the annual billing cycle, after which it is granted to the utility. Customers also retain all RECs associated with their generation. A standard agreement is used for the interconnection of customer-owned systems which includes a mutual indemnification provision but does not address insurance requirements.

## California

### Net Metering

2007: A

2008: B

2009: A

2010: A

2011: A

**2012: A**

<b>Eligible Renewable/Other Technologies:</b>	Photovoltaics, Wind, Fuel Cells, Biogas from manure methane production or as a byproduct of the anaerobic digestion of biosolids and animal waste
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Agricultural
<b>Applicable Utilities:</b>	All utilities (except LADWP): solar and wind; Investor-owned utilities: solar, wind, biogas and fuel cells
<b>System Capacity Limit:</b>	1 MW (10 MW for up to 3 biogas digesters)
<b>Aggregate Capacity Limit:</b>	5% of utility's peak demand (statewide limit of 50 MW for biogas digesters; 112.5 MW for fuel cells);
<b>Net Excess Generation:</b>	Credited to customer's next monthly bill at retail rate. Excess generation at end of 12-month true-up period valued according to DLAP (avoided cost of period where excess generation is likely) and is either issued as a check or monetized and rolled forward as a bill credit.
<b>REC Ownership:</b>	Customer owns RECs. If customer receives payment for remaining net excess generation at the end of a 12 month cycle, utility owns the RECs associated with the net excess electricity purchased.
<b>Meter Aggregation:</b>	Virtual meter aggregation on multi-family affordable housing allowed

Recommendation:

- Remove system size limitations to allow customers to meet all on-site energy needs

### Interconnection

2007: C

2008: B

2009: B

2010: B

2011: B

2012: A

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, Municipal Solid Waste, CHP/Cogeneration, Microturbines, Other Distributed Generation Technologies
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential
<b>Applicable Utilities:</b>	Investor-owned utilities
<b>System Capacity Limit:</b>	No limit specified
<b>Standard Agreement:</b>	Yes
<b>Insurance Requirements:</b>	Vary by system size and/or type; levels established by commission
<b>External Disconnect Switch:</b>	Varies by utility and system size
<b>Net Metering Required:</b>	No

Recommendations:

- Remove requirements for redundant external disconnect switch
- Prohibit requirements for additional insurance

California's original net metering law was enacted in 1996 and subsequent amendments have increased the eligible technologies and established fee structures, resulting in the current system. All utilities are subject to net metering rules except for publicly-owned utilities with 750,000 or more customers that also provide water (only the Los Angeles Department of Water and Power fits this description). Publicly-owned utilities can choose to incorporate a time-of-use rate schedule. Customers retain ownership of all RECs. Furthermore, no additional charges or fees are allowed. Beginning in 2009, California was also one of the first states to allow virtual net metering for multi-family affordable housing units and municipalities. Legislation enacted in 2010 raised the aggregate net metering limit to 5.0% of the utility's aggregate customer peak demand. A CPUC decision in 2012 clarified that aggregate customer peak demand is defined as the sum of the non-coincident peak demands of all utility customers. Previously, the utilities had used a more restrictive measure, the largest instantaneous peak demand, as their reference point. California's Rule 21 governs the interconnection process. CPUC D.11-07-03 allows multi-metered properties to net meter through VNM. Rule 21, adopted in 2000, is significantly different from the FERC standards in that Rule 21 does not include separate levels of interconnection. Rather, all applications enter the process at the same point and then "drop out" according to complexity. The first fundamental redesign to Rule 21 was enacted by the CPUC in 2012 to expedite interconnection to the grid at higher levels of renewable penetration (see In Focus section). The California Solar Initiative has set a goal of installing 3,000 MW by 2017.

## Colorado

### Net Metering

2007: A

2008: A

2009: A

2010: A

2011: A

**2012: A**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, Recycled Energy, Small Hydroelectric, Fuel Cells using Renewable Fuels
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential
<b>Applicable Utilities:</b>	All utilities (exceptions for small municipal utilities)
<b>System Capacity Limit:</b>	IOU customers: 120% of the customer's average annual consumption. Muni and co-op customers: 25 kW for non-residential & 10 kW for residential
<b>Aggregate Capacity Limit:</b>	No limit specified
<b>Net Excess Generation:</b>	Credited to customer's next bill at retail rate. IOUs pay customers at end of calendar year at average hourly incremental cost, or customer may opt for indefinite roll-over Munis and co-ops provide annual reconciliation at a rate they deem appropriate.
<b>REC Ownership:</b>	Customer owns RECs (must be relinquished to utility for 20 years in exchange for incentives)
<b>Meter Aggregation:</b>	Allowed for IOU customers; rules under development

Recommendation:

- Allow rules to cover muni and co-op customers

### Interconnection

2007: C

2008: C

2009: C

2010: B

2011: B

**2012: B**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, CHP/Cogeneration, Anaerobic Digestion, Fuel Cells using Renewable Fuels, Microturbines, Other Distributed Generation Technologies
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Utility, Agricultural, Institutional
<b>Applicable Utilities:</b>	All utilities (exceptions for small municipal utilities)
<b>System Capacity Limit:</b>	10 MW
<b>Standard Agreement:</b>	Yes
<b>Insurance Requirements:</b>	Vary by system size and/or type; levels established by commission
<b>External Disconnect Switch:</b>	Not addressed
<b>Net Metering Required:</b>	No

Recommendations:

- Increase covered system capacity to cover all system sizes
- Eliminate additional insurance requirements entirely
- Eliminate surcharge allowance

In September 2009, the Colorado PUC released a decision that made several changes to Colorado’s net metering rules for IOUs. These changes include shifting the maximum system size for solar electric systems from 2 MW to 120% of the annual consumption of the site; redefining a site to include all contiguous property owned by the consumer; and allowing system owners to make a one-time election in writing to have their annual NEG carried forward as a credit from month to month indefinitely. In a pioneering move, Colorado passed legislation that allows for Community Solar Gardens (CSG). Those CSGs of up to 2 MW in size that have at least 10 subscribers will receive kWh credits on their utility bills in proportion to the size of their subscription. Colorado’s interconnection procedures are divided into three levels and follow the FERC standards. Legislation enacted in March 2008 required municipal utilities with more than 5,000 customers and all cooperative utilities to offer net metering for residential systems up to 10 kW and commercial and industrial systems up to 25 kW.

## Connecticut

### Net Metering

2007: B

2008: B

2009: A

2010: A

2011: A

**2012: A**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Fuel Cells, Municipal Solid Waste, Small Hydroelectric, Tidal Energy, Wave Energy, Ocean Thermal
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Multi-Family Residential, Agricultural, Institutional
<b>Applicable Utilities:</b>	Investor-owned utilities
<b>System Capacity Limit:</b>	2 MW
<b>Aggregate Capacity Limit:</b>	No limit specified
<b>Net Excess Generation:</b>	Credited to customer's next bill at retail rate; excess reconciled annually at either avoided-cost rate or time-of-use/generation rate (for PV systems)
<b>REC Ownership:</b>	Customer owns RECs
<b>Meter Aggregation:</b>	Not addressed

### Recommendations:

- Remove system size limitations to allow customers to meet all on-site energy needs
- Adopt safe harbor language to protect customer-sited generators from extra and/or unanticipated fees
- Expand net metering to all utilities (i.e., – munis and co-ops).

### Interconnection

2007: D

2008: D

2009: D

2010: B

2011: B

**2012: B**

<b>Eligible Renewable/Other Technologies:</b>	Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Fuel Cells, Municipal Solid Waste, CHP/Cogeneration, Microturbines, Other Distributed Generation Technologies
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, (All Electric Customers)
<b>Applicable Utilities:</b>	Investor-owned utilities
<b>System Capacity Limit:</b>	20 MW
<b>Standard Agreement:</b>	Yes
<b>Insurance Requirements:</b>	Vary by system size and/or type; levels established by commission
<b>External Disconnect Switch:</b>	Required
<b>Net Metering Required:</b>	No

Recommendations:

- Remove requirement for redundant external disconnect switch
- Remove requirement for additional insurance
- Expand interconnection procedures to all utilities (i.e., munis and co-ops)

The Connecticut Department of Public Utility Control (DPUC) approved interconnection guidelines for systems up to 20 MW in 2007. These standards apply only to IOUs and include three levels of interconnection. An external disconnect switch is required, as well as liability insurance. Net metering is available to Class I renewable energy systems up to 2 MW. NEG rolls over to the next month at the retail rate and the utility compensates the customer for any NEG at the avoided cost at the end of the annual period. The DPUC ordered Connecticut Light and Power to calculate the reimbursement for PV systems for any NEG at the end of an annualized period on a time-of-use/generation basis. There is no stated limit on the aggregate capacity of net-metered systems in a utility's service territory. Also of note, Connecticut passed a new energy law (Public Act 11-80) in 2011.

## Delaware

### Net Metering

2007: B

2008: B

2009: A

2010: A

2011: A

**2012: A**

<b>Eligible Renewable/Other Technologies:</b>	Photovoltaics, Wind, Biomass, Hydroelectric, Anaerobic Digestion, Small Hydroelectric, Fuel Cells
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
<b>Applicable Utilities:</b>	All utilities
<b>System Capacity Limit:</b>	DP&L: 2 MW for non-residential DP&L customers; 500 kW non-residential DEC and municipal utility customers; 25 kW for all residential customers; 100 kW for all farm customers on residential rates
<b>Aggregate Capacity Limit:</b>	5% of peak demand (utilities may increase limit)
<b>Net Excess Generation:</b>	Credited to customer's next bill at retail rate; indefinite rollover permitted but customer may request payment at the energy supply rate at the end of an annualized period.
<b>REC Ownership:</b>	Customer retains ownership of RECs associated with electricity produced and consumed by the customer
<b>Meter Aggregation:</b>	Not addressed

Recommendation:

- Allow net metering for third parties using the PPA model

### Interconnection

2007: F

2008: F

2009: D

2010: F

2011: A

**2012: A**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Anaerobic Digestion, Fuel Cells, Other Distributed Generation Technologies
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
<b>Applicable Utilities:</b>	All utilities (only Delmarva Power is subject to commission rules)
<b>System Capacity Limit:</b>	10 MW
<b>Standard Agreement:</b>	Yes
<b>Insurance Requirements:</b>	"Additional" liability insurance not required for systems that meet certain technical standards
<b>External Disconnect Switch:</b>	Required. Delaware Electric Cooperative exempts systems 25 kW or less.
<b>Net Metering Required:</b>	No

Recommendations:

- Eliminate external disconnect switch requirement

Net metering is allowed in Delaware for systems up to 25 kilowatts (kW) for residential customers of DP&L, DEC and municipal electric utilities; two megawatts (MW) per meter for non-residential customers of DP&L; and 500 kW per meter for non-residential customers of DEC and municipal utilities. Legislation enacted in July 2009 allows for indefinite rollover of NEG, grants customer-generators ownership of all RECs and increases the aggregate participation limit to 5% of peak load. Delaware greatly improved their interconnection rules in 2011 by adopting IREC's model standards.

## District of Columbia

### Net Metering

2007: F  
2008: C  
2009: B  
2010: B  
2011: B  
**2012: A**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, CHP/Cogeneration, Anaerobic Digestion, Small Hydroelectric, Tidal Energy, Microturbines
<b>Applicable Sectors:</b>	Commercial, Residential
<b>Applicable Utilities:</b>	Investor-owned utilities
<b>System Capacity Limit:</b>	1 MW – however full retail rate net metering only applies to systems up to 100 kW
<b>Aggregate Capacity Limit:</b>	No limit specified
<b>Net Excess Generation:</b>	Credited to customer's next bill at the full retail rate for systems 100 kW or less or at generation rate (i.e., avoided cost) for systems larger than 100 kW; credits may be carried forward indefinitely
<b>REC Ownership:</b>	Customer and utility own RECs
<b>Meter Aggregation:</b>	Not addressed

Recommendations:

- Remove system size limitations to allow customers to meet all on-site energy needs
- Adopt stronger safe harbor language to protect customer-sited generators from extra and/or unanticipated fees
- Allow customers to retain RECs

**Interconnection**

2007: F

2008: F

2009: B

2010: B

2011: B

**2012: A**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, Municipal Solid Waste, CHP/Cogeneration, Anaerobic Digestion, Small Hydroelectric, Tidal Energy, Wave Energy, Ocean Thermal, Microturbines, Other Distributed Generation Technologies
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Institutional
<b>Applicable Utilities:</b>	Investor-owned utilities

<b>System Capacity Limit:</b>	10 MW
<b>Standard Agreement:</b>	Yes
<b>Insurance Requirements:</b>	Systems under 1 MW do not face additional insurance requirements. Systems over 1 MW have additional insurance requirements.
<b>External Disconnect Switch:</b>	Not required for inverter-based systems up to 10 kW; required for all other systems
<b>Net Metering Required:</b>	No

Recommendations:

- Increase covered system capacity to 20 MW
- Prohibit requirements for redundant external disconnect switch

Net metering is currently available to D.C. residential and commercial customer-generators with systems powered by renewable-energy sources, combined heat and power (CHP), fuel cells and microturbines. Legislation enacted in October 2008 expanded the limit on individual system size from 100 kW to 1 MW. A 2008 PSC order clarified that NEG for small DG systems is credited at the full retail rate during a billing cycle. In February 2009 the D.C. PSC issued an order establishing interconnection procedures for systems up to 10 MW, using a four-tiered approach to screening criteria. These tiers specify a process for non-exporting systems and those connecting to networks.

## Florida

### Net Metering

2007: N/A

2008: A

2009: A

2010: A

2011: A

**2012: B**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, CHP/Cogeneration, Hydrogen, Small Hydroelectric, Tidal Energy, Wave Energy, Ocean Thermal
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Tribal Government, Fed. Government, Agricultural, Institutional

<b>Applicable Utilities:</b>	Investor-owned utilities
<b>System Capacity Limit:</b>	2 MW
<b>Aggregate Capacity Limit:</b>	No limit specified
<b>Net Excess Generation:</b>	Credited to customer's next bill at retail rate; excess reconciled annually at avoided-cost rate
<b>REC Ownership:</b>	Customer owns RECs
<b>Meter Aggregation:</b>	Not allowed

Recommendation:

- Expand net metering to all utilities (i.e., munis and co-ops)
- Remove system size limitations to allow customers to meet all on-site energy needs
- Expand safe-harbor language to all system tiers.

**Interconnection**

2007: N/A

2008: D

2009: B

2010: B

2011: C

**2012: D**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, CHP/Cogeneration, Hydrogen, Anaerobic Digestion, Small Hydroelectric, Tidal Energy, Wave Energy, Ocean Thermal
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, General Public/Consumer, Nonprofit, Schools, Local Government, State Government, Tribal Government, Fed. Government, Agricultural, Institutional
<b>Applicable Utilities:</b>	Investor-owned utilities
<b>System Capacity Limit:</b>	2 MW
<b>Standard Agreement:</b>	Yes for each utility, but not standard statewide
<b>Insurance</b>	Vary by system size and/or type; levels established by commission

<b>Requirements:</b>	
<b>External Disconnect Switch:</b>	Not required for inverter-based systems up to 10 kW; required for all other systems
<b>Net Metering Required:</b>	Yes

Recommendations:

- Increase covered capacity from 2 MW to 20 MW
- Remove requirements for redundant external disconnect switch on larger systems
- Remove requirements for additional insurance on larger systems
- Implement a statewide standard form agreement

The interconnection and net metering standards adopted by the Florida Public Service Commission in March 2008 apply only to investor-owned utilities. The standards include three breakpoints of interconnection, but limit the capacity of individual interconnected and net-metered systems to 2 MW. Monthly NEG is credited to the customer's next bill at the utility's retail rate; at the end of the year, annual excess generation is credited at the avoided-cost rate. Customers retain all RECs. Systems over 10 kW are subject to additional interconnection application fees, studies and insurance requirements, as well as a required external disconnect switch. The standards include a standard form agreement. Legislation enacted in July 2008 required municipal utilities and electric co-ops to "develop a standardized interconnection agreement and net metering program for customer-owned renewable generation" by July 1, 2009. The law did not provide clear standards or definitions for municipal utilities and electric co-ops and the PSC does not maintain authority over these utilities.

## Georgia

### Net Metering

2007: F

2008: F

2009: F

2010: F

2011: F

**2012: F**

<b>Incentive Type:</b>	Net Metering
<b>Eligible Renewable/Other Technologies:</b>	Photovoltaics, Wind, Fuel Cells
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential

<b>Applicable Utilities:</b>	All utilities
<b>System Capacity Limit:</b>	100 kW non-residential; 10 kW residential
<b>Aggregate Capacity Limit:</b>	0.2% of utility's peak demand during previous year
<b>Net Excess Generation:</b>	Credited to customer's next bill at a predetermined rate filed with the commission
<b>REC Ownership:</b>	Not addressed

Recommendations:

- Remove system size limitations to allow customers to meet all on-site energy needs
- Increase program capacity to at least 5% of a utilities peak demand
- Adopt safe harbor language to protect customer-sited generators from extra and/or unanticipated fees

**Interconnection**

2007: F  
2008: F  
2009: F  
2010: N/A  
2011: F  
**2012: F**

Recommendation:

- The state should adopt IREC’s model interconnection procedures

Legislation enacted in 2001 spurred the development of net metering and interconnection procedures for residential customers with systems less than 10 kW and commercial facilities with systems less than 100 kW. The aggregate system capacity is limited to 0.2% of the utility’s peak load.

**Hawaii**

**Net Metering**

2007: C  
2008: C  
2009: C  
2010: B  
2011: B  
**2012: B**

<b>Eligible Renewable/Other Technologies:</b>	Photovoltaics, Wind, Biomass, Hydroelectric, Small Hydroelectric
<b>Applicable Sectors:</b>	Commercial, Residential, Local Government, State Government, Fed. Government
<b>Applicable Utilities:</b>	All utilities
<b>System Capacity Limit:</b>	100 kW for HECO, MECO, HELCO customers; 50 kW for KIUC customers
<b>Aggregate Capacity Limit:</b>	No aggregate cap
<b>Net Excess Generation:</b>	Credited to customer's next bill at retail rate; granted to utility at end of 12-month billing cycle
<b>REC Ownership:</b>	Not addressed
<b>Meter Aggregation:</b>	Not addressed

Recommendations:

- Remove system size limitations to allow customers to meet all on-site energy needs
- Increase capacity to at least 5% of a utility's peak demand

**Interconnection**

2007: F

2008: F

2009: F

2010: F

2011: F

**2012: B**

<b>Eligible Renewable/Other Technologies:</b>	Any customer or utility-owned electrical power generation
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, State Government, Fed. Government
<b>Applicable Utilities:</b>	Investor-owned utilities
<b>System Capacity Limit:</b>	No limit specified
<b>Standard Agreement:</b>	Yes

<b>Insurance Requirements:</b>	Additional insurance required, but not more than a typical customer would carry
<b>External Disconnect Switch:</b>	Required
<b>Net Metering Required:</b>	No

Recommendations:

- Remove requirements for redundant external disconnect switch
- Prohibit requirements for additional insurance

Net metering is available in Hawaii for systems up to 50 kW for Kauai Island Utility Cooperative (KIUC) and up to 100 kW for the state’s three IOUs (HECO, MECO and HELCO). All utilities are required to develop a pilot program for large systems. NEG is credited to the customer’s next bill until the end of a 12-month period, at which point any remaining NEG is granted to the utility. In October 2008, Hawaii's governor signed an energy agreement with utilities and other key players in the state, as part of the Hawaii Clean Energy Initiative. This agreement provides that there should be no system-wide caps on net metering, and that net metering should transition toward a feed-in-tariff. In January 2011, the PUC issued an order approving changes to Kauai's program, which was full, and the aggregate capacity limits for HECO companies were lifted and are now based on per-circuit caps rather than a percentage of peak demand. A manual disconnect switch is required, but no additional fees are allowed for purposes of interconnection. In November 2011, the Public Utilities Commission issued a decision and order to improve Hawaii's interconnection standards. The order approved a supplemental review process and other measures to limit the scope of systems that must conduct an Interconnection Requirements Study (IRS).

## Illinois

### Net Metering

2007: N/A

2008: B

2009: B

2010: B

2011: B

**2012: B**

<b>Eligible Renewable/Other Technologies:</b>	Photovoltaics, Wind, Biomass, Hydroelectric, Anaerobic Digestion, Small Hydroelectric, Fuel Cells using Renewable Fuels, Microturbines
<b>Applicable Sectors:</b>	Residential

<b>Applicable Utilities:</b>	Investor-owned utilities, alternative retail electric suppliers
<b>System Capacity Limit:</b>	2 MW
<b>Aggregate Capacity Limit:</b>	5% of utility's peak demand in previous year
<b>Net Excess Generation:</b>	Credited to customer's next bill at retail rate; granted to utility at end of 12-month billing cycle
<b>REC Ownership:</b>	Customer owns RECs
<b>Meter Aggregation:</b>	Allowed but not required

Recommendations:

- Remove system size limitations to allow customers to meet all on-site energy needs
- Expand net metering access to all customer classes

**Interconnection**

2007: N/A

2008: B

2009: B

2010: B

2011: B

**2012: B**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, Municipal Solid Waste, CHP/Cogeneration, Anaerobic Digestion, Tidal Energy, Wave Energy, Ocean Thermal, Microturbines, Other Distributed Generation Technologies
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
<b>Applicable Utilities:</b>	Investor-owned utilities
<b>System Capacity Limit:</b>	No limit specified
<b>Standard Agreement:</b>	Yes
<b>Insurance Requirements:</b>	Vary by system size and/or type; levels established by commission
<b>External Disconnect</b>	At utility's discretion

<b>Switch:</b>	
<b>Net Metering Required:</b>	No

Recommendation:

- Expand interconnection procedures to all utilities (i.e., munis and co-ops)

Legislation enacted in 2011 and 2012 (S.B. 1652, H.B. 3036, and S.B. 3811) changed several aspects of net metering in Illinois. For customers in competitive classes as of July 1, 2011, the law prescribes a dual metering and bill crediting system which does not meet the definition of net metering as the term is generally defined. The law also increased the system capacity limit to 2 MW and the aggregate capacity limit to 5%. Additionally, agricultural residues, untreated and unadulterated wood waste, landscape trimmings, and livestock manure are added to the list of eligible resources. These aspects of the net metering law remained in place: Electric co-ops and municipalities are exempt; net excess generation rolls-over to the next billing period at the retail rate but expires at the end of the year; customers retain all RECs. The ICC is currently developing new rules in accordance with this legislation. Illinois' interconnection rules use a four-tiered approach to review interconnection applications. The rules specify provisions for non-exporting systems and those connecting to spot and area networks. All systems are required to have an external disconnect switch directly accessible to the utility. Standardized interconnection agreements are available for all four tiers.

## Indiana

### Net Metering

2007: F

2008: F

2009: F

2010: D

2011: B

**2012: B**

Eligible Renewable/Other Technologies:	Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Fuel Cells, Hydrogen, Small Hydroelectric, Fuel Cells using Renewable Fuels
Applicable Sectors:	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Multi-Family Residential, Low-Income Residential, Agricultural, Institutional
Applicable Utilities:	Investor-owned utilities
System Capacity	1 MW

Limit:	
Aggregate Capacity Limit:	1% of utility's most recent peak summer load
Net Excess Generation:	Credited to customer's next bill at retail rate; carries over indefinitely
REC Ownership:	Not addressed
Meter Aggregation:	Not addressed

Recommendations:

- Remove system size limitations to allow customers to meet all on-site energy needs
- Increase capacity to at least 5% of a utility's peak demand
- Include all customer classes
- Adopt safe harbor language to protect customer-sited generators from extra and/or unanticipated fees
- Expand net metering to all utilities (i.e., munis and co-ops)

**Interconnection**

2007: D

2008: D

2009: D

2010: C

2011: B

**2012: B**

Eligible Renewable/Other Technologies:	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Fuel Cells, CHP/Cogeneration, Anaerobic Digestion, Fuel Cells using Renewable Fuels, Microturbines, Other Distributed Generation Technologies
Applicable Sectors:	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
Applicable Utilities:	Investor-owned utilities, regulated municipal utilities, regulated electric cooperatives
System Capacity Limit:	No limit specified
Standard Agreement:	Yes
Insurance Requirements:	Amount specified by IURC for net-metered systems; not specified for other systems
External Disconnect	Utility's discretion

Switch:	
Net Metering Required:	No

Recommendation:

- Prohibit utility’s discretion for redundant external disconnect switch

Indiana’s interconnection procedures were amended in November 2005 by the Indiana Utility Regulatory Commission (IURC) to provide three levels of interconnection. An external disconnect switch is required. The net metering rules adopted by IURC in 2004 apply to investor-owned utilities and limit the aggregate system to 0.1% of the utility’s most recent summer peak load. These rules allow net metering for residential customers and K-12 schools; this is the only state net metering program that excludes the commercial class. Net-metered customers may not be subject to additional fees, but insurance may be required. NEG is credited to the customer’s next bill; expiration of NEG for multi-year participants is not addressed.

## Iowa

### Net Metering

2007: C

2008: C

2009: C

2010: B

2011: B

**2012: B**

<b>Eligible Renewable/Other Technologies:</b>	Photovoltaics, Wind, Biomass, Hydroelectric, Municipal Solid Waste, Small Hydroelectric
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential
<b>Applicable Utilities:</b>	Investor-owned utilities
<b>System Capacity Limit:</b>	500 kW
<b>Aggregate Capacity Limit:</b>	No limit specified
<b>Net Excess</b>	Credited to customer's next bill at retail rate; carries over indefinitely

<b>Generation:</b>	
<b>REC Ownership:</b>	Not addressed
<b>Meter Aggregation:</b>	Not addressed

Recommendations:

- Remove system size limitations to allow customers to meet all on-site energy needs
- Expand net metering to all utilities (i.e., munis and co-ops)

**Interconnection**

2007: D

2008: F

2009: F

2010: B

2011: B

**2012: B**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Municipal Solid Waste, CHP/Cogeneration, Anaerobic Digestion
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
<b>Applicable Utilities:</b>	Investor-owned utilities; Linn County REC
<b>System Capacity Limit:</b>	10 MW
<b>Standard Agreement:</b>	Yes
<b>Insurance Requirements:</b>	Vary by system size and/or type; levels established by commission
<b>External Disconnect Switch:</b>	Utility's discretion
<b>Net Metering Required:</b>	No

Recommendations:

- Prohibit requirement for redundant external disconnect switch
- Prohibit requirements for additional insurance

The Iowa Utilities Board (IUB) adopted net metering standards in 1984. The guidelines allow customers of all IOUs to net meter renewable energy systems with no explicit limit on system size or total enrollment. More recent waivers have been able to limit system size to some customers at 500 kW. Changes to Iowa's interconnection procedures occurred in 2010 and now apply to distributed generation facilities of up to 10 MW. The standards set four levels of review based on project size and complexity. The rules require the use of standardized interconnection applications and agreements and necessitate liability insurance.

## Kansas

### Net Metering

2007: N/A

2008: N/A

2009: B

2010: B

2011: B

**2012: B**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Small Hydroelectric, Fuel Cells using Renewable Fuels
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
<b>Applicable Utilities:</b>	Investor-owned utilities
<b>System Capacity Limit:</b>	200 kW for non-residential; 25 kW for residential
<b>Aggregate Capacity Limit:</b>	1% of utility's peak demand during previous year
<b>Net Excess Generation:</b>	Credited to customer's next bill at retail rate; granted to utility at end of 12-month billing cycle
<b>REC Ownership:</b>	Utility owns RECs
<b>Meter Aggregation:</b>	Not addressed

### Recommendations:

- Remove system size limitations to allow customers to meet all on-site energy needs
- Expand net metering to all utilities (i.e., munis and co-ops)

**Interconnection**

2007: N/A

2008: N/A

2009: F

2010: N/A

2011: N/A

**2012: N/A**

No statewide policy exists.

Recommendation:

- The state should adopt IREC’s model interconnection procedures

The Kansas legislature enacted a state-wide net metering and interconnection law in May 2009 that applies to residential systems up to 25 kW and non-residential systems up to 200 kW. This bill carries an aggregate participation limit of 1% of the utility’s peak demand for the previous year, though this cap can be increased through a hearing process at the Kansas Corporation Commission (KCC). Net excess generation (NEG) may be carried forward from month to month though NEG remaining at the end of the calendar year is forfeited to the utility. Utilities may require an external disconnect switch though they may not require customers to purchase additional insurance. Utilities are also forbidden from charging customers additional standby, capacity, interconnection or other fees that would not otherwise be charged if the customer were not a customer-generator. The law also directs the KCC to require simple contracts for interconnection and net metering agreements. The capacity of all net metering systems interconnected with utilities under this law will count toward compliance for the state’s renewable energy standard.

**Kentucky****Net Metering**

2007: D

2008: B

2009: B

2010: B

2011: B

**2012: B**

<b>Incentive Type:</b>	Net Metering
<b>Eligible Renewable/Other Technologies:</b>	Photovoltaics, Wind, Biomass, Hydroelectric, Biogas, Small Hydroelectric
<b>Applicable Sectors:</b>	Commercial, Residential, Nonprofit, Schools, Local Government, State Government, Agricultural, Institutional

<b>Applicable Utilities:</b>	Investor-owned utilities, electric co-ops (except TVA distribution utilities)
<b>System Capacity Limit:</b>	30 kW
<b>Aggregate Capacity Limit:</b>	1% of utility's single-hour peak load during previous year
<b>Net Excess Generation:</b>	Credited to customer's next bill at retail rate; carries over indefinitely
<b>REC Ownership:</b>	Customer owns RECs

Recommendations:

- Remove system size limitations to allow customers to meet all on-site energy needs
- Increase program capacity to at least 5% of a utility's peak demand

**Interconnection**

2007: N/A

2008: N/A

2009: F

2010: F

2011: F

**2012: F**

<b>Eligible Renewable/Other Technologies:</b>	Photovoltaics, Wind, Biomass, Small Hydroelectric
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Agricultural, Institutional
<b>Applicable Utilities:</b>	Investor-owned utilities, electric co-ops (except TVA distribution utilities)
<b>System Capacity Limit:</b>	30 kW
<b>Standard Agreement:</b>	Yes
<b>Insurance Requirements:</b>	"Additional" liability insurance not required for systems that meet certain technical standards
<b>External Disconnect Switch:</b>	Utility's discretion
<b>Net Metering</b>	Yes

<b>Required:</b>	
------------------	--

Recommendation:

- The state should adopt IREC’s model interconnection procedures

Kentucky’s net metering law was expanded in April 2008 to systems up to 30 kW and to a variety of renewable technologies (previously, only PV was allowed). The PSC issued net metering and interconnection rules in January 2009 as a result of this law. NEG is rolled-over to the next month’s bill with no apparent expiration. Electricity generated under a time-of-use tariff is credited at the rate that applies at the time that the electricity was generated. The PSC may limit the aggregate capacity of net metering to 1% of a utility’s single-hour peak load. Kentucky’s interconnection rules use a two-tiered approach to specify review criteria and the requirement of an external disconnect switch has been left up to each utility’s discretion. Additional liability insurance is not required for systems that meet certain technical standards.

## Louisiana

### Net Metering

2007: B

2008: B

2009: B

2010: B

2011: C

**2012: C**

<b>Eligible Renewable/Other Technologies:</b>	Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, Small Hydroelectric, Fuel Cells using Renewable Fuels, Microturbines
<b>Applicable Sectors:</b>	Commercial, Residential, Agricultural
<b>Applicable Utilities:</b>	All utilities
<b>System Capacity Limit:</b>	300 kW for commercial; 25 kW for residential
<b>Aggregate Capacity Limit:</b>	0.5% of utility’s retail peak load
<b>Net Excess Generation:</b>	Credited to customer's next bill at retail rate; carried over indefinitely
<b>REC Ownership:</b>	Not addressed

<b>Meter Aggregation:</b>	Not addressed
---------------------------	---------------

Recommendations:

- Remove system size limitations to allow customers to meet all on-site energy needs
- Remove the aggregate participation limit
- Adopt safe harbor regulation to protect customer-sited generators from extra and/or unanticipated fees

**Interconnection**

2007: F  
 2008: F  
 2009: F  
 2010: N/A  
 2011: N/A  
 2012: N/A

No statewide policy exists.

Recommendation:

- The state should adopt IREC’s interconnection procedures

Rules set by the Louisiana Public Service Commission in November 2005 require investor-owned utilities and rural electric co-ops to offer net metering to residential customers with systems of 25 kW or less and to commercial customers with systems of 100 kW or less. In June 2008, Louisiana enacted legislation increasing the eligible size of non-residential systems to 300 kW. NEG is credited to the customer’s next monthly bill and then rolled-over for an indefinite period. In July 2011, the PSC issued an order that allows utilities to file for a suspension of the rule when the aggregate participation reaches 0.5% of the utility’s retail peak load, which had not been specified in the legislation.

**Maine**

**Net Metering**

2007: C  
 2008: C  
 2009: B  
 2010: B  
 2011: B  
 2012: B

<b>Eligible Renewable/Other</b>	Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, Municipal Solid Waste, CHP/Cogeneration, (CHP/Cogeneration
---------------------------------	--

<b>Technologies:</b>	since April 30, 2009), Small Hydroelectric, Tidal Energy
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential
<b>Applicable Utilities:</b>	All utilities
<b>System Capacity Limit:</b>	660 kW for IOU customers; 100 kW for muni and co-op customers (although they may offer up to 660 kW voluntarily)
<b>Aggregate Capacity Limit:</b>	No limit specified
<b>Net Excess Generation:</b>	Credited to customer's next bill at retail rate; granted to utility at end of 12-month billing cycle
<b>REC Ownership:</b>	Not addressed
<b>Meter Aggregation:</b>	Allowed

Recommendations:

- Remove system size limitations to allow customers to meet all on-site energy needs
- Adopt safe harbor language to protect customer-sited generators from extra and/or unanticipated fees

**Interconnection**

2007: N/A

2008: N/A

2009: N/A

2010: A

2011: A

**2012: A**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, Municipal Solid Waste, Tidal Energy, Wave Energy, Other Distributed Generation Technologies
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government
<b>Applicable Utilities:</b>	All Transmission and Distribution Utilities
<b>System Capacity Limit:</b>	Not specified
<b>Standard Agreement:</b>	Varies by system size

<b>Insurance Requirements:</b>	Not required for inverter-based systems up to 1 MW; Vary by system size and/or type
<b>External Disconnect Switch:</b>	Not required
<b>Net Metering Required:</b>	No

Recommendations:

- Provide more clarification on the dispute resolution process

In April 2009, the Maine legislature passed emergency legislation to allow the PUC to adopt rules modifying the states net metering policy. Net metering was subsequently allowed for systems up to 660 kW and included high-efficiency CHP as an eligible technology. Interestingly, this rule was also one of the first in the country to allow for the shared ownership of net-metered systems. Up to 10 meters may be aggregated against a single renewable facility. NEG is credited to the following month for 12 months, at which point it is granted to the utility. There is no aggregate limit on net metering. The Maine Public Utility Commission (PUC) adopted interconnection procedures in January 2010, which were based on the 2006 IREC model. The rules have four tiers for interconnection with each having a fee and technical screens for evaluation. Since interconnection was based on IREC’s model rules (IREC updated the model in 2009), Maine’s interconnection procedures are the strongest in the country.

## Maryland

### Net Metering

2007: A

2008: A

2009: A

2010: A

2011: A

**2012: A**

<b>Eligible Renewable/Other Technologies:</b>	Photovoltaics, Wind, Biomass, Fuel Cells, CHP/Cogeneration, Anaerobic Digestion
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
<b>Applicable Utilities:</b>	All utilities
<b>System Capacity Limit:</b>	2 MW generally, (30 kW for micro-CHP)

<b>Aggregate Capacity Limit:</b>	1,500 MW (~8% of peak demand)
<b>Net Excess Generation:</b>	Credited to customer's next bill at retail rate; reconciled annually at the retail energy rate
<b>REC Ownership:</b>	Customer owns RECs

Recommendations:

- Remove system size limitations to allow customers to meet all on-site energy needs
- Allow for meter aggregation across more customer classes

**Interconnection**

2007: D

2008: B

2009: B

2010: B

2011: B

**2012: A**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Geothermal Electric, Fuel Cells, CHP/Cogeneration, All Distributed Generation , Anaerobic Digestion, Tidal Energy, Wave Energy, Ocean Thermal, Other Distributed Generation Technologies
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
<b>Applicable Utilities:</b>	All utilities
<b>System Capacity Limit:</b>	10 MW
<b>Standard Agreement:</b>	Yes
<b>Insurance Requirements:</b>	Vary by system size and/or type; levels established by commission. No requirements for systems under 1 MW
<b>External Disconnect Switch:</b>	Required
<b>Net Metering Required:</b>	No

Recommendations:

- Remove requirements for redundant external disconnect switch

- Increase limit on system size to 20 MW

Maryland enacted legislation in April 2007 requiring the state Public Service Commission to devise interconnection procedures, which were adopted in March 2008. There are four levels of interconnection available to customers of all utilities with systems up to 10 MW in capacity of all types of utilities. There is an equipment requirement equivalent to an external disconnect switch, but processing fees are limited to larger systems. The 2007 legislation also increased the capacity limit for net-metered systems to 2 MW and the aggregate system capacity to 1,500 MW. NEG rolls-over to the next month's bill until the end of year, at which point it is granted to the utility. In May 2009 the Maryland legislature enacted bills that allowed third-party ownership and included CHP as an eligible net metering technology. Legislation enacted in May of 2010, however, would have adversely affected how NEG would be valued—(essentially at wholesale instead of retail rates)—however the law was revised again through legislation in May 2011, which provides monthly rollover of net excess generation at the retail rate, and annual reconciliation at the wholesale energy rate. Customers retain RECs and are protected from any additional fees.

## Massachusetts

### Net Metering

2007: C

2008: B

2009: B

2010: A

2011: A

**2012: A**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, Municipal Solid Waste, CHP/Cogeneration, Anaerobic Digestion, Small Hydroelectric, Other Distributed Generation Technologies
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
<b>Applicable Utilities:</b>	Investor-owned utilities
<b>System Capacity Limit:</b>	10 MW for net metering by a municipality or other governmental entity; 2 MW for all other "Class III" systems; 1 MW for all other "Class II" systems; 60 kW for all other "Class I" systems
<b>Aggregate Capacity Limit:</b>	1% of utility's peak load in general; 2% of utility's peak load for net metering by municipalities or governmental entities.
<b>Net Excess</b>	Varies by system type and customer class

<b>Generation:</b>	
<b>REC Ownership:</b>	Customer owns RECs
<b>Meter Aggregation:</b>	Neighborhood net metering allowed

Recommendations:

- Increase overall enrollment to at least 5% of peak capacity.
- Extend net metering to all utilities

**Interconnection**

2007: C

2008: B

2009: B

2010: A

2011: A

**2012: A**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, Municipal Solid Waste, CHP/Cogeneration, Microturbines, Other Distributed Generation Technologies
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government
<b>Applicable Utilities:</b>	Investor-owned utilities
<b>System Capacity Limit:</b>	No limit specified
<b>Standard Agreement:</b>	Yes
<b>Insurance Requirements:</b>	Vary by system size and/or type; levels established by commission
<b>External Disconnect Switch:</b>	Utility's discretion
<b>Net Metering Required:</b>	No

Recommendations:

- Prohibit the use of a redundant external disconnect switch
- Prohibit requirements for additional insurance

In June 2009 the Department of Public Utilities adopted net metering rules in accordance with a 2008 law. Net metering is generally available for “Class I, II, and III” systems up to 2 MW, with an aggregate capacity of 1% of a distribution company’s peak load. An October 2010 bill subsequently allowed government agencies to net meter systems up to 10 MW, and included a separate aggregate capacity of 2% for those facilities. NEG is rolled-over month-to-month at a slightly less-than-retail rate and credits from net metering facilities may be transferred to another customer of the same utility as long as certain conditions are met. Utilities may also choose to pay for the net metering credits for Class III facilities rather than allocating credits. Massachusetts’ rules additionally provide for “Neighborhood Net Metering” which allows a group of 10 or more residential customers to offset their electric load through one shared system. Interconnection procedures have been available, in some form, to all customers of the IOUs in Massachusetts since February 2004. IOUs are prohibited from charging net-metered customers extra fees or requiring additional insurance. There are three levels of interconnection, including special guidelines for network systems. A manual external disconnect switch may be required.

## Michigan

### Net Metering

2007: F

2008: F

2009: B

2010: A

2011: A

**2012: B**

<b>Eligible Renewable/Other Technologies:</b>	Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Municipal Solid Waste, Anaerobic Digestion, Small Hydroelectric, Tidal Energy, Wave Energy
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Agricultural
<b>Applicable Utilities:</b>	Investor-owned utilities, electric cooperatives, alternative electric suppliers
<b>System Capacity Limit:</b>	150 kW
<b>Aggregate Capacity Limit:</b>	0.75% of utility's peak load during previous year
<b>Net Excess Generation:</b>	Credited to customer's next bill at retail rate for systems 20 kW or less; credited to customer's next bill at power supply component of retail rate for larger systems. Carries over indefinitely.

<b>REC Ownership:</b>	Customer owns RECs
<b>Meter Aggregation:</b>	Not addressed

Recommendations:

- Remove system size limitations to allow customers to meet all on-site energy needs
- Increase aggregate capacity to 5% of peak load

**Interconnection**

2007: D

2008: D

2009: C

2010: C

2011: C

**2012: B**

<b>Eligible Renewable/Other Technologies:</b>	Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Fuel Cells, Municipal Solid Waste, CHP/Cogeneration, Anaerobic Digestion, Small Hydroelectric, Tidal Energy, Wave Energy, Microturbines, Other Distributed Generation Technologies
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Institutional
<b>Applicable Utilities:</b>	Investor-owned utilities, electric co-ops
<b>System Capacity Limit:</b>	No limit specified
<b>Standard Agreement:</b>	Yes
<b>Insurance Requirements:</b>	Vary by system size and/or type; levels established by commission
<b>External Disconnect Switch:</b>	Not addressed
<b>Net Metering Required:</b>	No

Recommendations:

- Remove requirement for additional insurance

In May 2009 the Michigan PSC adopted rules for net metering as a result of legislation passed in October 2008. The rules, which currently apply to IOUs, co-ops and alternative electric suppliers, specify that systems up to 20 kW are eligible for "true" net metering, and most systems between 20 kW and 150 kW are eligible for "modified" net metering. Methane digesters up to 550 kW are also eligible for net metering. True net metering is available until aggregate capacity reaches 0.5% of a utility's peak load; modified net metering is available until participation reaches an additional 0.25% of a utility's peak load for systems of 150 kW or less and 0.25% for systems larger than 150 kW. For true net metering, NEG during a billing period may be carried forward to the next billing period at the retail rate. Modified net metering allows NEG to carry over only for the power supply component of the retail rate. NEG may be carried forward indefinitely and system owners retain RECs associated with on-site production. The October 2008 legislation also slightly modified the state's interconnection procedures to provide for more customer protection. The standards, which apply to systems of all sizes, are separated into five levels of review. However, under a proposed joint utility application, additional conditions or further study and review of the systems may be required.

## Minnesota

### Net Metering

2007: C

2008: C

2009: C

2010: B

2011: B

2012: C

<b>Eligible Renewable/Other Technologies:</b>	Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Municipal Solid Waste, CHP/Cogeneration, Anaerobic Digestion, Small Hydroelectric, Other Distributed Generation Technologies
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential
<b>Applicable Utilities:</b>	All utilities
<b>System Capacity Limit:</b>	Less than 40 kW
<b>Aggregate Capacity Limit:</b>	No limit specified
<b>Net Excess Generation:</b>	Reconciled monthly; customer may elect to take compensation as a payment or as a bill credit at the retail utility energy rate
<b>REC Ownership:</b>	Not addressed
<b>Meter Aggregation:</b>	Not addressed

### Recommendations:

- Remove system size limitations to allow customers to meet all on-site energy needs

- Adopt safe harbor language to protect customer-sited generators from extra and/or unanticipated fees

**Interconnection**

2007: F  
 2008: F  
 2009: F  
 2010: D  
 2011: D  
 2012: F

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, Municipal Solid Waste, CHP/Cogeneration, Microturbines, Other Distributed Generation Technologies
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government
<b>Applicable Utilities:</b>	All utilities
<b>System Capacity Limit:</b>	10 MW
<b>Standard Agreement:</b>	Yes
<b>Insurance Requirements:</b>	Vary by system size and/or type; levels established by commission
<b>External Disconnect Switch:</b>	Required
<b>Net Metering Required:</b>	No

Recommendations:

- Remove requirements for redundant external disconnect switch
- Prohibit requirements for additional insurance
- Further delineate tiers to accommodate different levels of complexity among system types and sizes

Minnesota’s net metering legislation was adopted in the early 1980s. Net metering is offered for systems up to 40 kW with no limit on aggregate program capacity. The rules are unlike most other state net metering policies in that they allow utilities to pay customers at the end of the month in order to purchase NEG at the retail rate. Compensation may take the form of an actual payment (i.e., check for purchase) for NEG or as a credit on the customer's bill. The Minnesota Public Utilities Commission developed generic interconnection guidelines in 2004 pursuant to Minnesota law. These standards are limited to the interconnection of systems 10 MW or less and require utilities to provide streamlined uniform interconnection applications and a process that addresses safety, economics and reliability issues. The standards also require an external disconnect switch and additional insurance.

## Missouri

### Net Metering

2007: C

2008: C

2009: C

2010: C

2011: C

**2012: C**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Wind, Hydroelectric, Small Hydroelectric, Fuel Cells using Renewable Fuels
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
<b>Applicable Utilities:</b>	All utilities
<b>System Capacity Limit:</b>	100 kW
<b>Aggregate Capacity Limit:</b>	5% of utility's single-hour peak load during previous year
<b>Net Excess Generation:</b>	Credited to customer's next bill at avoided-cost rate; granted to utility at end of 12-month period
<b>REC Ownership:</b>	Not addressed
<b>Meter Aggregation:</b>	Not addressed

#### Recommendations:

- Remove system size limitations to allow customers to meet all on-site energy needs
- Credit net excess generation at the retail rate and provide the option of indefinite rollover

### Interconnection

2007: F

2008: F

2009: F

2010: N/A

2011: N/A

**2012: N/A**

No statewide policy exists.

#### Recommendations:

- The state should adopt IREC's model interconnection procedures

In June 2007, Missouri enacted legislation requiring all utilities to offer net metering to customers with systems up to 100 kW. Utilities are required to offer net metering up to a maximum of 5% of their peak demand for the previous year although there is also a smaller cap on the capacity of systems interconnected in a single year. NEG is credited at the avoided cost rate on a monthly basis and is granted to the utility annually. Some interconnection procedures are found in the state’s net metering law.

## Montana

### Net Metering

2007: C

2008: C

2009: C

2010: C

2011: C

2012: C

<b>Eligible Renewable/Other Technologies:</b>	Photovoltaics, Wind, Hydroelectric, Small Hydroelectric
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential
<b>Applicable Utilities:</b>	Investor-owned utilities
<b>System Capacity Limit:</b>	50 kW
<b>Aggregate Capacity Limit:</b>	No limit specified
<b>Net Excess Generation:</b>	Credited to customer's next bill at retail rate; granted to utility at end of 12-month billing cycle
<b>REC Ownership:</b>	Not addressed
<b>Meter Aggregation:</b>	Not addressed

#### Recommendations:

- Adopt safe harbor language to protect customer-sited generators from extra and/or unanticipated fees
- Remove system size limitations to allow customers to meet all on-site energy needs

**Interconnection**

2007: F

2008: F

2009: F

2010: C

2011: C

**2012: C**

<b>Eligible Renewable/Other Technologies:</b>	No restrictions on eligible technology
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Schools, Local Government, State Government
<b>Applicable Utilities:</b>	Investor-owned utilities
<b>System Capacity Limit:</b>	10 MW
<b>Standard Agreement:</b>	No
<b>Insurance Requirements:</b>	Not addressed
<b>External Disconnect Switch:</b>	Required
<b>Net Metering Required:</b>	No

## Recommendations:

- Prohibit the requirement of a redundant external disconnect switch
- Set standard interconnection fees and charges lower than FERC

All IOUs are required to offer net metering for systems of less than 50 kW. NEG is rolled over to the next monthly bill until the end of the year, at which point it is granted to the utility. Some of Montana’s utility companies, each with their own agreements and requirements, offer interconnection procedures. The Montana Electric Cooperatives Association (MECA) has adopted a scaled-down model interconnection and net metering policy. While net metering is voluntary for non-investor-owned utilities, most have adopted voluntary programs similar to the MECA models. In 2010, the Montana Public Service Commission proposed and adopted interconnection procedures. The interconnection rules apply to all electric utilities within the jurisdiction of the Commission, which includes IOUs and co-ops. The Commission unanimously adopted the interconnection rules on July 19, 2010 and they went into effect on August 13, 2010.

## Nebraska

### Net Metering

2007: N/A

2008: N/A

2009: B

2010: B

2011: B

**2012: B**

<b>Eligible Renewable/Other Technologies:</b>	Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Anaerobic Digestion, Small Hydroelectric
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Agricultural
<b>Applicable Utilities:</b>	All utilities
<b>System Capacity Limit:</b>	25 kW
<b>Aggregate Capacity Limit:</b>	1% of utility's average monthly peak demand
<b>Net Excess Generation:</b>	Credited to customer's next bill at avoided-cost rate; excess reconciled at end of annual period
<b>REC Ownership:</b>	Customer owns RECs
<b>Meter Aggregation:</b>	Not addressed

#### Recommendations:

- Remove system size limitations to allow customers to meet all on-site energy needs
- Credit net excess generation at the customer's retail rate with indefinite rollover
- Remove the aggregate capacity limit

### Interconnection

2007: N/A

2008: N/A

2009: F

2010: N/A

2011: N/A

**2012: N/A**

No statewide policy exists.

Recommendation:

- The state should adopt IREC’s model interconnection procedures

Legislation signed in May 2009 established statewide net metering rules for all electric utilities in Nebraska. The rules apply to facilities that are rated at or below 25 kW in capacity. Monthly NEG is credited at the utility's avoided cost rate for that month and carried forward to the next billing period. Any remaining credit at the end of an annualized period will be paid out to the customer, also at the avoided cost rate. Customers retain all RECs for electricity generated. The allowed net metering enrollment cap is reached when the aggregate generating capacity of all customer-generators equals one percent of the utility's average monthly peak demand for that year.

## Nevada

### Net Metering

2007: B

2008: B

2009: B

2010: B

2011: B

**2012: B**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, Small Hydroelectric
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential
<b>Applicable Utilities:</b>	Investor-owned utilities
<b>System Capacity Limit:</b>	1 MW
<b>Aggregate Capacity Limit:</b>	1% of utility's peak capacity
<b>Net Excess Generation:</b>	Credited to customer's next bill at retail rate; carries over indefinitely
<b>REC Ownership:</b>	Customer owns RECs (must be relinquished to utility if utility subsidizes system)
<b>Meter Aggregation:</b>	Not addressed

Recommendations:

- Increase limit on overall enrollment to at least 5% of utility’s peak capacity
- Remove system size limitations to allow customers to meet all on-site energy needs
- Allow meter aggregation and net metering for shared or community systems

### Interconnection

2007: N/A

2008: B

2009: B

2010: B

2011: B

2012: B

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Wind, Biomass, Geothermal Electric
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government
<b>Applicable Utilities:</b>	Investor-owned utilities
<b>System Capacity Limit:</b>	20 MW
<b>Standard Agreement:</b>	No
<b>Insurance Requirements:</b>	Vary by system size and/or type; levels established by commission
<b>External Disconnect Switch:</b>	Not addressed in interconnection procedures
<b>Net Metering Required:</b>	No

Recommendations:

- Establish a standard interconnection agreement
- Expressly prohibit requirements for an external disconnect switch

Nevada originally enacted net metering in 1997 and has since amended its law several times. In 2007, legislation increased the net metering capacity to 1 MW; however, the aggregate limit on enrollment in net metering is limited to 1% of a utility's peak capacity. NEG rolls over to the next month's bill indefinitely. There are specific guidelines for customers billed under a TOU schedule. Additional liability insurance requirements are prohibited by Nevada law. Third-party systems are allowed to net meter and are not considered utilities. Interconnection procedures adopted by the Nevada PUC are largely consistent with California's Rule 21.

## New Hampshire

### Net Metering

2007: C

2008: C

2009: C

2010: B

2011: B

2012: B

<b>Eligible Renewable/Other</b>	Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal
---------------------------------	---

<b>Technologies:</b>	Electric, Small Hydroelectric, Tidal Energy, Wave Energy, Biodiesel, Other Distributed Generation Technologies
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential
<b>Applicable Utilities:</b>	All utilities
<b>System Capacity Limit:</b>	1 MW for most renewables, 100 kW for wind, 30 kW for CHP
<b>Aggregate Capacity Limit:</b>	50 MW, 2 MW for CHP
<b>Net Excess Generation:</b>	Credited to customer's next bill at retail rate; carries over indefinitely
<b>REC Ownership:</b>	Not addressed
<b>Meter Aggregation:</b>	Not addressed

Recommendations:

- Remove system size limitations to allow customers to meet all on-site energy needs
- Adopt safe harbor language to protect customer-generators from extra and/or unanticipated fees
- Increase limit on overall enrollment to at least 5% of utility's peak capacity

**Interconnection**

2007: D

2008: D

2009: C

2010: D

2011: D

**2012: D**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Hydroelectric, Geothermal Electric, Small Hydroelectric, Tidal Energy, Wave Energy, Biodiesel, Other Distributed Generation Technologies
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential
<b>Applicable Utilities:</b>	All utilities
<b>System Capacity Limit:</b>	1 MW for most renewables, 100 kW for wind
<b>Standard Agreement:</b>	No
<b>Insurance Requirements:</b>	Not required
<b>External Disconnect Switch:</b>	Not required for inverter-based systems that comply with IEEE 1547 and UL 1741
<b>Net Metering Required:</b>	Yes

Recommendations:

- Establish tiers to accommodate different levels of complexity among system types and sizes
- Establish timelines at or quicker than those outlined by the FERC

In June 2010, New Hampshire enacted a law that expanded the availability of net metering and interconnection in the state. As of publication, the New Hampshire PUC has not yet established rules to in accordance with the new law. All utilities are required to offer net metering to customers with renewable systems with a maximum capacity of 1 MW, with the exception of wind energy systems which remain at the previous system cap of 100 kW. The aggregate system capacity is 50 MW for the entire state, calculated by multiplying the state cap (50 MW) by the individual utility's share of the "total 2010 annual coincident peak energy demand." NEG carries over indefinitely. The interconnection procedures come out of the net metering rules the New Hampshire Public Utilities Commission set according to the law. An external disconnect switch is optional and any other additional charges or required insurance is not allowed.

## New Jersey

### Net Metering

2007: A

2008: A

2009: A

2010: A

2011: A

**2012: A**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Geothermal Electric, Anaerobic Digestion, Tidal Energy, Wave Energy, Fuel Cells using Renewable Fuels
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Tribal Government, Fed. Government, Agricultural, Institutional
<b>Applicable Utilities:</b>	Investor-owned utilities (electric distribution companies); electric suppliers
<b>System Capacity Limit:</b>	System must be sized not to exceed the customer's electricity consumption during the previous year
<b>Aggregate Capacity Limit:</b>	No limit specified (commission may limit to 2.5% of peak demand)
<b>Net Excess Generation:</b>	Generally credited to customer's next bill at retail rate; excess reconciled at end of annual period at avoided-cost rate
<b>REC Ownership:</b>	Customer owns RECs
<b>Meter Aggregation:</b>	Permitted for public entity PV systems

Recommendations:

- Allow meter aggregation and net metering for additional customer classes

**Interconnection**

2007: B  
 2008: B  
 2009: B  
 2010: B  
 2011: B  
 2012: B

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Geothermal Electric, Anaerobic Digestion, Tidal Energy, Wave Energy, Fuel Cells using Renewable Fuels
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential
<b>Applicable Utilities:</b>	Investor-owned utilities (electric distribution companies)
<b>System Capacity Limit:</b>	No limit specified
<b>Standard Agreement:</b>	No
<b>Insurance Requirements:</b>	"Additional" liability insurance not required for systems that meet certain technical standards
<b>External Disconnect Switch:</b>	Not required for systems that meet certain standards
<b>Net Metering Required:</b>	No

Recommendation:

- Adopt standard interconnection applications

New Jersey enacted legislation in 1999 requiring utilities to offer net metering to residential and small commercial customers which have been significantly improved upon since, making New Jersey a model state for net metering rules. In January 2010 New Jersey enacted legislation removing the 2 MW cap for net-metered systems and the BPU adopted this change in June 2010. Although there is no hard limit stated in the rules, the BPU is authorized to limit aggregate system capacity to 2.5% of utilities' peak demand. Net metering customers are also allowed to choose their annual period to take advantage of seasonal fluctuations in energy use and generation. In July 2012 New Jersey enacted legislation (S.B. 1925) requiring electric utilities to allow public entities such as state and local governments, local agencies and school districts to engage in "net metering aggregation" of solar facilities (implementing rules are not yet in place). Interconnection fees are divided into three levels, depending on system size and complexity. Utilities may not require Level 1 and Level 2 customers to install additional controls or

external disconnect switches not included in the equipment package, to perform or pay for additional tests, or to purchase additional liability insurance.

## New Mexico

### Net Metering

2007: B

2008: B

2009: B

2010: B

2011: B

**2012: B**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, Municipal Solid Waste, CHP/Cogeneration, Small Hydroelectric, Microturbines
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential
<b>Applicable Utilities:</b>	Investor-owned utilities, electric co-ops
<b>System Capacity Limit:</b>	80 MW
<b>Aggregate Capacity Limit:</b>	No limit specified
<b>Net Excess Generation:</b>	Credited to customer's next bill at avoided-cost rate or reconciled monthly at avoided-cost rate
<b>REC Ownership:</b>	Utility owns RECs
<b>Meter Aggregation:</b>	Not addressed

Recommendations:

- Allow customers to retain RECs
- Credit net excess generation at the retail rate and provide the option of indefinite rollover
- Allow meter aggregation and net metering for shared or community systems

### Interconnection

2007: C

2008: B

2009: B

2010: B

2011: B

2012: B

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, Municipal Solid Waste, CHP/Cogeneration, Small Hydroelectric, Microturbines, Other Distributed Generation Technologies
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government
<b>Applicable Utilities:</b>	Investor-owned utilities, electric co-ops
<b>System Capacity Limit:</b>	80 MW
<b>Standard Agreement:</b>	Yes
<b>Insurance Requirements:</b>	Generally not required for systems up to 250 kW. Utilities may require insurance for systems > 250 kW, with limits set by commission.
<b>External Disconnect Switch:</b>	Not required for inverter-based systems up to 10 kW; utility's discretion for all other systems
<b>Net Metering Required:</b>	No

Recommendations:

- Prohibit requirements for a redundant external disconnect switch
- Prohibit requirements for additional insurance

The New Mexico Public Regulation Commission (PRC) required utilities to offer net metering beginning in 1999, but current standards are a result of 2007 revisions. Systems of up to 80 MW are eligible to interconnect and net meter, but are subject to additional charges and safety standards. There is no aggregate cap on the capacity of net-metered systems statewide. Net excess generation rolls over monthly at the utility's avoided-cost rate and is credited to the customer's next bill if it is under \$50. The utility will pay the customer for monthly NEG exceeding \$50. Interconnection procedures, adopted in July 2008, have been established for "Qualifying Facilities," under PURPA, up to 80 MW. The standards have four levels of review, may require an external disconnect switch for systems greater than 10 kW, and allow utilities to require proof of insurance for systems greater than 250 kW. New Mexico has also specified that third-party-owned systems will not be subject to PRC regulation as of January 1, 2011.

## New York

### Net Metering

2007: D

2008: B

2009: D

2010: B

2011: B

2012: A

<b>Eligible Renewable/Other Technologies:</b>	Photovoltaics, Wind, Biomass, Fuel Cells, CHP/Cogeneration, Anaerobic Digestion, Microturbines
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
<b>Applicable Utilities:</b>	Investor-owned utilities
<b>System Capacity Limit:</b>	2 MW for non-residential solar or wind; 500 kW for agricultural wind or biogas; 25 kW for residential solar or wind; 10 kW for residential micro-CHP and fuel cells; 1.5 MW for non-residential fuel cells
<b>Aggregate Capacity Limit:</b>	1% of utility's 2005 demand for solar, agricultural biogas, residential micro-CHP and fuel cells; 0.3% of utility's 2005 demand for wind. Exception: Central Hudson cap is 3% for most systems
<b>Net Excess Generation:</b>	Generally credited to customer's next bill at retail rate, except avoided cost for micro-CHP and fuel cells; excess generally reconciled annually at avoided-cost rate, except excess for non-residential wind and solar and residential micro-CHP and fuel cells carries over indefinitely
<b>REC Ownership:</b>	Not addressed
<b>Meter Aggregation:</b>	Allowed for non-residential and farm-based customers

Recommendations:

- Increase limit on overall enrollment to at least 5% of a utility's peak capacity

**Interconnection**

2007: C

2008: C

2009: B

2010: B

2011: B

**2012: B**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, Municipal Solid Waste, CHP/Cogeneration, Microturbines, Other Distributed Generation Technologies
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
<b>Applicable Utilities:</b>	Investor-owned utilities
<b>System Capacity</b>	2 MW

<b>Limit:</b>	
<b>Standard Agreement:</b>	Yes
<b>Insurance Requirements:</b>	Not required
<b>External Disconnect Switch:</b>	Not required for inverter-based systems up to 25 kW; required for all other systems
<b>Net Metering Required:</b>	No

Recommendations:

- Remove system size limits
- Establish a tier establishing rules for interconnecting non-exporting systems

New York allows net metering for residential solar and wind systems of up to 25 kW, non-residential solar and wind systems of up to 2 MW, agricultural wind or biogas systems up to 500 kW and 10 kW for residential micro-CHP and fuel cells. In June 2011 New York enacted legislation allowing eligible farm-based and non-residential customer-generators to engage in "remote" net metering. In October 2012 the PSC directed Central Hudson Gas and Electric to file net metering tariff revisions tripling the aggregate net metering cap for most systems from 1% of 2005 peak demand (12 MW) to 3% of 2005 peak demand (36 MW). The PSC is now accepting comments on whether similar increases should be considered for the state's other utilities. In November 2009, the state's Public Service Commission modified the Standard Interconnection Requirements (SIR), setting the maximum capacity at 2 MW for individual systems. The SIR includes simplified requirements for small net-metered systems and certified, inverter-based systems up to 25 kW are not required to have an external disconnect switch.

## North Carolina

### Net Metering

2007: F

2008: F

2009: D

2010: D

2011: D

**2012: D**

<b>Eligible Renewable/Other Technologies:</b>	Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, CHP/Cogeneration, Hydrogen, Anaerobic Digestion, Small Hydroelectric, Tidal Energy, Wave Energy, Fuel Cells using Renewable Fuels
---	--

<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Tribal Government, Fed. Government, Agricultural, Institutional
<b>Applicable Utilities:</b>	Investor-owned utilities
<b>System Capacity Limit:</b>	1 MW
<b>Aggregate Capacity Limit:</b>	No limit specified
<b>Net Excess Generation:</b>	Credited to customer's next bill at retail rate; granted to utility at beginning of summer billing season
<b>REC Ownership:</b>	Utility owns RECs (unless customer chooses to net meter under a time-of-use tariff)
<b>Meter Aggregation:</b>	Not addressed

Recommendations:

- Remove system size limitations to allow customers to meet all on-site energy needs
- Adopt safe harbor language to protect customer-sited generators from extra and/or unanticipated fees
- Extend net metering requirements to all utilities (i.e., munis and co-ops)
- Remove limitations on REC ownership

**Interconnection**

2007: F  
2008: B  
2009: B  
2010: B  
2011: B  
**2012: B**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Fuel Cells, Municipal Solid Waste, CHP/Cogeneration, Anaerobic Digestion, Small Hydroelectric, Microturbines, Other Distributed Generation Technologies
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
<b>Applicable Utilities:</b>	Investor Owned Utilities
<b>System Capacity Limit:</b>	No limit specified
<b>Standard Agreement:</b>	Yes
<b>Insurance Requirements:</b>	Vary by system size and/or type; levels established by commission

<b>External Disconnect Switch:</b>	Not required for inverter-based systems up to 10 kW (unless the utility pays for it); utility's discretion for all other systems
<b>Net Metering Required:</b>	No

Recommendations:

- Prohibit requirements for redundant external disconnect switch
- Prohibit requirements for additional insurance
- Extend interconnection procedures to all utilities (i.e., munis and co-ops)

The North Carolina Utilities Commission (NCUC) adopted a net metering standard in October 2005, and revised it in 2006 and 2009. There are no limits on aggregate customer participation. Time-of-use (TOU) customers retain RECs, while non-TOU customers must turn over all RECs to the utility. Standby charges are prohibited for residential systems up to 20 kW and for non-residential systems up to 100 kW. The NCUC adopted interconnection procedures in June 2008 that apply to the state’s investor-owned utilities. These standards generally follow the FERC standards. North Carolina’s standards include three levels of interconnection review, with no limit on individual systems, but fast-track application available to generators smaller than 2 MW. Extra charges and additional insurance are only required for certain systems. IOUs may require an external disconnect switch, but must reimburse the customer for the cost.

## North Dakota

### Net Metering

2007: D

2008: D

2009: D

2010: D

2011: D

**2012: D**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, Municipal Solid Waste, CHP/Cogeneration, Small Hydroelectric
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential
<b>Applicable Utilities:</b>	Investor-owned utilities
<b>System Capacity Limit:</b>	100 kW
<b>Aggregate Capacity Limit:</b>	No limit specified
<b>Net Excess</b>	Reconciled monthly at avoided-cost rate

<b>Generation:</b>	
<b>REC Ownership:</b>	Customer and utility share RECs
<b>Meter Aggregation:</b>	Not addressed

Recommendations:

- Remove system size limitations to allow customers to meet all on-site energy needs
- Credit NEG at the retail rate, with indefinite roll-over
- Extend net metering requirements to all utilities (i.e., munis and co-ops)

### Interconnection

2007: N/A

2008: N/A

2009: N/A

2010: N/A

2011: N/A

**2012: N/A**

No statewide policy exists.

Recommendation:

- The state should adopt IREC's model interconnection procedures

The North Dakota Public Utilities Commission issued net metering rules in 1991. These rules make net metering available to renewable energy systems of up to 100 kW, and allow customers to retain the RECs associated with production of non-NEG. Utilities retain any RECs associated with NEG, but must compensate the customer. Net excess generation is purchased at the end of the month at the utility's avoided-cost rate. North Dakota has not yet adopted statewide interconnection procedures.

## Ohio

### Net Metering

2007: B

2008: B

2009: B

2010: A

2011: A

**2012: A**

<b>Eligible Renewable/Other</b>	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric,
---------------------------------	--

<b>Technologies:</b>	Fuel Cells, Small Hydroelectric, Microturbines
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential
<b>Applicable Utilities:</b>	Investor-owned utilities, competitive retail electric service providers
<b>System Capacity Limit:</b>	No limit specified (limit based on customer's load)
<b>Aggregate Capacity Limit:</b>	No limit specified
<b>Net Excess Generation:</b>	Credited to customer's next bill at unbundled generation rate; customer may request refund of excess at end of 12-month billing period
<b>REC Ownership:</b>	Not addressed
<b>Meter Aggregation:</b>	Not addressed

Recommendations:

- Credit Net Excess Generation at the retail rate and provide the option of indefinite rollover
- Adopt safe harbor language to protect customer-sited generators from extra and/or unanticipated fees
- Specify that RECs belong to the customer

**Interconnection**

2007: C

2008: C

2009: C

2010: C

2011: C

**2012: C**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, Municipal Solid Waste, CHP/Cogeneration, Microturbines, Other Distributed Generation Technologies
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government
<b>Applicable Utilities:</b>	Investor-owned utilities
<b>System Capacity Limit:</b>	20 MW
<b>Standard Agreement:</b>	Yes
<b>Insurance Requirements:</b>	"Additional" liability insurance not required

<b>External Disconnect Switch:</b>	Required
<b>Net Metering Required:</b>	No

Recommendations:

- Remove requirements for redundant external disconnect switch
- Expand interconnection procedures to all utilities (i.e., munis and co-ops)

The Public Utilities Commission of Ohio (PUCO) adopted revised interconnection procedures in March 2007 to provide for three levels of review for systems up to 20 MW in capacity. Technical screens, fees and timelines are contained in the standards for each level. PUCO revised the state’s net metering standards, as prompted by EAct 2005. These revisions expanded net metering; however, a 2002 Ohio Supreme Court decision requires that NEG be credited to the customer at the utility’s unbundled generation rate. In November 2008, PUCO created rules for the amended net metering law. The new rules removed the aggregate capacity limit and the limitations on eligible technologies.

## Oklahoma

### Net Metering

2007: D

2008: D

2009: D

2010: F

2011: F

**2012: F**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, Municipal Solid Waste, CHP/Cogeneration, Small Hydroelectric
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, General Public/Consumer
<b>Applicable Utilities:</b>	Investor-owned utilities, regulated electric co-ops
<b>System Capacity Limit:</b>	100 kW or 25,000 kWh/year (whichever is less)
<b>Aggregate Capacity Limit:</b>	No limit specified
<b>Net Excess Generation:</b>	Credited to customer's next bill or granted to utility monthly (varies by utility)

<b>REC Ownership:</b>	Not addressed
<b>Meter Aggregation:</b>	Not addressed

Recommendations:

- Remove system size limitations to allow customers to meet all on-site energy needs
- Require all utilities to rollover NEG month-to-month at the retail rate
- Specify that RECs belong to the customer

### Interconnection

2007: N/A

2008: N/A

2009: N/A

2010: N/A

2011: N/A

**2012: N/A**

No statewide policy exists.

Recommendation:

- The state should adopt IREC’s model interconnection procedures

Oklahoma’s investor-owned utilities and electric co-ops are required to offer net metering to customers with systems up to 100 kW, as a result of an order issued by the Oklahoma Corporation Commission in 1988. There is no stated aggregate limit on net-metered capacity. Utilities are not allowed to impose extra charges or require additional insurance of customers with net-metered systems. Utilities are not required to purchase NEG. An external disconnect switch is required. Oklahoma has not yet adopted statewide interconnection procedures.

## Oregon

### Net Metering

2007: B

2008: A

2009: A

2010: A

2011: A

**2012: A**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Fuel Cells, Anaerobic Digestion, Small Hydroelectric
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State

	Government, Fed. Government, Agricultural, Institutional
<b>Applicable Utilities:</b>	All utilities (except Idaho Power)
<b>System Capacity Limit:</b>	2 MW for non-residential & 25 kW for residential PGE and PacifiCorp customers; 25 kW for non-residential & 10 kW for residential muni, co-op and PUD customers
<b>Aggregate Capacity Limit:</b>	No limit specified for PGE and PacifiCorp; 0.5% of utility's historic single-hour peak load for munis, co-ops, PUDs
<b>Net Excess Generation:</b>	Credited to customer's next bill at utility's retail rate for IOU customers; varies for muni, co-op and PUD customers
<b>REC Ownership:</b>	Customer owns RECs (must be relinquished in exchange for Energy Trust incentives)
<b>Meter Aggregation:</b>	Allowed

Recommendations:

- Increase aggregate capacity for municipal utilities, electric co-ops and people's utility districts to at least 5% of utility's peak capacity
- Remove system size limitations to allow customers to meet all on-site energy needs

**Interconnection**

2007: C

2008: B

2009: B

2010: B

2011: B

**2012: B**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Fuel Cells, Municipal Solid Waste, Anaerobic Digestion
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
<b>Applicable Utilities:</b>	Investor-owned utilities (Idaho Power is exempt from interconnection procedures for net-metered systems)
<b>System Capacity Limit:</b>	Greater than 20 MW for large generators; Up to 10 MW for small generators; 25 kW for residential net-metered; 2 MW for non-residential net-metered
<b>Standard Agreement:</b>	Yes
<b>Insurance Requirements:</b>	"Additional" liability insurance not required; small generator facilities over 200 kW must have general liability insurance
<b>External Disconnect Switch:</b>	Not required for inverter-based systems up to 25 kW; required for all other systems
<b>Net Metering Required:</b>	No (separate interconnection procedures exist for net-metered systems)

Recommendations:

- Remove requirements for redundant external disconnect switch for customers of investor-owned utilities and for all system sizes
- Expand interconnection procedures to all utilities (i.e., munis and co-ops)

Oregon has two sets of net metering and interconnection rules. In June 2009, the Oregon PUC adopted rules for the interconnection of small generator facilities (i.e. non-net-metered) systems up to 10 MW. The PUC also maintains separate rules for net-metered systems which have three levels of interconnection review, a standard agreement and which require the use of a standard application. Oregon has also established separate net metering programs for the state's primary investor-owned utilities (PGE and PacifiCorp), and for its municipal utilities and electric co-ops. The PUC adopted rules for net metering for PGE and PacifiCorp customers in July 2007, raising the individual system capacity limit from 25 kW to two MW for non-residential applications. Net excess generation is carried over to the customer's next bill as a kilowatt-hour credit for a 12-month period. Munis, co-ops and public utility districts are required to offer net metering up to 25 kW for non-residential systems and 10 kW for residential systems. Net excess is either purchased at the utility's avoided-cost rate or credited to the customer's next monthly bill as a kilowatt-hour credit. In July 2008, the Oregon PUC further incentivized renewable installations by allowing third-party ownership of net-metered systems.

## Pennsylvania

### Net Metering

2007: A

2008: A

2009: A

2010: A

2011: A

**2012: A**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Fuel Cells, Municipal Solid Waste, CHP/Cogeneration, Waste Coal, Coal-Mine Methane, Anaerobic Digestion, Small Hydroelectric, Other Distributed Generation Technologies
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
<b>Applicable Utilities:</b>	Investor-owned utilities
<b>System Capacity Limit:</b>	5 MW for microgrid and emergency systems; 3 MW for non-residential; 50 kW for residential
<b>Aggregate Capacity Limit:</b>	No limit specified
<b>Net Excess Generation:</b>	Credited to customer's next bill at retail rate; reconciled at end of year at "price-to-compare"
<b>REC Ownership:</b>	Customer owns RECs
<b>Meter Aggregation:</b>	Virtual meter aggregation allowed

Recommendation:

- Expand net metering to include all utilities (i.e., munis and co-ops)

**Interconnection**

2007: D

2008: B

2009: B

2010: B

2011: B

**2012: B**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Fuel Cells, Municipal Solid Waste, CHP/Cogeneration, Waste Coal, Coal-Mine Methane, Anaerobic Digestion, Small Hydroelectric, Other Distributed Generation Technologies
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
<b>Applicable Utilities:</b>	Investor-owned utilities
<b>System Capacity Limit:</b>	5 MW (seek utility guidance for systems above 2MW)
<b>Standard Agreement:</b>	Yes
<b>Insurance Requirements:</b>	"Additional" liability insurance not required
<b>External Disconnect Switch:</b>	Required
<b>Net Metering Required:</b>	Yes

Recommendations:

- Remove requirements for redundant external disconnect switch for customers of investor owned utilities.
- Expand interconnection procedures to all utilities (i.e., munis and co-ops)

The Pennsylvania Public Utilities Commission (PUC) issued rules in 2008 that require investor-owned utilities to offer net metering to residential customers with systems up to 50 kW and non-residential customers with systems up to 3 MW. Systems up to 5 MW are also allowed for customers who make their systems available to the grid during emergencies, or where a micro-grid is established in order to maintain critical infrastructure. RECs are retained by the customer. Pennsylvania allows meter aggregation on multiple properties owned or operated by one customer within 2 miles of each other.

The PUC adopted interconnection procedures that include four levels of interconnection. An external disconnect switch is required at the cost of the customer.

## Puerto Rico

### Net Metering

2007: N/A

2008: N/A

2009: N/A

2010: B

2011: B

**2012: B**

<b>Eligible Renewable/Other Technologies:</b>	Photovoltaics, Wind, "Other Sources" of Renewable Energy
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Multi-Family Residential, Agricultural, Institutional
<b>Applicable Utilities:</b>	PREPA
<b>System Capacity Limit:</b>	1 MW for non-residential; 25 kW for residential
<b>Aggregate Capacity Limit:</b>	No limit specified
<b>Net Excess Generation:</b>	Credited to customer's next bill at utility's retail rate (with certain limitations); excess reconciled at end of 12-month billing cycle
<b>REC Ownership:</b>	Not addressed
<b>Meter Aggregation:</b>	Not addressed

### Recommendations:

- Remove system size limitations to allow customers to meet all on-site energy needs
- Allow customers to retain all RECs associated with generation

### Interconnection

2007: N/A

2008: N/A

2009: N/A

2010: F

2011: F

2012: F

<b>Eligible Renewable/Other Technologies:</b>	Photovoltaics, Wind, "Other Sources" of Renewable Energy
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Multi-Family Residential, Agricultural, Institutional
<b>Applicable Utilities:</b>	PREPA
<b>System Capacity Limit:</b>	No limit specified
<b>Standard Agreement:</b>	Yes
<b>Insurance Requirements:</b>	Vary by system size and/or type; levels established by PREPA
<b>External Disconnect Switch:</b>	Required
<b>Net Metering Required:</b>	No

Recommendation:

- The territory should adopt IREC's model interconnection procedures

Puerto Rico enacted net metering legislation in August 2007, allowing customers of Puerto Rico Electric Power Authority (PREPA) to use electricity generated by solar, wind or "other" renewable-energy resources to offset their electricity usage. This law applies to residential systems with a generating capacity of up to 25 kilowatts (kW) and non-residential systems up to one megawatt (MW) in capacity. Customer net excess generation (NEG) is carried over as a kilowatt-hour (kWh) credit to the following month, but NEG credit is limited to a "daily maximum" of 300 kWh for residential customers and 10 megawatt-hours (MWh) for commercial customers. PREPA promulgated interconnection rules in August 2008 that apply to all distributed generation (DG) projects that interconnect to PREPA's electric distribution system. Interconnected systems must meet all safety and performance standards established by IEEE Standard 1547 as well as local construction and safety codes. A manual external disconnect switch is required for all interconnected systems.

## Rhode Island

### Net Metering

2007: C

2008: B

2009: B  
 2010: B  
 2011: B  
**2012: B**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, Anaerobic Digestion, Small Hydroelectric, Ocean Thermal, Fuel Cells using Renewable Fuels
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Multi-Family Residential, Agricultural, Institutional
<b>Applicable Utilities:</b>	Investor-owned utilities
<b>System Capacity Limit:</b>	5 MW (systems must be "reasonably designed" to generate only up to 100% of annual electricity consumption)
<b>Aggregate Capacity Limit:</b>	3% of peak load (2 MW reserved for systems under 50 kW)
<b>Net Excess Generation:</b>	Credited at avoided cost; rolled over to next bill or purchased by utility
<b>REC Ownership:</b>	Not addressed
<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, Anaerobic Digestion, Small Hydroelectric, Ocean Thermal, Fuel Cells using Renewable Fuels

Recommendations:

- Increase limit on overall enrollment to at least 5% of utility's peak capacity
- Expand net metering to all utilities (i.e., munis and co-ops)

**Interconnection**

2007: N/A  
 2008: N/A  
 2009: N/A  
 2010: N/A  
 2011: N/A  
**2012: N/A**

No statewide policy exists.

Recommendation:

- The state should adopt IREC's model interconnection procedures

In 1998, Rhode Island’s Public Utilities Commission (PUC) issued an order requiring the largest investor-owned utility in the state to offer net metering. In July 2008, legislation was enacted to expand net metering and by June 2011 a new net metering program was in place. The new program that took effect in July 2011 allows systems up to 5MW to net meter, so long as it provides approximately 100% of onsite needs. The rules allow municipalities and multi-municipal collaborative to net meter and provides for meter aggregation. In the summer of 2011 a bill was passed for certain interconnection provisions. The PUC's implementation could lead to an effort to create greater standardization.

## South Carolina

### Net Metering

2007: N/A

2008: N/A

2009: N/A

2010: F

2011: F

**2012: F**

<b>Eligible Renewable/Other Technologies:</b>	Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Small Hydroelectric
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Tribal Government, Fed. Government, Agricultural, Institutional
<b>Applicable Utilities:</b>	Duke Energy, Progress Energy, SCE&G
<b>System Capacity Limit:</b>	100 kW for non-residential; 20 kW for residential
<b>Aggregate Capacity Limit:</b>	0.2% of utility's SC jurisdictional retail peak demand for previous calendar year
<b>Net Excess Generation:</b>	Credited to customer's next bill at applicable time-of-use rate or less; granted to utility (annually) at beginning of each summer
<b>REC Ownership:</b>	Not addressed
<b>Meter Aggregation:</b>	Not addressed

Recommendation:

- The state should adopt IREC’s model net metering rules

### Interconnection

2007: N/A  
 2008: F  
 2009: F  
 2010: F  
 2011: F  
 2012: F

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Fuel Cells, Municipal Solid Waste, CHP/Cogeneration, Anaerobic Digestion, Small Hydroelectric, Microturbines, Other Distributed Generation Technologies
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
<b>Applicable Utilities:</b>	Investor-owned utilities
<b>System Capacity Limit:</b>	100 kW for non-residential; 20 kW for residential
<b>Standard Agreement:</b>	Yes
<b>Insurance Requirements:</b>	Vary by system size and/or type; levels established by commission
<b>External Disconnect Switch:</b>	Required
<b>Net Metering Required:</b>	No

Recommendation:

- The state should adopt IREC’s model interconnection procedures

The South Carolina Public Service Commission (PSC) adopted interconnection procedures for investor-owned utilities for residential systems up to 20 kW and non-residential systems up to 100 kW. The system capacity is limited to 2% of rated circuit capacity, although additional interconnection applications may be considered. In August 2009, the PSC issued a directive approving a net metering settlement, in which involved parties signed an agreement to improve the terms of net metering in the state.

## South Dakota

### Net Metering

2007: N/A

2008: N/A  
 2009: N/A  
 2010: N/A  
 2011: N/A  
**2012: N/A**

No statewide policy exists.

Recommendation:

- The state should adopt IREC’s model net metering rules

**Interconnection**

2007: N/A  
 2008: N/A  
 2009: B  
 2010: B  
 2011: B  
**2012: B**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, CHP/Cogeneration, Anaerobic Digestion, Small Hydroelectric, Fuel Cells using Renewable Fuels, Microturbines, Other Distributed Generation Technologies
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Tribal Government, Fed. Government, Agricultural, Institutional
<b>Applicable Utilities:</b>	Investor-owned utilities
<b>System Capacity Limit:</b>	10 MW
<b>Standard Agreement:</b>	Yes
<b>Insurance Requirements:</b>	Vary by system size and/or type; levels established by commission
<b>External Disconnect Switch:</b>	Utility's discretion
<b>Net Metering Required:</b>	No

Recommendations:

- Prohibit requirements for redundant external disconnect switch
- Prohibit requirements for additional insurance and naming the utility as an “additional insured”

On May 29, 2009, the South Dakota PUC issued an order approving their proposed South Dakota Small Generation Interconnection Rules. The rules specify interconnection procedures, in four tiers, for systems up to 10 MW. These rules were modeled from Illinois’ Small Generator Interconnection Rules. System owners are generally responsible for all interconnection expenses and utilities are authorized to require the use of an external disconnect switch. Limited interconnection to area networks is permitted. General liability insurance is required and for all systems other than residential generators up to 10 kW in capacity and the customer must include the utility as an “additional insured.” Net metering is not available in South Dakota.

## Texas

### Net Metering

2007: D

2008: N/A

2009: N/A

2010: N/A

2011: N/A

**2012: N/A**

No statewide policy exists.

Recommendation:

- The state should adopt IREC’s model net metering rules

### Interconnection

2007: D

2008: D

2009: D

2010: C

2011: C

**2012: C**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, CHP/Cogeneration, Reciprocating Engines, Turbines, Storage , Tidal Energy, Wave Energy, Ocean Thermal, Microturbines, Other Distributed Generation Technologies
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential
<b>Applicable Utilities:</b>	Investor-owned utilities
<b>System Capacity Limit:</b>	10 MW
<b>Standard Agreement:</b>	Yes

<b>Insurance Requirements:</b>	Not addressed
<b>External Disconnect Switch:</b>	Required
<b>Net Metering Required:</b>	No

Recommendations:

- Prohibit requirements for redundant external disconnect switch
- Prohibit requirements for additional insurance

Interconnection procedures have been in place in Texas since 1999 for systems up to 10 MW, with four levels of review, at 10 kW, 500 kW, 2 MW and 10 MW. An external disconnect device is required for all systems but utilities are prohibited from requiring any pre-interconnection fees for systems less than 500 kW. Standardized interconnection applications and interconnection agreements are available.

## Utah

### Net Metering

2007: F

2008: D

2009: A

2010: A

2011: A

**2012: A**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, Hydrogen, Waste Gas and Waste Heat Capture or Recovery, Anaerobic Digestion, Small Hydroelectric
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
<b>Applicable Utilities:</b>	Investor-owned utilities, electric co-ops
<b>System Capacity Limit:</b>	2 MW for non-residential; 25 kW for residential
<b>Aggregate Capacity Limit:</b>	20% of 2007 peak demand for Rocky Mountain Power; 0.1% of utility's 2007 peak demand for co-ops
<b>Net Excess Generation:</b>	Credited to customer's next bill as retail rate for Rocky Mountain Power customers and at avoided-cost rate for co-ops; granted to utility at end of 12-month billing period

<b>REC Ownership:</b>	Customer owns RECs
<b>Meter Aggregation:</b>	Allowed at same or adjacent location

Recommendations:

- Increase limit on overall enrollment to at least 5% of utility's peak capacity
- Allow net metering for shared or community systems

**Interconnection**

2007: F

2008: F

2009: F

2010: A

2011: A

**2012: A**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, Municipal Solid Waste, Hydrogen, Waste Gas and Waste Heat Capture and Recovery, Anaerobic Digestion, Small Hydroelectric, Fuel Cells using Renewable Fuels
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
<b>Applicable Utilities:</b>	Investor-owned utilities, electric co-ops
<b>System Capacity Limit:</b>	20 MW
<b>Standard Agreement:</b>	Varies by system size
<b>Insurance Requirements:</b>	Not addressed
<b>External Disconnect Switch:</b>	Not required for inverter-based systems up to 25 kW; required for all other systems
<b>Net Metering Required:</b>	No

Utah began requiring all investor-owned utilities and co-ops to allow interconnection and net metering for systems up to 25 kW in 2002. In March 2008, non-residential net metering was expanded to 2 MW, but co-ops serving fewer than 1,000 customers were allowed to discontinue offering net metering. The Public Service Commission increased Rocky Mountain Power's aggregate capacity limit to 20% of 2007 peak demand in 2009 (for co-ops it is still 0.1%). NEG rolls over to the next month's bill at the avoided-cost rate until the end of a 12-month period, at which point it is granted to the utility. In 2010, Utah

improved its interconnection procedures by basing them on the FERC's interconnection procedures for small generators. These rules include provisions for three levels of interconnection for systems up to 20 MW, based on system complexity.

## Vermont

### Net Metering

2007: C

2008: B

2009: B

2010: B

2011: A

**2012: A**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, CHP/Cogeneration, Anaerobic Digestion, Small Hydroelectric, Fuel Cells using Renewable Fuels
<b>Applicable Sectors:</b>	Commercial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
<b>Applicable Utilities:</b>	All utilities
<b>System Capacity Limit:</b>	2.2 MW for military systems; 20 kW for micro-CHP; 500 kW for all other systems
<b>Aggregate Capacity Limit:</b>	4% of utility's 1996 peak demand or peak demand during most recent calendar year (whichever is greater).
<b>Net Excess Generation:</b>	Credited to customer's next bill at retail rate; excess credits not used within 12 months of generation granted to utility
<b>REC Ownership:</b>	Not addressed
<b>Meter Aggregation:</b>	Group net metering allowed

### Recommendations:

- Adopt safe harbor language to protect customer-generators from extra and/or unanticipated fees
- Increase limit on overall enrollment to at least 5% of utility's peak capacity
- Specify that customer-generators own their RECs

### Interconnection

2007: C

2008: C

2009: C

2010: C  
 2011: C  
 2012: C

<b>Eligible Renewable/Other Technologies:</b>	Photovoltaics, Wind, Biomass, Fuel Cells, CHP/Cogeneration, Anaerobic Digestion, Microturbines, Other Distributed Generation Technologies
<b>Applicable Sectors:</b>	Commercial, Residential, Agricultural
<b>Applicable Utilities:</b>	All utilities
<b>System Capacity Limit:</b>	No limit specified
<b>Standard Agreement:</b>	Yes
<b>Insurance Requirements:</b>	Not addressed
<b>External Disconnect Switch:</b>	Required
<b>Net Metering Required:</b>	No (separate interconnection procedures exist for net-metered systems 150 kW and under)

Recommendations:

- Update interconnection procedures to incorporate the 2008 revisions to net metering
- Remove requirements for redundant external disconnect switch

Legislation adopted in May 2011 increased the system and aggregate capacity limits for Net Metering. “Group net metering” is allowed for all types of customers (previously it was only allowed for farm-based systems). The utility is required to issue a single aggregate monthly bill to the contact person of the group net metering system and therefore allocation of NEG credits among group members is the responsibility of the group. Vermont has adopted separate interconnection procedures for net-metered systems that are 150 kW or less, and for DG systems that are net-metered but greater than 150 kW (up to 250 kW) as well as systems that are not net-metered.

## Virginia

### Net Metering

2007: C  
 2008: C  
 2009: B  
 2010: B  
 2011: B

**2012: B**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, Municipal Solid Waste, Small Hydroelectric, Tidal Energy, Wave Energy
<b>Applicable Sectors:</b>	Commercial, Residential, Nonprofit, Schools, Local Government, State Government, Institutional
<b>Applicable Utilities:</b>	Investor-owned utilities, electric co-ops
<b>System Capacity Limit:</b>	500 kW for non-residential (may be higher if a utility chooses); and 10 kW (20 kW with standby charges) for residential
<b>Aggregate Capacity Limit:</b>	1% of utility's adjusted Virginia peak-load forecast for the previous year
<b>Net Excess Generation:</b>	Credited to customer's next bill at retail rate. After 12-month cycle, customer may opt to roll over credit indefinitely or to receive payment at avoided-cost rate
<b>REC Ownership:</b>	Customer owns RECs
<b>Meter Aggregation:</b>	Not addressed

## Recommendations:

- Remove system size limitations to allow customers to meet all on-site energy needs
- Increase limit on overall enrollment to at least 5% of utility's peak capacity

**Interconnection**

2007: F

2008: F

2009: A

2010: A

2011: A

**2012: A**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, Municipal Solid Waste, Tidal Energy, Wave Energy
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government
<b>Applicable Utilities:</b>	All utilities
<b>System Capacity Limit:</b>	20 MW
<b>Standard Agreement:</b>	Varies by system size
<b>Insurance Requirements:</b>	Vary by system size and/or type; levels established by commission
<b>External Disconnect Switch:</b>	Utility's discretion
<b>Net Metering Required:</b>	No (separate interconnection procedures exist for net-metered systems)

## Recommendations:

- Prohibit requirements for redundant external disconnect switch

- Prohibit requirements for additional insurance

The Virginia State Corporation Commission (SCC) approved net metering regulations in April 2010, pursuant to a 2009 law. Primarily, these actions increased the system size limit for non-residential customers to 500 kW from 250 kW, clarified that the customer retains ownership of RECs and allows the customer a one-time option of selling RECs back to the utility. The SCC also adopted interconnection procedures that took effect in July 2009. The procedures cover all utilities, all eligible technologies and systems up to 20 MW. The procedures adopt spot and area network interconnection screens that reflect those in the IREC Model Interconnection Procedures. Systems under 10 kW must carry \$100,000 in liability insurance. Systems up to 500 kW must carry at least \$300,000. Systems between 500 kW and 2 MW must carry \$2 million. Insurance requirements for systems larger than 2 MW will be determined on a case-by-case basis. The new interconnection procedures do not apply to net-metered systems.

## Washington

### Net Metering

2007: D

2008: D

2009: C

2010: B

2011: B

**2012: B**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Wind, Hydroelectric, Fuel Cells, CHP/Cogeneration, Small Hydroelectric
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential
<b>Applicable Utilities:</b>	All utilities
<b>System Capacity Limit:</b>	100 kW
<b>Aggregate Capacity Limit:</b>	0.25% of utility's 1996 peak demand (increases to 0.5% on 1/1/2014)
<b>Net Excess Generation:</b>	Credited to customer's next bill at retail rate; granted to utility at end of 12-month billing cycle
<b>REC Ownership:</b>	Customer owns RECs
<b>Meter Aggregation:</b>	Allowed

### Recommendations:

- Remove system size limitations to allow customers to meet all on-site energy needs
- Increase limit on overall enrollment to at least 5% of utility's peak capacity

**Interconnection**

2007: F

2008: D

2009: D

2010: D

2011: D

**2012: D**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, Municipal Solid Waste, CHP/Cogeneration, Anaerobic Digestion, Small Hydroelectric, Tidal Energy, Wave Energy, Microturbines, Other Distributed Generation Technologies
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
<b>Applicable Utilities:</b>	Investor-owned utilities
<b>System Capacity Limit:</b>	20 MW
<b>Standard Agreement:</b>	Yes
<b>Insurance Requirements:</b>	"Additional" liability insurance generally not required for net-metered systems. For other systems, requirements vary by system application and/or size; levels established by commission.
<b>External Disconnect Switch:</b>	Generally required for systems up to 300 kW; not addressed for larger systems
<b>Net Metering Required:</b>	No

## Recommendations:

- Prohibit requirements for redundant external disconnect switch
- Prohibit requirements for additional insurance

Net metering is available to all customers of all utilities in Washington. The aggregate capacity of net-metered systems is limited to 0.25% of each utility's 1996 peak demand, but this limit will increase to 0.5% in 2014. Individual systems are limited to 100 kW. NEG is credited to the customer's next bill at the utility's retail rate for a 12-month period; any remaining NEG at the end of this period is granted to the utility. Interconnection procedures, adopted in September 2007, apply to DG systems up to 20 MW. Washington's interconnection procedures provide for two levels of review. An external disconnect switch and additional insurance may be required.

## West Virginia

### Net Metering

2007: F

2008: F

2009: D

2010: A

2011: A

**2012: A**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, Small Hydroelectric, Renewable Fuels
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Agricultural
<b>Applicable Utilities:</b>	All utilities
<b>System Capacity Limit:</b>	IOUs with more than 30,000 customers: 2 MW for industrial; 500 kW for commercial; 25 kW for residential. IOUs with fewer than 30,000 customers, municipal utilities and co-ops: 50 kW for commercial and industrial; 25 kW for residential.
<b>Aggregate Capacity Limit:</b>	3% of peak demand during the previous year
<b>Net Excess Generation:</b>	Credited to customer's next bill at retail rate with no annual true-up (perpetual rollover)
<b>REC Ownership:</b>	Not addressed
<b>Meter Aggregation:</b>	Allowed

### Recommendations:

- Specify that customers retain RECS associated with net metering generation
- Increase limit on overall enrollment to at least 5% of utility's peak capacity

### Interconnection

2007: N/A

2008: N/A

2009: N/A

2010: B

2011: B

**2012: B**

<b>Eligible</b>	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric,
-----------------	--

<b>Renewable/Other Technologies:</b>	Geothermal Electric, Fuel Cells, Small Hydroelectric, Renewable Fuels
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Agricultural
<b>Applicable Utilities:</b>	All utilities
<b>System Capacity Limit:</b>	2 MW
<b>Standard Agreement:</b>	Yes
<b>Insurance Requirements:</b>	Vary by system size and/or type; levels established by PSC
<b>External Disconnect Switch:</b>	Not required for inverter-based systems up to 25 kW; utility's discretion for all other systems
<b>Net Metering Required:</b>	No

Recommendation:

- Remove system capacity limit

The West Virginia PSC adopted rules for both net metering and interconnection in 2010. The interconnection rules were similar to the previous set of rules; however, several important improvements were incorporated, such as tiered insurance requirements and a prohibition of external disconnect switch requirements in the case of smaller, inverter-based systems. The PSC also dramatically improved their net metering rules by raising the system cap to 2 MW for industrial customers of investor-owned utilities and to 500 kW for commercial customers. The new net metering rules also provide for indefinite rollover of NEG credits and allow customers to combine meters for the purpose of offsetting energy consumption at multiple sites on their property.

## Wisconsin

### Net Metering

2007: F

2008: D

2009: D

2010: C

2011: D

**2012: D**

<b>Eligible Renewable/Other</b>	Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, Municipal Solid Waste, CHP/Cogeneration, Small Hydroelectric, Other
---------------------------------	---

<b>Technologies:</b>	Distributed Generation Technologies
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential
<b>Applicable Utilities:</b>	Investor-owned utilities, municipal utilities
<b>System Capacity Limit:</b>	20 kW (100 kW for wind for We Energies customers)
<b>Aggregate Capacity Limit:</b>	No limit specified
<b>Net Excess Generation:</b>	Generally credited at retail rate for renewables and avoided-cost for non-renewables
<b>REC Ownership:</b>	Not addressed
<b>Meter Aggregation:</b>	Not addressed

Recommendations:

- Remove system size limitations to allow customers to meet all on-site energy needs
- Adopt safe harbor language to protect customer-generators from extra and/or unanticipated fees

**Interconnection**

2007: D

2008: D

2009: D

2010: D

2011: D

**2012: D**

<b>Eligible Renewable/Other Technologies:</b>	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, Municipal Solid Waste, CHP/Cogeneration, Microturbines, Other Distributed Generation Technologies
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government
<b>Applicable Utilities:</b>	Investor-owned utilities, municipal utilities
<b>System Capacity Limit:</b>	15 MW
<b>Standard Agreement:</b>	Yes
<b>Insurance Requirements:</b>	Vary by system size and/or type; levels established by PSC
<b>External Disconnect</b>	Required

<b>Switch:</b>	
<b>Net Metering Required:</b>	No

Recommendations:

- Prohibit requirements for redundant external disconnect switch
- Prohibit requirements for additional insurance

The Wisconsin Public Service Commission adopted net metering standards for investor-owned and municipal utilities in 1982, which were subsequently amended in 1992. Wisconsin allows net metering for systems up to 20 kW (100 kW for We Energies customers) and interconnection procedures for systems up to 15 MW. NEG provisions are specific to each utility, but utilities generally pay customers for NEG at the retail rate for renewable energy systems and at the avoided-cost rate for non-renewable energy systems. Interconnection review is divided into four categories. Wisconsin's interconnection procedures require an external disconnect switch and additional insurance.

## Wyoming

### Net Metering

2007: B

2008: B

2009: B

2010: B

2011: B

**2012: B**

<b>Eligible Renewable/Other Technologies:</b>	Photovoltaics, Wind, Biomass, Hydroelectric, Small Hydroelectric
<b>Applicable Sectors:</b>	Commercial, Industrial, Residential
<b>Applicable Utilities:</b>	Investor-owned utilities, electric co-ops, irrigation districts
<b>System Capacity Limit:</b>	25 kW
<b>Aggregate Capacity Limit:</b>	No limit specified
<b>Net Excess Generation:</b>	Credited to customer's next bill at retail rate; excess reconciled annually at seasonal avoided-cost rate

<b>REC Ownership:</b>	Not addressed
<b>Meter Aggregation:</b>	Not addressed

Recommendations:

- Remove system size limitations to allow customers to meet all on-site energy needs
- Allow customers to own RECs

### **Interconnection**

2007: F

2008: F

2009: F

2010: N/A

2011: N/A

**2012: N/A**

No statewide policy exists.

Recommendation:

- The state should adopt IREC's model interconnection procedures

Wyoming requires investor-owned utilities and electric co-ops to offer net metering for certain systems up to 25 kW. Systems must comply with IEEE and UL standards, and an external disconnect switch is required. NEG is credited to the following month at the retail rate and utilities must pay customers at the avoided-cost rate for any remaining NEG credit at the end of a 12-month period. A few interconnection guidelines are incorporated in the state's net metering law.

## STATES THAT DID NOT MAKE THE GRADE

### States without statewide net metering

Alabama  
Idaho\*  
Mississippi  
South Carolina\*  
South Dakota  
Tennessee  
Texas\*

### States without statewide interconnection procedures

Alabama  
Alaska  
Arizona  
Arkansas  
Georgia  
Idaho  
Kansas  
Louisiana  
Mississippi  
Missouri  
Nebraska  
North Dakota  
Oklahoma  
Rhode Island  
Tennessee  
Wyoming

*\*Voluntary net metering available*

## Worst Practices

### In Focus: SDG&E's proposal to charge net metered customers for exports as "use" of the grid

In October 2011, one of California's major utilities, San Diego Gas & Electric (SDG&E), proposed a new charge in its general rate case that would have had a negative impact on the otherwise thriving local rooftop solar market. The Network Use Charge (NUC) was specifically designed to collect infrastructure costs from net metered customers who could otherwise avoid such charges by offsetting electricity purchases.

SDG&E claimed that the NUC would charge customers similarly for all use of its distribution grid by applying a demand charge on "absolute power flow," including both exports and imports of electricity. For residential customers, this meant that the utility would calculate the average hourly demand by averaging the hourly demand peaks for all 24 hours of a day. For NEM customers, any hours when they generated more electricity than they consumed, and thus would have a negative demand, the SDG&E proposal would nonetheless treat electricity exports the same as actual demand. It would do this by converting those exports (a negative demand number) to a positive demand number. With exports averaged into the daily average demand as a positive number instead of reflecting the actual negative demand during periods of net generation, NEM customers would now be charged for their "use" of the distribution grid, even at times when they consume no electricity.

Fortunately, in January 2012, the California Public Utilities Commission rejected SDG&E's NUC proposal, due in part to its concern that this proposal violated state net metering policy. California, like a number of other states, has strong "safe harbor" language that protects net metered customers from any "additional charge" and requires tariffs to be identical in all respects for both net metered and non-net metered customers. SDG&E claimed that the NUC satisfied this by applying to all customers on the tariff, but, in operation, a charge on exports can only apply to net metered customers. Ultimately, the Commission refused to consider the NUC in the rate case and required SDG&E to re-file its rate case application without the proposal. While the Commission did not explicitly reject the NUC on legal grounds, it did note its concern that the NUC represented the type of "new charge" that the statute's safe harbor protects against. This illustrates the power of such provisions and their inclusion in best practices for statewide net metering policies.

However, at its core, the NUC proposal represents a worst practice because it would have undermined the value of net metering by applying a charge to energy exported to the grid without any cost-based justification for doing so. A foundation of utility ratemaking is that utility charges must be based on cost of service and net metering customers have a right to be treated no differently. In the case of the NUC proposal, SDG&E's testimony did not contain an assessment of the costs and benefits of net-metered systems much less any analysis that showed a net cost to SDG&E's other customers. Without such information, it was impossible to judge the merits of SDG&E's claims.

## Best Practices

### In Focus: Hawaii and California take on interconnection reform

Access to an expedited interconnection process for small systems is a critical element of a thriving distributed generation (DG) market. The costs and duration of the full study process in most states can quickly render small DG projects unviable. To address this concern, stakeholders have developed screening criteria that if met will ensure that a system generators is unlikely to have more than a negligible impact on the utility's grid. These screens not only ensure that DG systems that are unlikely to have any significant grid impacts can move forward quickly in the interconnection process at little cost, they also are important to manage the sheer volume of interconnection requests being received by the utilities in thriving DG markets as significant queuing issues can develop if each project requires a multi-month study in order to interconnect. Thus, an expedited process that uses a set of transparent screens to identify the projects that truly warrant additional study to interconnect safely can significantly facilitate an efficient interconnection process for both utilities and developers.

As distributed generation makes up an increasing share of the overall resource mix in parts of the country, the opportunities to interconnect under an expedited path have begun to narrow. In California, for example, generators applying to interconnect to the investor-owned utilities' distribution system using the fast track process are failing the "penetration screen" in increasing numbers. This screen, which was incorporated into the Federal Energy Regulatory Commission's (FERC) Small Generator Interconnection Procedures (SGIP) and is reflected in most state interconnection procedures, prevents a request from proceeding along an expedited path where the aggregate generation on a line section exceeds 15% of the line section's annual peak load. Generators that exceed this standard fail the fast track review and will either proceed to a supplemental review that is heavily dependent on utility discretion or will face a lengthy, costly and potentially unnecessary full study process.

In light of this growing problem, California and Hawaii have taken positive steps via collaborative, stakeholder-driven processes to reform their state interconnection procedures, known as Rule 14H in Hawaii and Rule 21 in California. One of the important changes made to these interconnection policies is to provide a clear, objective supplemental review process that provides the utility additional time to review generators that fail the penetration screen without requiring that they proceed to full study. Instead, projects that fail the penetration screen during initial evaluation move into a more precise and less conservative screen that looks at whether aggregate generation on the line section will exceed the line section's minimum load. In addition, the utility will have an opportunity during the supplemental review period to evaluate potential safety, reliability and power quality issues that may arise at higher penetrations when using the minimum load screen.

In Hawaii, if the aggregate generation on a line section does not exceed 50% of annual minimum load, the interconnection may proceed on the expedited path. For California, this standard is set at 100% of minimum load. Using minimum load during the secondary review process is an emerging best practice

because it focuses additional attention during the interconnection review process on a metric – minimum load – that is most directly related to preventing upstream problems in the distribution system. If the aggregate capacity of generation on a line section never exceeds minimum load, then all of the output can be expected to serve local load, reducing the risk that generation will backfeed and cause upstream problems. Both rules recognize that solar systems only generate power when the sun is shining, and, thus only consider daytime minimum load for interconnections utilizing solar. Hence, this evolution in interconnection standards will enable continued growth in distributed generation without sacrificing the safety and reliability of the grid.

Minimum load data may not be readily available in all circumstances today, but it can be calculated in most cases. Stakeholders also expect that data on line section minimum loads will increase as utilities invest in smart grid technologies, including advanced metering. It is of utmost importance that all stakeholders continue to work cooperatively to find new ways of using grid data to accommodate expedited interconnection in the nation’s highest penetration solar markets. In this sense, California and Hawaii’s efforts represent best practices in freeing the grid.

### **In Focus: Assessing the costs and benefits of net metering the right way**

One of net metering’s strongest virtues is its simplicity. Valuing the many attributes of on-site generation is a complex endeavor, but net metering keeps this conversation simple for consumers considering an investment in renewable energy: when your system produces more energy than you need, you will earn a utility bill credit that you can use some other time when you do need it. In this way, the complexity of markets and pricing is distilled down into a conversation energy consumers can easily understand and are familiar with – like cell-phone rollover minutes.

Because the concept of fair credit through net metering is so easy to understand, it has supported unprecedented growth in the solar industry and is now a foundational renewable energy policy in over 40 states. It has fostered gigawatts of rooftop solar development, helped support tens of thousands of American jobs, and saved energy consumers billions of dollars. Yet it is increasingly coming under attack from utility interests that voice concern about higher levels of customer sited generation.

The primary complaint of utilities is that the success of net metering is built on a subsidy, in that every purchase of a kWh that a net metering customer avoids shifts the burden of recovering the fixed costs of building and operating the utility grid to non-participating customers. The utilities argue that this outcome occurs because many residential and small business customers, who make up the majority of net-metered customers, face utility rates that recover all utility costs, including fixed costs, through volumetric rates – meaning that payments increase and decrease in direct relationship to the amount of power they are purchasing. If a net metered customer has enough credits, then that customer can avoid paying any money to the utility over a month or even a year.

However, this view of the relative costs and benefits of net metering is overly myopic and not based on best practices. The real question is not whether net metering customers avoid paying utility fixed costs,

but rather: Do net metering customers bring benefits to the grid that equal or exceed the fixed costs they avoid paying for by self-generating electricity?

Unfortunately, utilities that are challenging full retail net metering around the country on the basis of a purported “cost-shift” have not framed the discussion in this way. Instead, many utilities have asked public utility commissions around the country to approve special charges that purport to recover their fixed costs from net metering customers, without any, or very limited, consideration of the actual and potential benefits of that customer investment in renewable energy facilities bring to their grids. This approach to policy making is not based on best practices and has led to unnecessary confusion among stakeholders and decision-makers about how best to achieve their state’s renewable policy goals.

For example, in 2012, San Diego Gas & Electric Company (SDG&E) requested that the California Public Utilities Commission impose a “network use charge” on net metering customers based on SDG&E’s view that net metered customers were not paying for their use of grid. Along with other stakeholders, Vote Solar formally opposed SDG&E’s application, noting that the utility provided scant data to support its claims and that the proposal violated California’s “safe harbor” provisions. Ultimately, the California Commission rejected SDG&E’s request, relying on strong “safe harbor” provisions in California’s net metering statute that protect net metering customers from unjustified discriminatory treatment. This tale directly shows why such language is recognized as a best practice in our grading criteria. To SDG&E’s credit, after the Commission rejected its proposal, SDG&E convened a working group comprised of industry, non-profit and energy consumer groups to assist it in developing a robust process to study the costs and benefits of net metering in its service territory. Cooperative, stakeholder driven processes like this represent the best way forward in addressing concerns around net metering with solid data all stakeholders can support.

Stakeholders faced a similar claim in New Mexico wherein PNM proposed an \$0.08/kWh charge on all on-site renewable energy production based on analysis showing net metering customers were not paying for the full costs of their energy use. Careful analysis and review of the utility’s study by the Interstate Renewable Energy Council showed that the study contained a number of flaws. When those flaws were corrected, the research showed that net metering customers were actually providing net benefits to non-net metering customers in New Mexico. After discussing these findings in the rate case, PNM dropped its request for a charge on net metering customers.

However, state regulatory commissions have not always ruled to protect net metering against exaggerated utility cost claims. In late 2011 for example, the Virginia State Corporation Commission approved substantial standby charges for residential net metering customers of Dominion Power with systems between 10 kW and 20 kW, without considering any net metering benefits.

All three of these examples demonstrate why lack of safe harbor language and/or the imposition of a significant additional charge on net metering customers without solid justification receive the high penalties in our Freeing the Grid grading criteria. These wonky rules can mean the difference between a

good net metering program and one that places unfounded penalties on customers who invest in renewable energy resources to generate their own power and support state renewable energy goals.

Fortunately, the way forward is simple: address concerns related to potential cost-shifts due to net metering with solid, credible data so stakeholders can develop a solution in a collaborative stakeholder process. Solid research has shown that net metering, in and of itself, is not fundamentally shifting costs to non-participating utility customers as many utility voices purport. The situation is far more complex than that and in many cases the distribution of costs and benefits across net metered and non-net metered customers is a function of individual utility rate design. As the examples highlighted in this section show, customer investment in net metered local generation is actually delivering a net benefit to other ratepayers. A thorough accounting of the costs and benefits of net metering is essential to establish if, indeed, a net metering cost-shift does exist, the direction in which it flows, and how the cost-shift should be dealt with. Engaging in these conversations with solid data allows all stakeholders to arrive at winning situations for all – utility customers, customers who invest in renewable energy, and their utility.

For example, recent research performed by Austin Energy showed that the benefits to utility from the installation of customer-sited renewable energy systems is approximately \$0.128/kWh which is far greater than the value customers who invested in renewable energy currently receive for any monthly excess generation remaining on their bill after net metering. To address this issue, Austin Energy has proposed to pay customers at this new rate which they will adjust every year based on updated information. This outcome shows that careful research can arrive at outcomes that are fair for all stakeholders while simultaneously addressing subsidy concerns.

Resources are available to assist stakeholders in developing approaches to valuing net metering that comport with best practices. A recently published report by the Solar America Board for Codes and Standards, *A Generalized Approach to Assessing the Rate Impacts of Net Energy Metering*, discusses the range of benefits and costs that should be considered in any analysis of the relative costs and benefits of net metering based on a thorough review of cost-benefit studies done to date and review by knowledgeable practitioners.<sup>1</sup> This report can serve as a starting point for developing study methodologies that comport with best practices and lead to results that all stakeholders can use to develop net metering policies that continue to support the growth of renewable energy while ensuring utilities have a fair opportunity to recover their costs of operating the grid.

---

<sup>1</sup> Jason B. Keyes and Joseph F. Wiedman, *A Generalized Approach to Assessing the Rate Impacts of Net Energy Metering* (SolarABCs), p.6 (January 2012) (citing a list of benefits considered by an Austin Energy study on the costs and benefits of net metering), available at [www.solarabcs.org/about/publications/reports/rateimpact/](http://www.solarabcs.org/about/publications/reports/rateimpact/).

## Model Rules

Applying the lessons from existing statewide net metering programs and interconnection procedures, IREC has drafted model interconnection procedures and net metering rules for use by state utility commissions and other stakeholders. As states consider adopting or revising programs, these models provide an easy way to emulate effective policies and avoid wasteful mistakes.

Critically, these models already represent a negotiated compromise and best practices regime—one proven to safeguard the grid and other ratepayers, while permitting distributed generation to flourish. It is the authors' view that to renegotiate the provisions within these models would simply consume resources in an attempt to reinvent the wheel.

Ideally, a uniform national renewable energy policy would stem from federal leadership. The current discrepancy in the design and implementation of several dozen vastly different state programs has created an uneven playing field for renewable energy service providers and utilities alike, and is preventing distributed renewable energy technologies from reaching economies of scale. Uniform federal interconnection and net metering standards could create a level playing field and provide greater regulatory predictability than the existing patchwork of state policies.

See Appendix B to download IREC's model rules.

## Appendix A

### Net Metering Scores

State	Total	Grade	System Capacity	Program Capacity	Rollover	Metering Issues	RECs	Eligible Tech	Eligible Customers	Aggregate Meters	Shared Renewables	Safe Harbor	Rule Coverage	Retail Choice	PPA Treatment
IREC model rules	24.5	A	5	2.5	1.5	4	1	1	2	1	1	3	1	0.5	1
California	21	A	3	2.5	0.5	4	1	1	2	1	1	3	0.5	0.5	1
Colorado	21	A	5	2.5	1.5	2	1	1	2	1	1	2	1	0	1
Arizona	20.5	A	5	2.5	0.5	3	1	1	2	0.5	0.5	3	0.5	0	1
Delaware	20.5	A	5	2.5	1.5	2	1	1	1	1	1	2	1	0.5	1
New Jersey	19.5	A	5	2.5	0.5	2	1	1	2	1	0	3	0	0.5	1
Maryland	18.5	A	5	2.5	1	0	1	1	2	1	0	3	1	0	1
Oregon	18.5	A	5	2.5	0	2	1	1	2	1	0	2	1	0	1
Pennsylvania	18.5	A	5	2.5	1	3	1	1	2	1	0	1	0	0	1
Utah	18.5	A	5	2.5	0	2	1	1	2	1	0	3	0	0	1
Connecticut	17	A	5	2.5	1	3	1	1	2	0	0	0	1	0.5	0
Ohio	17	A	5	2.5	-1	2	1	1	2	0	0	3	0	0.5	1
New York	16.5	A	5	1.5	0.5	2	-1	1	2	1	0	3	0	0.5	1
West Virginia	16.5	A	3	2	1.5	3	-1	1	1	1	0	3	1	0	1
Vermont	16	A	3	2	0	3	-1	1	2	1	1	2	1	0	1
Massachusetts	15.5	A	5	1	1.5	0.5	1	1	2	1	1	0	0	0.5	1
Florida	14	B	5	2.5	0.5	2	1	1	2	0	0	1	0	0	-1
Rhode Island	14	B	5	2	-2	2	1	1	2	1	0	3	0	0	-1
Illinois	13.5	B	1	2.5	0	3	1	1	0	0.5	0	3	0	0.5	1
New Hampshire	13	B	3	1	0	2	-1	1	2	0	0	3	1	0	1
DC	12.5	B	2	2.5	0.5	2	-1	1	2	0	0	1	1	0.5	1
Hawaii	12.5	B	1	2.5	0	2	-1	1	2	0	0	3	1	0	1
Nevada	12.5	B	3	1.5	1.5	2	-5	1	2	0	0	1	0	0	1
Washington	12.5	B	1	0.5	0	2	-1	1	2	1	1	3	1	0	1
Kansas	12	B	2	1	0	2	0	1	2	0	0	3	0	0	1
Kentucky	12	B	0	1	1.5	3	1	1	2	0	0	3	0.5	0	-1
Maine	12	B	2	1	0	2	1	1	2	1	-	0	1	0	1
Michigan	12	B	2	1	0.5	1.5	1	1	2	0	0	1	0.5	0.5	1
Indiana	11.5	B	3	1	1.5	1	-1	1	2	0	-	3	0	0	0

State	Total	Grade	System Capacity	Program Capacity	Rollover	Metering Issues	RECs	Eligible Tech	Eligible Customers	Aggregate Meters	Shared Renewables	Safe Harbor	Rule Coverage	Retail Choice	PPA Treatment
Wyoming	11.5	B	0	2.5	0.5	2	-1	1	2	0	0	3	0.5	0	1
New Mexico	11	B	2	2.5	0	3	0	1	2	0	0	-1	0.5	0	1
Nebraska	10	B	0	1	-2	2	1	1	2	0	0	3	1	0	1
Arkansas	9	B	2	2.5	0	2	1	1	2	0	0	-1	0.5	0	-1
Iowa	9	B	2	2.5	1.5	2	-1	1	1	0	-	0	0	0	0
Minnesota	8.5	C	0	2.5	1	0	-1	1	2	0	0	1	1	0	1
Missouri	8.5	C	1	2.5	-2	0	-1	1	2	0	0	3	1	0	1
Montana	8.5	C	1	2.5	0	2	-1	1	2	0	-	1	0	0	0
Louisiana	8	C	2	0.5	1.5	2	-1	1	1	0	0	-1	1	0	1
Wisconsin	6.5	D	0	2.5	1	1.5	-1	1	2	0	0	0	0.5	0	-1
Alaska	6	C	0	1.5	-1.5	2	-1	1	2	0	0	1	0	0	1
Virginia	6	C	2	1	0.5	3	1	1	1	0	0	-5	0.5	0	1
North Carolina	5.5	D	3	2.5	0	2	-3	1	2	0	0	-1	0	0	-1
North Dakota	3.5	D	1	2.5	-2	0	-1	1	2	0	0	0	0	0	0
Georgia	1	F	1	0	-2	2	-1	1	1	0	0	-1	1	0	-1
Oklahoma	1	F	0	2.5	-4	0	-1	1	2	0	0	0	0.5	0	0
South Carolina	0.5	F	1	0	0	3	-5	1	1	0	0	-1	0	0	0.5
Alabama	-	n/a	-	-	-	-	-	-	-	-	-	-	-	-	-
Idaho	-	n/a	-	-	-	-	-	-	-	-	-	-	-	-	-
Mississippi	-	n/a	-	-	-	-	-	-	-	-	-	-	-	-	-
South Dakota	-	n/a	-	-	-	-	-	-	-	-	-	-	-	-	-
Tennessee	-	n/a	-	-	-	-	-	-	-	-	-	-	-	-	-
Texas	-	n/a	-	-	-	-	-	-	-	-	-	-	-	-	-
Puerto Rico	Pending	-	-	-	-	-	-	-	-	-	-	-	-	-	-

## Interconnection Scores

State	Total	Grade	Eligible Tech	System Capacity	Breakpoints	Timelines	Interconnection Fee	Engineering Fee	External Disconnect	Certification	Tech Screens	Secondary Networks	Standard Form	Insurance	Disputes	Rule Coverage	Misc.
IREC model rules	21	A	0	0	1	1	1	1	1	0	1	2	1.5	1	2	1	0
California	18.5	A	0	0	1	0	3	1	-5	1	1	1	1	0.5	2	0	0
Maine	18	A	0	0	1	1	0.5	1	0.5	0	1	2	1.5	1	0	1	0
Massachusetts	17	A	0	0	1	1	3	1	-1.5	1	-1	2	0.5	0.5	2	0	0
Maryland	16.5	A	0	-5	1	-1	1	0	-2	1	2	1	1.5	1	2	1	1
Virginia	16.5	A	0	0	1	0	1	0	-1	1	1	2	0.5	0.5	2	1	0
DC	16	A	0	-5	1	-1	0	0	0.5	1	1	1	1.5	1	2	0	1
Utah	16	A	0	0	0	0	1	1	0.5	1	1	0	0.5	1	2	0.5	0
Delaware	15.5	A	0	-5	1	-1	1	0	-2	1	2	1	1.5	1	2	0	1
New Jersey	14.5	B	-1	0	0	1	1	1	0.5	1	0	2	0.5	1	0	0	0
Michigan	14	B	0	0	1	1	1	0.5	0	0	-2	3	0	0.5	2	0.5	-1
Oregon	14	B	0	-5	0.5	1	0.5	1	0.5	1	1	1	-5	1	0	0	0
Iowa	13.5	B	0	-5	1	-1	0.5	0	-1	0	1	3	-5	0.5	2	0	1
Hawaii	12.5	B	0	0	1	0	3	0	-2	0	1	0	0.5	0.5	1	0	0
New York	11.5	B	0	-1	0	1	2	1	0.5	1	-2	-1	1.5	1	1	0	-1
Colorado	10.5	B	0	-5	0	0	-1	0	-1	0	0	3	0.5	-1	2	1	0
Connecticut	10.5	B	0	0	0	0	0	0	-2	0	1	1	0.5	0.5	1	1	0
North Carolina	10	B	0	0	0	0	1	0	0.5	0	0	0	0.5	0.5	0	0	0
South Dakota	10	B	0	-5	1	-1	0.5	0	-1	0	1	2	-5	-1	2	0	0
West Virginia	10	B	0	-1	-1	-1	0.5	0	0.5	0	0.5	2	1	0.5	0	0.5	0
Indiana	9.5	B	0	0	1	-1	1	1	-1	0	-1	2	-5	0.5	0	0	0
Nevada	9.5	B	0	0	-1	0	2	1	0	1	-1	0	0	1	0	0	-1
New Mexico	9.5	B	0	0	0	0	0.5	0	0.5	0	-2	3	0.5	0	0	0.5	-1
Illinois	9	B	0	0	1	-1	-1	0	-1	0	1	1	0.5	-1	2	0	0
Pennsylvania	9	B	0	-1	1	-1	0.5	1	-2	0	-1	2	0	1	2	0	-1
Vermont	8	C	0	0	1	0	1	0	-1	0	0	-1	-5	0	0	1	0
Texas	7.5	C	0	-1	1	-1	1	0	-2	0	-2	3	0	1	1	0	-1
Montana	7	C	0	-5	0	0	-1	0	-2	0	1	2	-5	0	2	0.5	-2
Ohio	7	C	0	0	0	-1	-1	0	-2	0	-1	2	2	0.5	0	0	0
Wisconsin	5.5	D	0	-5	1	-1	2	0.5	-1	0	-2	1	0.5	-2	0	0.5	-1
Rhode Island	4.5	D	0	0	-1	0	1	0.5	-1.5	1	-2	0	0.5	-2	2	0	-1.5
New Hampshire	4	D	0	-4	-2	-1	1	1	0.5	0	0	-1	0	1	0	1	0
Florida	3	D	-1	-1	0	1	0	0	0.5	0	-2	-1	-5	0.5	0	0	-1
Washington	3	D	0	0	-1	-1	0	0	-1.5	0	-2	1	-5	0.5	1	0	-1

State	Total	Grade	Eligible Tech	System Capacity	Breakpoints	Timelines	Interconnection Fee	Engineering Fee	External Disconnect	Certification	Tech Screens	Secondary Networks	Standard Form	Insurance	Disputes	Rule Coverage	Misc.
Kentucky	0.5	F	-1	-4	-1	-1	3	0	-1	0	-1	-2	0	0.5	0	0.5	0
Minnesota	0.5	F	0	-5	-2	1	0.5	1	-2	0	-2	-2	0	-2	1	1	-1
South Carolina	-5.5	F	0	-4	-2	-1	1	0	-2	0	-2	-2	-5	0.5	0	0	-1
Alabama	-	n/a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Alaska	-	n/a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arizona	-	n/a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arkansas	-	n/a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Georgia	-	n/a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Idaho	-	n/a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kansas	-	n/a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Louisiana	-	n/a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mississippi	-	n/a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Missouri	-	n/a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nebraska	-	n/a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
North Dakota	-	n/a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oklahoma	-	n/a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tennessee	-	n/a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wyoming	-	n/a	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Puerto Rico	Pending		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

**Grade Score**

- A 15+
- B 9 to <15
- C 6 to <9
- D 3 to <6
- F < 3

**Notes:** 7.5 points are added to interconnection scores to achieve grading parity with net metering.

Some states' numeric scores (for either net metering or interconnection) may exceed the numeric score of IREC's model rules. These instances demonstrate the evolution of policies that are setting the 'Best Practices' bar higher. Future IREC model rules may incorporate elements from those state policies. Conversely, states with lower numeric scores than the previous year's score may have not actively made the policies worse. As the FTG methodology evolves state scores may decrease based on the increase in the points for what constitutes 'Best Practices'.

## **Appendix B**

### **Interstate Renewable Energy Council's 2009 Model Net Metering Rules and Model Interconnection Procedures**

#### **Model Net Metering Rules**

Interstate Renewable Energy Council's (IREC's) model net metering rules have been highly influential in New Jersey and Colorado, which are widely considered to have the best net metering policies in the United States. IREC's model rules apply to systems rated up to a customer's service entrance capacity. These rules are available at: <http://www.irecusa.org/NMmodel09>

#### **Model Interconnection procedures and Procedures for Small Generator Facilities**

IREC's model interconnection procedures incorporate the best practices of small-generator interconnection procedures developed by various state governments, the Federal Energy Regulatory Commission (FERC) standards, the National Association of Regulatory Utility Commissioners (NARUC), and the Mid-Atlantic Distributed Resources Initiative (MADRI). IREC's model standards include four levels of interconnection.

These standards are available at: <http://www.irecusa.org/ICmodel09>

A review of the four leading interconnection procedures is available in the analysis: Keyes, Jason B. and Kevin T. Fox. (2008) Comparison of the Four Leading Small Generator Interconnection Procedures. U.S. Department of Energy's Solar America Board for Codes and Standards.

<http://www.solarabcs.org/interconnection>

## Appendix C

### Abbreviations and Acronyms

<b>BPU</b>	Board of Public Utilities
<b>CHP</b>	Combined Heat and Power
<b>DG</b>	Distributed Generation
<b>DSIRE</b>	Database of State Incentives for Renewables & Efficiency
<b>EPAct</b>	Energy Policy Act of 2005
<b>FERC</b>	Federal Energy Regulatory Commission
<b>IC</b>	Interconnection
<b>IEEE</b>	Institute of Electrical and Electronics Engineers
<b>IOU</b>	Investor-Owned Utility
<b>IREC</b>	Interstate Renewable Energy Council
<b>kW</b>	Kilowatt (1000 Watts)
<b>kWh</b>	Kilowatt-Hour
<b>MW</b>	Megawatt (1,000,000 Watts)
<b>NARUC</b>	National Association of Regulatory Utility Commissioners
<b>NEG</b>	Net Excess Generation
<b>NEM</b>	Net Energy Metering
<b>NNEC</b>	Network for New Energy Choices
<b>PPA</b>	Power Purchase Agreement
<b>PUC</b>	Public Utilities Commission
<b>PSC</b>	Public Service Commission
<b>PURPA</b>	Public Utility Regulatory Policies Act of 1978
<b>PV</b>	Photovoltaic
<b>QF</b>	Qualifying Facility
<b>REC</b>	Renewable Energy Credit
<b>RPS</b>	Renewable Portfolio Standard
<b>TOU</b>	Time-of-Use
<b>UL</b>	Underwriters Laboratories

## About Us

### Interstate Renewable Energy Council

[irecusa.org](http://irecusa.org)

The Interstate Renewable Energy Council (IREC) is a non-profit organization accelerating the use of renewable energy since 1982. IREC's programs and policies lead to easier, more affordable connection to the utility grid; fair credit for renewable energy produced; best practices for states, municipalities, utilities and industry; and quality assessment for the growing green workforce through the credentialing of trainers and training programs

### The Vote Solar Initiative

[www.votesolar.org](http://www.votesolar.org)

Founded in 2002, the Vote Solar Initiative is a grassroots non-profit organization working to combat climate change and foster economic development by bringing solar energy into the mainstream.

### The North Carolina Solar Center

[www.ncsc.ncsu.edu](http://www.ncsc.ncsu.edu)

Created in 1988, the North Carolina Solar Center, as part of the College of Engineering at North Carolina State University (NCSU), works closely with state and local government and the renewable energy industry. It manages and maintains the NCSU Solar House and serves as a resource for innovative, green energy technologies through research and demonstration, technical assistance, education, outreach and training. It also administers the Database of Incentives for Renewables & Efficiency (DSIRE), a resource providing financial incentives and policies.

### Network for New Energy Choices

[newenergychoices.org](http://newenergychoices.org)

Network for New Energy Choices promotes environmentally responsible energy policies and technologies through in-depth reports and web content.

NNEC, formed in 2006, is a program of GRACE.