2011 EDITION

Freeing the Grid

Best Practices in State Net Metering Policies and Interconnection Procedures

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The Vote Solar Initiative
300 Brannan St, Suite 609
San Francisco, CA 94107
tel: 415 817 5062
info@votesolar.org
www.votesolar.org

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
www.gracelinks.org

Project Managers
» Shaun Chapman, The Vote Solar Initiative
shaun@votesolar.org
» James Rose, Network for New Energy Choices
james@newenergychoices.org

Contributing Authors
» **Interstate Renewable Energy Council (IREC):**
Joseph Wiedman
Thad Culley
» **The Vote Solar Initiative:**
Shaun Chapman
Rosalind Jackson
» **North Carolina Solar Center:**
Laurel Varnado
» **Network for New Energy Choices:**
James Rose

Endorsed By
» The Solar Alliance
» The Solar Foundation

Design
Katie Sweetman

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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 did not receive a grade in this edition.

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"I'd put my money on the sun and solar energy. What a source of power! I hope we don't have to wait until oil and coal run out before we tackle that."

—Thomas Edison

A Note About the 2011 Edition

Adam Browning, Executive Director, The Vote Solar Initiative

The 2011 Edition of *Freeing the Grid* marks the 5th year of the report. With the astronomical growth of the renewable energy industry and a heavy focus on distributed generation resources, these five years have felt like a lifetime. Much has changed in that period, and much has been for the better. For instance, community solar and virtual net metering arrangements are now commonplace in many jurisdictions. This policy element didn't exist when *Freeing the Grid* was first introduced.

As a sign of how far *Freeing the Grid* has come, this year the U.S. Department of Energy will grant awards to state and local governments through its innovative SunShot program and *Freeing the Grid* is playing an important role. The program's mission is to bring the installed cost of residential solar down to one dollar per watt by 2018 Currently price is roughly five to seven dollars per watt, depending on system size and location. Integral to this mission are good net metering policies and interconnection procedures; so much so that the DOE is basing some of its award metrics on *Freeing the Grid* grading. It is an honor and a responsibility the authors of this report take very seriously.

More report content will be posted online to reduce reliance on a report that is published only once annually. There are numerous instances where policymakers changed their programs after the report was issued then inquire as to when their improved grade would be posted only to learn that the next annual edition would not be released for six or seven months. An online presence will allow us to stay current with the latest trends and developments in real time and will better position the material to fulfill its mission to promote best practices.

Staying on top of changing events is going to be increasingly important as the race for a clean renewable energy future continues. Clean, distributed generation technologies are a critical piece of this race. Financing incentives and structures are clearly the engines that are driving us forward. Market leaders in California and New Jersey embody this with their diverse and scalable financing programs. Of course, even a top-of-the-line engine with many resources invested in the vehicle will not perform well without a smooth road on which to travel.

This is what world-class net metering rules and interconnection programs do. They provide the smooth roads that transition us from dependence on centralized, dirty power generation to a system that embraces clean, distributed resources. Without effective policy, that road is going to be rocky and tumultuous.

This is why we are proud to continue this important work. We are now in the decade of retail grid parity for photovoltaics (PV), and as the price of renewables aligns with that of grid supply, good net metering and interconnection policies are going to be more important than ever.

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.*

** A kilowatt-hour (kWh) is the unit of energy equal to 1,000 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.*

Introduction to the 2011 Edition

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 clearly in the vanguard of best practices that go beyond merely *enabling* customer-sited Distributed Generation (DG) by actively encouraging these *clean energy systems*. Since the premier edition of *Freeing the Grid*, many states have embraced these best practices. The federal Energy Policy Act of 2005 (EPAct 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 EPAct 2005 required states to consider a net metering standard and make a "determination" regarding the standard by August 2008. Section 1254 of EPAct 2005 required states to consider an interconnection standard and make a determination regarding the standard by August 2007.[1] Several states took this as an opportunity to implement or upgrade their net metering and interconnection procedures.

Since the sunset of the EPAct 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, the Interstate Renewable Energy Council (IREC), The Vote Solar Initiative and the Network for New Energy Choices (NNEC) revised the methodology used in *Freeing the Grid* 2010 to reflect policy evolution and the current state of best practices.

Chart 1: 2010 Installed Grid Connected PV Capacity by State (MW_{DC})

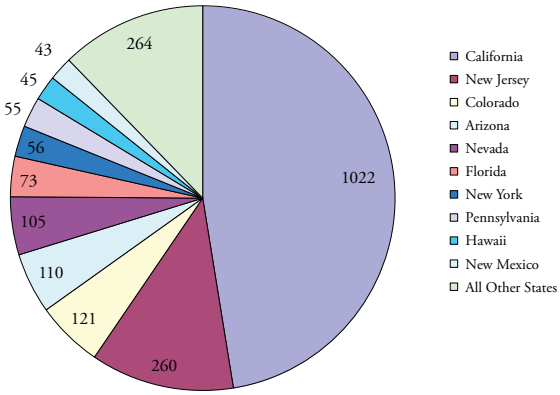

Chart 2: 2010 Cumulative Installed Capacity per Person (W_{DC}/person)

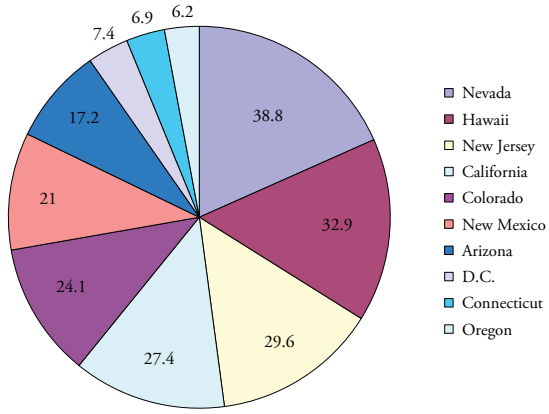

Table 1: Change in Installed Capacity for the Top-Ten States from 2009 to 2010

State	2010 (MW_{DC})	2009 (MW_{DC})	2009 – 2010 % change	2010 Market Share	2009 Rank
California	252	213.7	18%	28%	1
New Jersey	132.4	57.3	131%	15%	2
Nevada	68.3	2.5	2598%	8%	15
Arizona	63.6	21.1	201%	7%	5
Colorado	62	23.4	165%	7%	4
Pennsylvania	46.5	4.4	947%	5%	13
New Mexico	40.9	1.4	2815%	5%	20
Florida	34.8	35.7	-2%	4%	3
North Carolina	28.7	6.6	332%	3%	10
Texas	25.9	4.2	517%	3%	14

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.[2] 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.[3]

California still dominates in terms of installed capacity, New Jersey maintains second place and Colorado narrowly beats out Arizona for third.[4]

As an indicator of how the solar market is diversifying, Nevada, New Jersey and Hawaii are leading the pack.[5]

Solar Markets in 2010

California maintains the number-one position, but its market dominance is eroding. In 2009, California held 49% of the U.S. market share. In 2010, it fell to 28%. Nevada, New Mexico and Texas are on the 2010 list due to a single large solar installation. Interestingly, Nevada's 58 MW solar installation sells it energy to a California utility in support of meeting the utility's RPS obligations.[6]

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 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.[7]

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 6th 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.[8]

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.[9]

Each edition of this report shows states moving from lower to higher grades. But as states like Delaware, Colorado, Maine and Massachusetts continue to raise the bar, others will need to follow the best practices represented in this report and in IREC's Model Net Metering Rules and Model Interconnection Procedures to move to the head of the class.

End Notes

1. Ward, Joan. (2008) States' Consideration of EPAct 2005 Standards. Interstate Renewable Energy Council. July. http://www.irecusa.org/fileadmin/

The Four Pillars of Cost-Effective Solar Policy

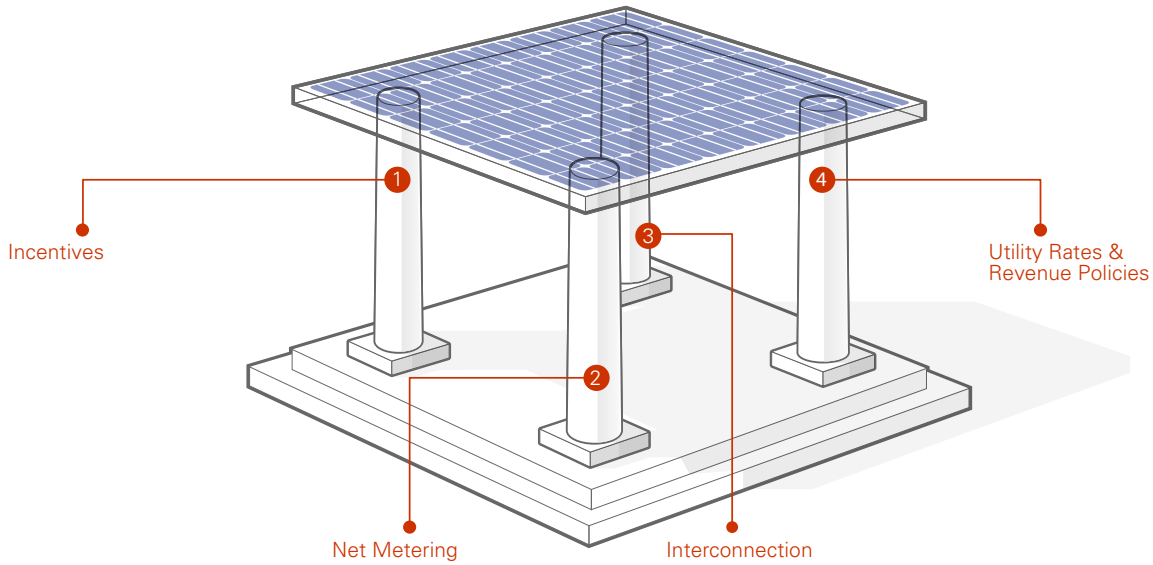

Table 2: State Grades for 2011

State	Net Metering Grade	Interconnection Grade		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	B	New Jersey	A	B
Colorado	A	B	New Mexico	B	B
Connecticut	A	B	New York	B	B
D.C.	B	B	North Carolina	D	B
Delaware	A	A	North Dakota	D	–
Florida	A	C	Ohio	A	C
Georgia	F	–	Oklahoma	F	–
Hawaii	B	F	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	B	Virginia	B	A
Massachusetts	A	A	Washington	B	D
Michigan	A	C	West Virginia	A	B
Minnesota	F	D	Wisconsin	C	C
Mississippi	–	–	Wyoming	B	–
Missouri	C	–			

Note: A lack of a grade indicates no statewide policy.

Table 3: Cumulative State Net Metering and Interconnection Grades by Year

Net Metering						
Year	**A**	**B**	**C**	**D**	**F**	**N/A**
2007	5	8	12	6	8	12
2008	6	15	9	7	6	8
2009	11	16	8	6	3	7
2010	15	22	3	3	3	6
2011	17	18	5	2	4	6

Interconnection						
Year	**A**	**B**	**C**	**D**	**F**	**N/A**
2007	0	1	9	8	15	18
2008	0	11	3	9	14	14
2009	1	14	6	6	14	10
2010	4	16	7	4	5	16
2011	6	17	7	4	3	15

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user_upload/ConnectDocs/EPActJune08_01.doc (The timing and requirements of EPAct 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.

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.

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.

8. The document is available at www.irecusa.org.

9. For more information on the Four Pillars, visit the Solar Alliance website: www.solaralliance.org.

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 following 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).[1] 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.[2]

Policy Points: Net Metering

Individual System Capacity

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.[3]

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.[4] 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 Retail Choice

Points	Bonus
+0.5	Net metering is allowed under retail choice

This criteria was evaluated based on a variety of policy provisions, including whether or not competitive suppliers are required to offer net metering, whether distribution charges are netted for retail choice customers and whether there is a non-discriminatory clause for retail choice customers who wish to engage in net metering. For this point value, the authors relied on an IREC report, The Intersection of Net Metering and Retail Choice, which based its conclusions on a combination of net metering statute and regulation review and communications with Commission and utility staff.[5]

Bonus for Community 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

community renewables programs. Under a community 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 community 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[6]

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,"[7] 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.[8]

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.[9]

External disconnect switches are unnecessary because all inverters that meet IEEE standards have automatic shut-off capabilities integrated within the systems.[10] In the event of grid failure, a DG system's inverter will detect the loss of power and shut themselves off.[11] It is important to note that not one accident resulting from the islanding of net-metered renewable energy systems has been reported.[12] 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.[13] 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.[14]

Certification

Points	Standard
+1	UL 1741 / IEEE 1547 standards are used in addition to other options (e.g., 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.[15]

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
Bonus	
+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. 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. Barnes, Justin and Varnado, Laurel. (2010) The Intersection of Net Metering & Retail Choice: An Overview of Policy, Practice, and Issues. Interstate Renewable Energy Council. December. http://irecusa.org/wp-content/uploads/2010/12/FINAL-Intersection-of-Retail-Choice-and-Net-Metering-Report.docx.pdf

6. 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.

7. 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

8. Renewable Energy World. (2008) Third-Party System Ownership Approved in Oregon. August 8. http://www.renewableenergyworld.com/rea/news/story?id=53273

9. 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).

10. Institute of Electrical and Electronics Engineers (IEEE). (2003) 1547-2003 IEEE Standard for Interconnecting Distributed Resources with Electric Power Systems.

11. 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

12. 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.

13. Sheehan, Michael (2008) Utility External Disconnect Switch. Solar Americas Board for Codes and Standards. http://www.solarabcs.org/utilitydisconnect/

14. 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).

15. 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.

"The future is already here—it's just not very evenly distributed."

—William Gibson

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.

– 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.

– 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 September 13, 2011. For further information, details and updates on state net metering policies and interconnection procedures, visit:

DSIRE: www.dsireusa.org
IREC: www.irecusa.org

Alaska

Net Metering				
–	–	–	B	C
2007	2008	2009	2010	2011

Eligible Renewable/ Other Technologies:	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
Applicable Sectors:	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Federal Government, Agricultural, Institutional
Applicable Utilities:	Utilities with annual retail sales of 5,000,000 kWh or more
System Capacity Limit:	25 kW
Aggregate Capacity Limit:	1.5% of average retail demand
Net Excess Generation:	Utilities with annual retail sales of 5,000,000 kWh or more
REC Ownership:	Not addressed
Meter Aggregation:	Not addressed

Recommendation:

» 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	2008	2009	2010	2011

Eligible Renewable/ Other Technologies:	–
Applicable Sectors:	–
Applicable Utilities:	–
System Capacity Limit:	–
Standard Agreement:	–
Insurance Requirements:	–
External Disconnect Switch:	–
Net Metering Required:	–

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	B 2008	A 2009	A 2010	A 2011

Eligible Renewable/ Other Technologies:	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
Applicable Sectors:	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Institutional
Applicable Utilities:	Investor-owned utilities, electric co-ops
System Capacity Limit:	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
Aggregate Capacity Limit:	No limit specified
Net Excess Generation:	Credited to customer's next bill at retail rate; excess reconciled annually at avoided-cost rate
REC Ownership:	Customer owns RECs (must be relinquished to utility in exchange for distributed generation payments)
Meter Aggregation:	Not addressed

Recommendation:

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

Interconnection				
C 2007	C 2008	C 2009	– 2010	– 2011

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

Recommendation:

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

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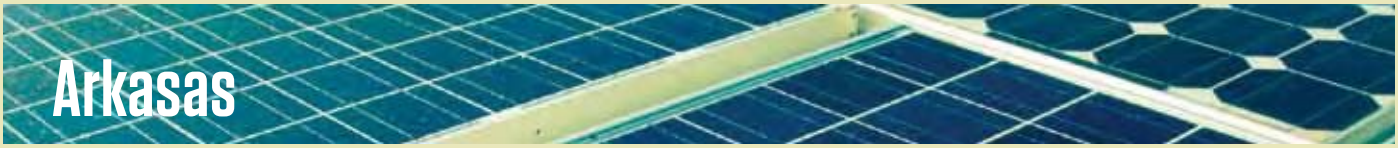
The Arizona Corporation Commission (ACC) adopted net metering rules in October 2008 which became effective in May 2009. These rules, which apply to investor-owned and cooperative utilities in the state, allow net metering for systems that provide 125% or less of the customer's peak connected load. Net 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.



Arkasas

Net Metering				
C 2007	C 2008	C 2009	B 2010	B 2011

Interconnection				
F 2007	F 2008	F 2009	F 2010	– 2011

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

Recommendation:

» 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

Eligible Renewable/Other Technologies:	Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells using Renewable Fuels, Microturbines
Applicable Sectors:	Commercial, Industrial, Residential, General Public/Consumer, Nonprofit, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
Applicable Utilities:	All utilities (municipal utilities not subject to commission rules)
System Capacity Limit:	300 kW for non-residential; 25 kW for residential
Standard Agreement:	Yes
Insurance Requirements:	Not addressed
External Disconnect Switch:	Not required for certain inverter-based systems; required for all other systems
Net Metering Required:	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				
A 2007	B 2008	A 2009	A 2010	A 2011

Interconnection				
C 2007	B 2008	B 2009	B 2010	B 2011

Eligible Renewable/ Other Technologies:	Photovoltaics, Wind, Fuel Cells, Biogas from manure methane production or as a byproduct of the anaerobic digestion of biosolids and animal waste
Applicable Sectors:	Commercial, Industrial, Residential, Agricultural
Applicable Utilities:	All utilities (except LADWP): solar and wind; Investor-owned utilities: solar, wind, biogas and fuel cells
System Capacity Limit:	1 MW (10 MW for up to 3 biogas digesters)
Aggregate Capacity Limit:	5% of utility's peak demand (statewide limit of 50 MW for biogas digesters; 112.5 MW for fuel cells)
Net Excess Generation:	Credited to customer's next monthly bill at retail rate. Customer may decide NEG treatment annually.
REC Ownership:	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.
Meter Aggregation:	Virtual meter aggregation on multi-family affordable housing allowed

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

Recommendation:

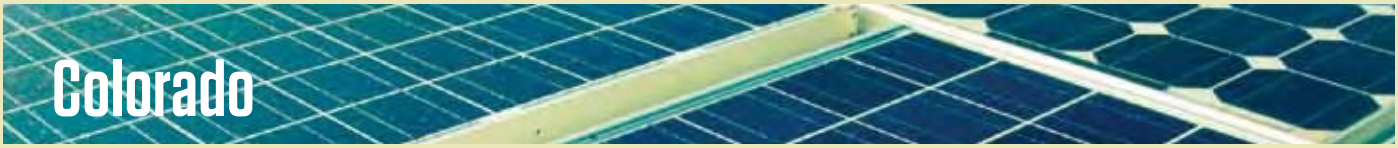
» Remove system size limitations to allow customers to meet all on-site energy needs

Recommendation:

» 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. California's Rule 21 governs the interconnection process. 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 California Solar Initiative has set a goal of installing 3,000 MW by 2017.



Colorado

Net Metering

A 2007	A 2008	A 2009	A 2010	A 2011

Eligible Renewable/ Other Technologies:	Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, Recycled Energy, Small Hydroelectric, Fuel Cells using Renewable Fuels
Applicable Sectors:	Commercial, Industrial, Residential
Applicable Utilities:	All utilities (exceptions for small municipal utilities)
System Capacity Limit:	120% of the customer's average annual consumption. Muni and co-op customers: 25 kW for non-residential & 10 kW for residential.
Aggregate Capacity Limit:	No limit specified
Net Excess Generation:	Credited to customer's next bill at retail rate
REC Ownership:	Customer owns RECs (must be relinquished to utility for 20 years in exchange for incentives)
Meter Aggregation:	Allowed for IOU customers; rules under development

Recommendation:

» None

Interconnection

C 2007	C 2008	C 2009	B 2010	B 2011

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

Recommendation:

» Increase covered system capacity to cover all system sizes

» Eliminate additional insurance requirements entirely

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

B 2007	B 2008	A 2009	A 2010	A 2011

Eligible Renewable/ Other Technologies:	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Fuel Cells, Municipal Solid Waste, Small Hydroelectric, Tidal Energy, Wave Energy, Ocean Thermal
Applicable Sectors:	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Multi-Family Residential, Agricultural, Institutional
Applicable Utilities:	Investor-owned utilities
System Capacity Limit:	2 MW
Aggregate Capacity Limit:	No limit specified
Net Excess Generation:	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)
REC Ownership:	Customer owns RECs
Meter Aggregation:	Not addressed

Recommendation:

- 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

D 2007	D 2008	D 2009	B 2010	B 2011

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

Recommendation:

- 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

B 2007	B 2008	A 2009	A 2010	A 2011

Eligible Renewable/ Other Technologies:	Photovoltaics, Wind, Biomass, Hydroelectric, Anaerobic Digestion, Small Hydroelectric, Fuel Cells
Applicable Sectors:	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
Applicable Utilities:	All utilities
System Capacity Limit:	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
Aggregate Capacity Limit:	5% of peak demand (utilities may increase limit)
Net Excess Generation:	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.
REC Ownership:	Customer retains ownership of RECs associated with electricity produced and consumed by the customer
Meter Aggregation:	Not addressed

Recommendation:

» Allow net metering for third parties using the PPA model

Interconnection

F 2007	F 2008	D 2009	F 2010	A 2011

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

Recommendation:

» None

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. They are subject of Freeing the Grid's in focus section.***

District of Columbia

Net Metering

F 2007	C 2008	B 2009	B 2010	B 2011

Eligible Renewable/ Other Technologies:	Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, CHP/Cogeneration, Anaerobic Digestion, Small Hydroelectric, Tidal Energy, Microturbines
Applicable Sectors:	Commercial, Residential
Applicable Utilities:	Investor-owned utilities
System Capacity Limit:	1 MW
Aggregate Capacity Limit:	No limit specified
Net Excess Generation:	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
REC Ownership:	Customer and utility own RECs
Meter Aggregation:	Not addressed

Recommendation:

» 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
» Allow customers to retain RECs

Interconnection

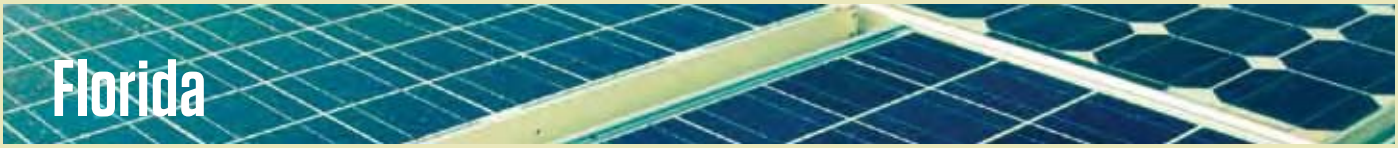
F 2007	F 2008	B 2009	B 2010	B 2011

Eligible Renewable/Other Technologies:	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
Applicable Sectors:	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Institutional
Applicable Utilities:	Investor-owned utilities
System Capacity Limit:	10 MW
Standard Agreement:	Yes
Insurance Requirements:	Vary by system size and/or type; levels established by commission
External Disconnect Switch:	Not required for inverter-based systems up to 10 kW; required for all other systems
Net Metering Required:	No

Recommendation:

» Increase covered system capacity to 20 MW
» Prohibit requirements for redundant external disconnect switch
» Prohibit requirements for additional insurance

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	A 2008	A 2009	A 2010	**A 2011**

Eligible Renewable/ Other Technologies:	Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, CHP/Cogeneration, Hydrogen, Small Hydroelectric, Tidal Energy, Wave Energy, Ocean Thermal
Applicable Sectors:	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Tribal Government, Fed. Government, Agricultural, Institutional
Applicable Utilities:	Investor-owned utilities
System Capacity Limit:	2 MW
Aggregate Capacity Limit:	No limit specified
Net Excess Generation:	Credited to customer's next bill at retail rate; excess reconciled annually at avoided-cost rate
REC Ownership:	Customer owns RECs
Meter Aggregation:	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

Interconnection				
– 2007	D 2008	B 2009	B 2010	**C 2011**

Eligible Renewable/Other Technologies:	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, CHP/Cogeneration, Hydrogen, Anaerobic Digestion, Small Hydroelectric, Tidal Energy, Wave Energy, Ocean Thermal
Applicable Sectors:	Commercial, Industrial, Residential, General Public/Consumer, Nonprofit, Schools, Local Government, State Government, Tribal Government, Fed. Government, Agricultural, Institutional
Applicable Utilities:	Investor-owned utilities
System Capacity Limit:	2 MW
Standard Agreement:	Yes
Insurance Requirements:	Vary by system size and/or type; levels established by commission
External Disconnect Switch:	Not required for inverter-based systems up to 10 kW; required for all other systems
Net Metering Required:	Yes

Recommendation:

» 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

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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				
F 2007	F 2008	F 2009	F 2010	F 2011

Eligible Renewable/ Other Technologies:	Net Metering
Applicable Sectors:	Photovoltaics, Wind, Fuel Cells
Applicable Utilities:	Commercial, Industrial, Residential
System Capacity Limit:	All utilities
Aggregate Capacity Limit:	100 kW non-residential; 10 kW residential
Net Excess Generation:	0.2% of utility's peak demand during previous year
REC Ownership:	Credited to customer's next bill at a predetermined rate filed with the commission
Meter Aggregation:	Not addressed

Recommendation:

» 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				
F 2007	F 2008	F 2009	– 2010	– 2011

Eligible Renewable/Other Technologies:	–
Applicable Sectors:	–
Applicable Utilities:	–
System Capacity Limit:	–
Standard Agreement:	–
Insurance Requirements:	–
External Disconnect Switch:	–
Net Metering Required:	–

Recommendation:

» The state should adopt IREC's model interconnection procedures

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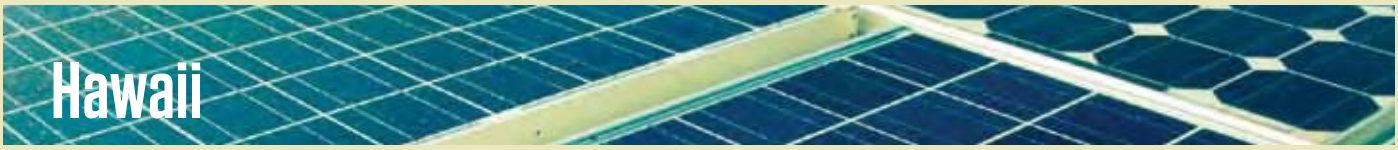
Legislation enacted in 2001 spurred the development of net metering and interconnection procedures for residential customers with systems less than 10 kW and commercial facilities with systems less than 100 kW. The aggregate system capacity is limited to 0.2% of the utility's peak load.

Hawaii



Net Metering				
C 2007	C 2008	C 2009	B 2010	B 2011

Eligible Renewable/ Other Technologies:	Photovoltaics, Wind, Biomass, Hydroelectric, Small Hydroelectric
Applicable Sectors:	Commercial, Residential, Local Government, State Government, Fed. Government
Applicable Utilities:	All utilities
System Capacity Limit:	100 kW for HECO, MECO, HELCO customers; 50 kW for KIUC customers
Aggregate Capacity Limit:	3% of utility's peak demand for HELCO and MECO; 1% of utility's peak demand for KIUC and HECO
Net Excess Generation:	Credited to customer's next bill at retail rate; granted to utility at end of 12-month billing cycle
REC Ownership:	Not addressed
Meter Aggregation:	Not addressed

Recommendation:

» 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				
F 2007	F 2008	F 2009	F 2010	F 2011

Eligible Renewable/Other Technologies:	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, Municipal Solid Waste, CHP/ Cogeneration, Microturbines, Other Distributed Generation Technologies
Applicable Sectors:	Commercial, Industrial, Residential, Nonprofit, Schools, State Government, Fed. Government
Applicable Utilities:	Investor-owned utilities
System Capacity Limit:	No limit specified
Standard Agreement:	Yes
Insurance Requirements:	Amount not specified
External Disconnect Switch:	Required
Net Metering Required:	No

Recommendation:

» 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). Each of these four utilities' net metering programs are slightly different but each has a set-aside within their participation caps for systems 10 kW and smaller. 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. A manual disconnect switch is required, but no additional fees are allowed for purposes of interconnection.

Illinois

Net Metering

– 2007	B 2008	B 2009	B 2010	B 2011

Eligible Renewable/ Other Technologies:	Photovoltaics, Wind, Biomass, Hydroelectric, Anaerobic Digestion, Small Hydroelectric, Fuel Cells using Renewable Fuels, Microturbines
Applicable Sectors:	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
Applicable Utilities:	Investor-owned utilities, alternative retail electric suppliers
System Capacity Limit:	40 kW
Aggregate Capacity Limit:	1% of utility's peak demand in previous year
Net Excess Generation:	Credited to customer's next bill at retail rate; granted to utility at end of 12-month billing cycle
REC Ownership:	Customer owns RECs
Meter Aggregation:	Not addressed

Recommendation:

» 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

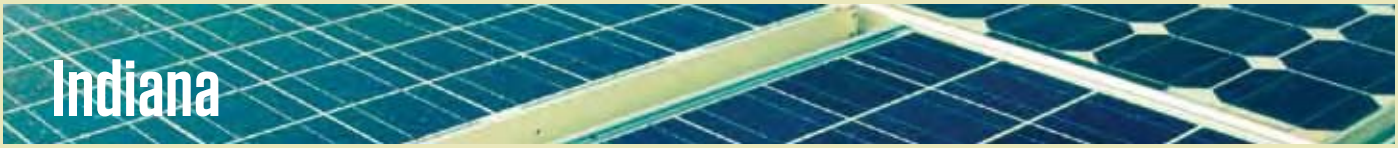
– 2007	B 2008	B 2009	B 2010	B 2011

Eligible Renewable/Other Technologies:	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
Applicable Sectors:	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
Applicable Utilities:	Investor-owned utilities
System Capacity Limit:	No limit specified
Standard Agreement:	Yes
Insurance Requirements:	Vary by system size and/or type; levels established by commission
External Disconnect Switch:	Required
Net Metering Required:	No

Recommendation:

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

Legislation enacted in Illinois in 2007 required the Illinois Corporation Commission to establish net metering and interconnection procedures by April 2008. Net metering was adopted in May 2008 and interconnection procedures for systems up to 10 MW were adopted in August 2008. These standards make net metering available to systems up to 40 kW with an aggregate limit of 1% of each utility's peak demand (larger systems are allowed, but on terms that are equivalent to what is required under PURPA). Electric co-ops and municipalities are exempt. NEG rolls-over to the next billing period at the retail rate but expires at the end of the year. Customers retain all RECs. 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

F 2007	F 2008	F 2009	D 2010	B 2011

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 Limit:	1 MW
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

Recommendation:

» 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

D 2007	D 2008	D 2009	C 2010	B 2011

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
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 Switch:	Utility's discretion
Net Metering Required:	No

Recommendation:

» Prohibit utility's discretion for redundant external disconnect switch

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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

C 2007	C 2008	C 2009	B 2010	B 2011

Eligible Renewable/ Other Technologies:	Photovoltaics, Wind, Biomass, Hydroelectric, Municipal Solid Waste, Small Hydroelectric
Applicable Sectors:	Commercial, Industrial, Residential
Applicable Utilities:	Investor-owned utilities
System Capacity Limit:	500 kW
Aggregate Capacity Limit:	No limit specified
Net Excess Generation:	Credited to customer's next bill at retail rate; carries over indefinitely
REC Ownership:	Not addressed
Meter Aggregation:	Not addressed

Recommendation:

» 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

D 2007	F 2008	F 2009	B 2010	B 2011

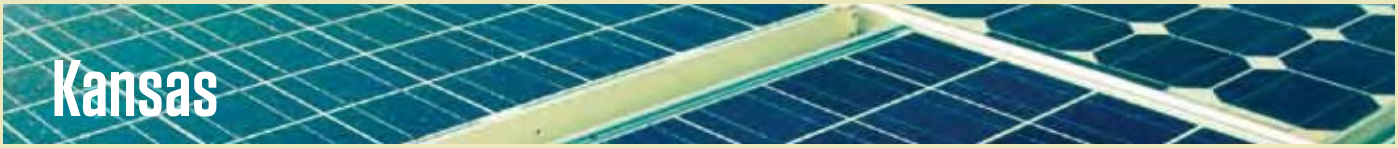
Eligible Renewable/Other Technologies:	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Municipal Solid Waste, CHP/ Cogeneration, Anaerobic Digestion
Applicable Sectors:	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State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

Recommendation:

» 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	– 2008	B 2009	B 2010	B 2011

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

Recommendation:

» 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	– 2008	F 2009	– 2010	– 2011

Eligible Renewable/Other Technologies:	–
Applicable Sectors:	–
Applicable Utilities:	–
System Capacity Limit:	–
Standard Agreement:	–
Insurance Requirements:	–
External Disconnect Switch:	–
Net Metering Required:	–

Recommendation:

» The state should adopt IREC's model interconnection procedures

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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				
D 2007	B 2008	B 2009	B 2010	B 2011

Interconnection				
– 2007	– 2008	F 2009	F 2010	F 2011

Eligible Renewable/ Other Technologies:	Net Metering
Applicable Sectors:	Photovoltaics, Wind, Biomass, Hydroelectric, Biogas, Small Hydroelectric
Applicable Utilities:	Commercial, Residential, Nonprofit, Schools, Local Government, State Government, Agricultural, Institutional
System Capacity Limit:	Investor-owned utilities, electric co-ops (except TVA distribution utilities)
Aggregate Capacity Limit:	30 kW
Net Excess Generation:	1% of utility's single-hour peak load during previous year
REC Ownership:	Credited to customer's next bill at retail rate; carries over indefinitely
Meter Aggregation:	Customer owns RECs

Recommendation:

» 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

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

Recommendation:

» The state should adopt IREC's model interconnection procedures

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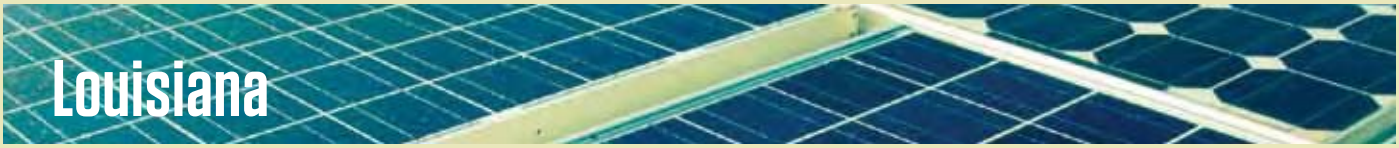
Kentucky's net metering law was expanded in April 2008 to systems up to 30 kW and to a variety of renewable technologies (previously, only PV was allowed). The PSC issued net metering and interconnection rules in January 2009 as a result of this law. NEG is rolled-over to the next month's bill with no 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				
B 2007	B 2008	B 2009	B 2010	C 2011

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

Recommendation:

» 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				
F 2007	F 2008	F 2009	– 2010	– 2011

Eligible Renewable/Other Technologies:	–
Applicable Sectors:	–
Applicable Utilities:	–
System Capacity Limit:	–
Standard Agreement:	–
Insurance Requirements:	–
External Disconnect Switch:	–
Net Metering Required:	–

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

C 2007	C 2008	B 2009	B 2010	B 2011

Eligible Renewable/ Other Technologies:	Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, Municipal Solid Waste, CHP/Cogeneration, (CHP/Cogeneration since April 30, 2009), Small Hydroelectric, Tidal Energy
Applicable Sectors:	Commercial, Industrial, Residential
Applicable Utilities:	All utilities
System Capacity Limit:	660 kW for IOU customers; 100 kW for muni and co-op customers (although they may offer up to 660 kW voluntarily)
Aggregate Capacity Limit:	No limit specified
Net Excess Generation:	Credited to customer's next bill at retail rate; granted to utility at end of 12-month billing cycle
REC Ownership:	Not addressed
Meter Aggregation:	Allowed

Recommendation:

» 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	– 2008	– 2009	A 2010	A 2011

Eligible Renewable/Other Technologies:	Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, Municipal Solid Waste, Tidal Energy, Wave Energy, Other Distributed Generation Technologies
Applicable Sectors:	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government
Applicable Utilities:	All Transmission and Distribution Utilities
System Capacity Limit:	Not specified
Standard Agreement:	Varies by system size
Insurance Requirements:	Not required for inverter-based systems up to 1 MW; Vary by system size and/ or type
External Disconnect Switch:	Not required
Net Metering Required:	No

Recommendation:

» Provide more clarification on the dispute resolution process

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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

A 2007	A 2008	A 2009	A 2010	A 2011

Eligible Renewable/ Other Technologies:	Photovoltaics, Wind, Biomass, Fuel Cells, CHP/Cogeneration, Anaerobic Digestion
Applicable Sectors:	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
Applicable Utilities:	All utilities
System Capacity Limit:	2 MW generally, (30 kW for micro-CHP)
Aggregate Capacity Limit:	1,500 MW (~8% of peak demand)
Net Excess Generation:	Credited to customer's next bill at retail rate; reconciled annually at the wholesale energy rate
REC Ownership:	Customer owns RECs
Meter Aggregation:	Not addressed

Recommendation:

» Remove system size limitations to allow customers to meet all on-site energy needs
» Allow for meter aggregation
» Credit Net Excess Generation at the retail rate and provide the option of indefinite rollover

Interconnection

D 2007	B 2008	B 2009	B 2010	B 2011

Eligible Renewable/Other Technologies:	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
Applicable Sectors:	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
Applicable Utilities:	All utilities
System Capacity Limit:	10 MW
Standard Agreement:	Yes
Insurance Requirements:	Vary by system size and/or type; levels established by commission
External Disconnect Switch:	Required
Net Metering Required:	No

Recommendation:

» 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

C 2007	B 2008	B 2009	A 2010	A 2011

Eligible Renewable/ Other Technologies:	Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, Municipal Solid Waste, CHP/Cogeneration, Anaerobic Digestion, Small Hydroelectric, Other Distributed Generation Technologies
Applicable Sectors:	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
Applicable Utilities:	Investor-owned utilities
System Capacity Limit:	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
Aggregate Capacity Limit:	1% of utility's peak load in general; 2% of utility's peak load for net metering by municipalities or governmental entities
Net Excess Generation:	Varies by system type and customer class
REC Ownership:	Customer owns RECs
Meter Aggregation:	Neighborhood net metering allowed

Recommendation:

» Increase overall enrollment to at least 5% of peak capacity

» Extend net metering to all utilities

Interconnection

C 2007	B 2008	B 2009	A 2010	A 2011

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

Recommendation:

» 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

F 2007	F 2008	B 2009	A 2010	A 2011

Eligible Renewable/ Other Technologies:	Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Municipal Solid Waste, Anaerobic Digestion, Small Hydroelectric, Tidal Energy, Wave Energy
Applicable Sectors:	Commercial, Industrial, Residential, Nonprofit, Schools, 'Local, State and Fed. Government, Agricultural
Applicable Utilities:	Investor-owned utilities, electric cooperatives, alternative electric suppliers
System Capacity Limit:	150 kW
Aggregate Capacity Limit:	0.75% of utility's peak load during previous year
Net Excess Generation:	Credited to customer's next bill at retail rate for systems 20 kW or less. Carries over indefinitely
REC Ownership:	Customer owns RECs
Meter Aggregation:	Not addressed

Recommendation:

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

» Increase aggregate capacity to 5% of peak load

Interconnection

D 2007	D 2008	C 2009	C 2010	C 2011

Eligible Renewable/Other Technologies:	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
Applicable Sectors:	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Institutional
Applicable Utilities:	Investor-owned utilities, electric co-ops
System Capacity Limit:	No limit specified
Standard Agreement:	Yes
Insurance Requirements:	Vary by system size and/or type; levels established by commission
External Disconnect Switch:	Not addressed
Net Metering Required:	No

Recommendation:

» 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

C 2007	C 2008	C 2009	B 2010	F 2011

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

Recommendation:

» 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

F 2007	F 2008	F 2009	D 2010	D 2011

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

Recommendation:

» 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

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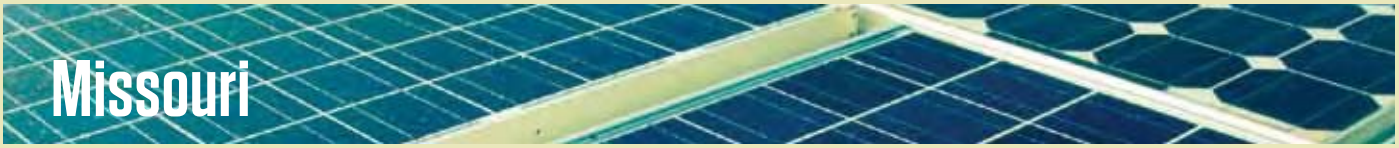
Minnesota's net metering legislation was adopted in the early 1980s. Net metering is offered for systems up to 40 kW with no limit on aggregate program capacity. The rules are unlike most other state net metering policies in that they allow utilities to pay customers at the end of the month in order 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				
C 2007	C 2008	C 2009	C 2010	C 2011

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

Recommendation:

» 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				
F 2007	F 2008	F 2009	– 2010	– 2011

Eligible Renewable/Other Technologies:	–
Applicable Sectors:	–
Applicable Utilities:	–
System Capacity Limit:	–
Standard Agreement:	–
Insurance Requirements:	–
External Disconnect Switch:	–
Net Metering Required:	–

Recommendation:

» 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

C 2007	C 2008	C 2009	C 2010	C 2011

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

Recommendation:

» 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

F 2007	F 2008	F 2009	C 2010	C 2011

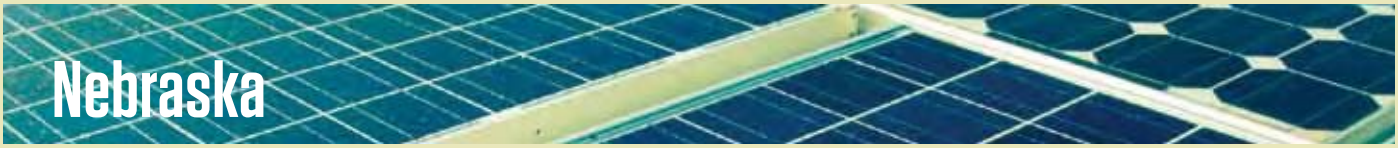
Eligible Renewable/Other Technologies:	No restrictions on eligible technology
Applicable Sectors:	Commercial, Industrial, Residential, Schools, Local Government, State Government
Applicable Utilities:	Investor-owned utilities
System Capacity Limit:	10 MW
Standard Agreement:	No
Insurance Requirements: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

Recommendation:

» 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	– 2008	B 2009	B 2010	B 2011

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

Recommendation:

» 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	– 2008	F 2009	– 2010	– 2011

Eligible Renewable/Other Technologies:	–
Applicable Sectors:	–
Applicable Utilities:	–
System Capacity Limit:	–
Standard Agreement:	–
Insurance Requirements:	–
External Disconnect Switch:	–
Net Metering Required:	–

Recommendation:

» The state should adopt IREC's model interconnection procedures

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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

B 2007	B 2008	B 2009	B 2010	B 2011

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

Recommendation:

» 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	B 2008	B 2009	B 2010	B 2011

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

Recommendation:

» Establish a standard interconnection agreement

» Expressly prohibit requirements for an external disconnect switch

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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

C 2007	C 2008	C 2009	B 2010	B 2011

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

Recommendation:

» 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

D 2007	D 2008	C 2009	D 2010	D 2011

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

Recommendation:

» 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

A 2007	A 2008	A 2009	A 2010	A 2011

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

Recommendation:

» Allow meter aggregation and net metering for shared or community systems

Interconnection

B 2007	B 2008	B 2009	B 2010	B 2011

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

B 2007	B 2008	B 2009	B 2010	B 2011

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

Recommendation:

» 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

C 2007	B 2008	B 2009	B 2010	B 2011

Eligible Renewable/Other Technologies:	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
Applicable Sectors:	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government
Applicable Utilities:	Investor-owned utilities, electric co-ops
System Capacity Limit:	80 MW
Standard Agreement:	Yes
Insurance Requirements:	Generally not required for systems up to 250 kW. Utilities may require insurance for systems > 250 kW, with limits set by commission
External Disconnect Switch:	Not required for inverter-based systems up to 10 kW; utility's discretion for all other systems
Net Metering Required:	No

Recommendation:

» 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

D 2007	B 2008	D 2009	B 2010	B 2011

Eligible Renewable/ Other Technologies:	Photovoltaics, Wind, Biomass, Fuel Cells, CHP/Cogeneration, Anaerobic Digestion, Microturbines
Applicable Sectors:	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
Applicable Utilities:	Investor-owned utilities
System Capacity Limit:	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
Aggregate Capacity Limit:	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
Net Excess Generation:	Generally credited to customer's next bill at retail rate; excess generally reconciled annually at avoided-cost rate
REC Ownership:	Not addressed
Meter Aggregation:	Allowed for non-residential and farm-based customers

Recommendation:

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

» Credit net excess generation at the retail rate and provide the option of indefinite rollover

Interconnection

C 2007	C 2008	B 2009	B 2010	B 2011

Eligible Renewable/Other Technologies:	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, Municipal Solid Waste, CHP/ Cogeneration, Microturbines
Applicable Sectors:	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
Applicable Utilities:	Investor-owned utilities
System Capacity Limit:	2 MW
Standard Agreement:	Yes
Insurance Requirements:	Insurance not required
External Disconnect Switch:	Not required for inverter-based systems up to 25 kW; required for all other systems
Net Metering Required:	No

Recommendation:

» Remove system size limits

» Establish a tier establishing rules for interconnecting non-exporting systems

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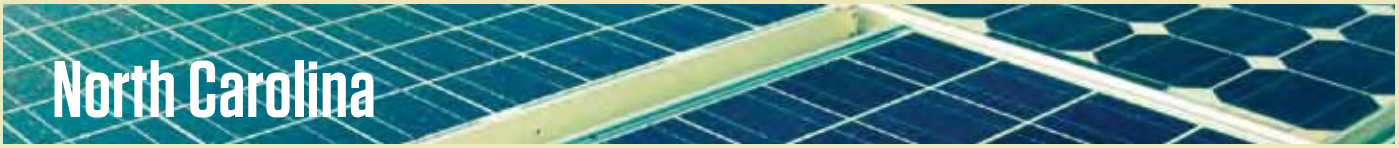
New York allows net metering for residential solar and wind systems of up to 25 kW, non-residential solar and wind systems of up to 2 MW, agricultural wind or biogas systems up to 500 kW and 10 kW for residential micro-CHP and fuel cells. In June 2011 New York enacted legislation allowing eligible farm-based and non-residential customer-generators to engage in "remote" net metering. In 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				
F 2007	F 2008	D 2009	D 2010	D 2011

Eligible Renewable/ Other Technologies:	Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, CHP/Cogeneration, Hydrogen, Anaerobic Digestion, Small Hydroelectric, Tidal Energy, Wave Energy, Fuel Cells using Renewable Fuels
Applicable Sectors:	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Tribal Government, Fed. Government, Agricultural, Institutional
Applicable Utilities:	Investor-owned utilities
System Capacity Limit:	1 MW
Aggregate Capacity Limit:	No limit specified
Net Excess Generation:	Credited to customer's next bill at retail rate; granted to utility at beginning of summer billing season
REC Ownership:	Utility owns RECs (unless customer chooses to net meter under a time-of-use tariff)
Meter Aggregation:	Not addressed

Recommendation:

- 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				
F 2007	B 2008	B 2009	B 2010	B 2011

Eligible Renewable/Other Technologies:	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Fuel Cells, Municipal Solid Waste, CHP/ Cogeneration, Anaerobic Digestion, Small Hydroelectric, 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
System Capacity Limit:	No limit specified
Standard Agreement:	Yes
Insurance Requirements:	Vary by system size and/or type; levels established by commission
External Disconnect Switch:	Not required for inverter-based systems up to 10 kW; utility's discretion for all other systems
Net Metering Required:	No

Recommendation:

- 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				
D 2007	D 2008	D 2009	D 2010	D 2011

Interconnection				
– 2007	– 2008	– 2009	– 2010	– 2011

Eligible Renewable/ Other Technologies:	Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, Municipal Solid Waste, CHP/ Cogeneration, Small Hydroelectric
Applicable Sectors:	Commercial, Industrial, Residential
Applicable Utilities:	Investor-owned utilities
System Capacity Limit:	100 kW
Aggregate Capacity Limit:	No limit specified
Net Excess Generation:	Reconciled monthly at avoided-cost rate
REC Ownership:	Customer and utility share RECs
Meter Aggregation:	Not addressed

Eligible Renewable/Other Technologies:	–
Applicable Sectors:	–
Applicable Utilities:	–
System Capacity Limit:	–
Standard Agreement:	–
Insurance Requirements:	–
External Disconnect Switch:	–
Net Metering Required:	–

Recommendation:

» 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)

Recommendation:

» The state should adopt IREC's model interconnection procedures

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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

B 2007	B 2008	B 2009	A 2010	A 2011

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

Recommendation:

» 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

C 2007	C 2008	C 2009	C 2010	C 2011

Eligible Renewable/Other Technologies:	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, Municipal Solid Waste, CHP/ Cogeneration, Microturbines, Other Distributed Generation Technologies
Applicable Sectors:	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government
Applicable Utilities:	Investor-owned utilities
System Capacity Limit:	20 MW
Standard Agreement:	Yes
Insurance Requirements:	"Additional" liability insurance not required
External Disconnect Switch:	Required
Net Metering Required:	No

Recommendation:

» 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 EPAct 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

D 2007	D 2008	D 2009	F 2010	F 2011

Eligible Renewable/ Other Technologies:	Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, Municipal Solid Waste, CHP/ Cogeneration, Small Hydroelectric
Applicable Sectors:	Commercial, Industrial, Residential, General Public/Consumer
Applicable Utilities:	Investor-owned utilities, regulated electric co-ops
System Capacity Limit:	100 kW or 25,000 kWh/year (whichever is less)
Aggregate Capacity Limit:	No limit specified
Net Excess Generation:	Credited to customer's next bill or granted to utility monthly (varies by utility)
REC Ownership:	Not addressed
Meter Aggregation:	Not addressed

Recommendation:

» 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	– 2008	– 2009	– 2010	– 2011

Eligible Renewable/Other Technologies:	–
Applicable Sectors:	–
Applicable Utilities:	–
System Capacity Limit:	–
Standard Agreement:	–
Insurance Requirements:	–
External Disconnect Switch:	–
Net Metering Required:	–

Recommendation:

» The state should adopt IREC's model interconnection procedures

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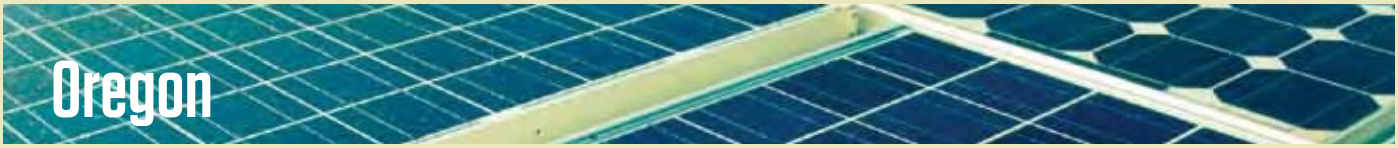
Oklahoma's investor-owned utilities and electric co-ops are required to offer net metering to customers with systems up to 100 kW, as a result of an order issued by the Oklahoma Corporation Commission in 1988. There is no stated aggregate limit on net-metered capacity. Utilities are not allowed to impose 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

B 2007	A 2008	A 2009	A 2010	A 2011

Eligible Renewable/ Other Technologies:	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Fuel Cells, Anaerobic Digestion, Small Hydroelectric
Applicable Sectors:	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
Applicable Utilities:	All utilities (except Idaho Power)
System Capacity Limit:	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
Aggregate Capacity Limit:	No limit specified for PGE and PacifiCorp
Net Excess Generation:	Credited to customer's next bill at utility's retail rate for IOU customers; varies for muni, co-op and PUD customers
REC Ownership:	Customer owns RECs (must be relinquished in exchange for Energy Trust incentives)
Meter Aggregation:	Allowed

Recommendation:

» 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

C 2007	B 2008	B 2009	B 2010	B 2011

Eligible Renewable/Other Technologies:	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Fuel Cells, Municipal Solid Waste, Anaerobic Digestion
Applicable Sectors:	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
Applicable Utilities:	Investor-owned utilities
System Capacity Limit:	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
Standard Agreement:	Yes
Insurance Requirements:	"Additional" liability insurance not required; small generator facilities over 200 kW must have general liability insurance
External Disconnect Switch:	Not required for inverter-based systems up to 25 kW
Net Metering Required:	No

Recommendation:

» 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

A 2007	A 2008	A 2009	A 2010	A 2011

Eligible Renewable/ Other Technologies:	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
Applicable Sectors:	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
Applicable Utilities:	Investor-owned utilities
System Capacity Limit:	5 MW for microgrid and emergency systems; 3 MW for non-residential; 50 kW for residential
Aggregate Capacity Limit:	No limit specified
Net Excess Generation:	Credited to customer's next bill at retail rate; reconciled at end of year at "price-to-compare"
REC Ownership:	Customer owns RECs
Meter Aggregation:	Virtual meter aggregation allowed

Recommendation:

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

Interconnection

D 2007	B 2008	B 2009	B 2010	B 2011

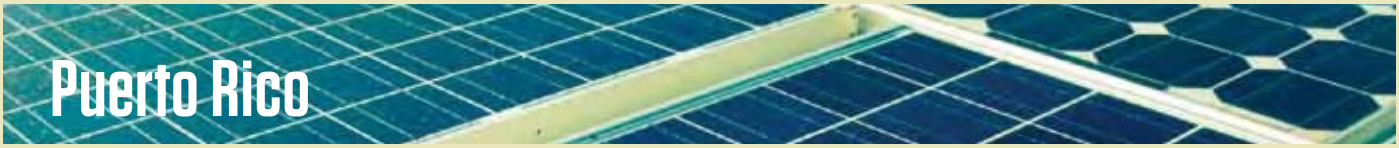
Eligible Renewable/Other Technologies:	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Fuel Cells, Municipal Solid Waste, CHP/Cogeneration, Waste Coal, Coal-Mine Methane, Anaerobic Digestion, Small Hydroelectric, Other Distributed Generation Technologies
Applicable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

Recommendation:

» 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	– 2008	– 2009	B 2010	B 2011

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

Recommendation:

» 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	– 2008	– 2009	F 2010	F 2011

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

Recommendation:

» The territory should adopt IREC's model interconnection procedures

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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				
C 2007	B 2008	B 2009	B 2010	B 2011

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

Recommendation:

» 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	– 2008	– 2009	– 2010	D 2011

Eligible Renewable/Other Technologies:	Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, Anaerobic Digestion, Small Hydroelectric, Ocean Thermal, Fuel Cells
Applicable Sectors:	Commercial, Industrial, Residential, Nonprofit, Schools, Local, State and Fed. Government, Multi-Family Residential, Agricultural, Institutional
Applicable Utilities:	Investor-owned utilities
System Capacity Limit:	Not specified
Standard Agreement:	No
Insurance Requirements:	Not addressed
External Disconnect Switch:	Not addressed
Net Metering Required:	No

Recommendation:

» The state should adopt IREC's model interconnection procedures

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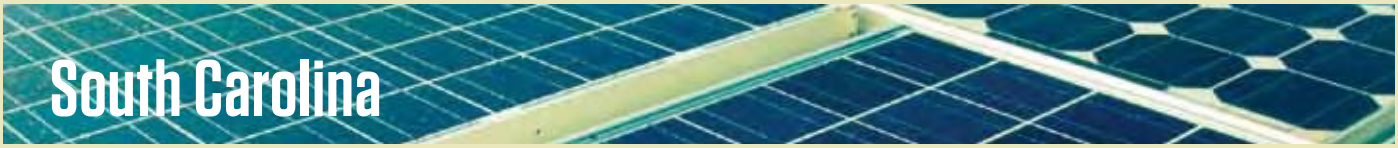
In 1998, Rhode Island's Public Utilities Commission (PUC) issued an order requiring the largest investor-owned utility in the state to offer net metering. In July 2008, legislation was enacted to expand net metering and by June 2011 a new net metering program was in place. The new program that took effect 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. The Rhode Island interconnection score is based on Narragansett Electric Company's "Standards for Connecting Distributed Generation," as it existed on 8/1/11. The score takes into account House Bill 6222 which sets certain fees and timelines for renewable generators. Narragansett filed a revised tariff on 8/26/11 to reflect these legislative changes, but, as of printing of this edition of *Freeing the Grid*, the tariff was not effective. Any approved changes will be evaluated in subsequent editions.

South Carolina



Net Metering

– 2007	– 2008	– 2009	F 2010	F 2011

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

Recommendation:

» The state should adopt IREC's model net metering rules

Interconnection

– 2007	F 2008	F 2009	F 2010	F 2011

Eligible Renewable/Other Technologies:	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Fuel Cells, Municipal Solid Waste, CHP/ Cogeneration, Anaerobic Digestion, Small Hydroelectric, 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
System Capacity Limit:	100 kW for non-residential; 20 kW for residential
Standard Agreement:	Yes
Insurance Requirements:	Vary by system size and/or type; levels established by commission
External Disconnect Switch:	Required
Net Metering Required:	No

Recommendation:

» The state should adopt IREC's model interconnection procedures

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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	– 2008	– 2009	– 2010	– 2011

Eligible Renewable/ Other Technologies:	–
Applicable Sectors:	–
Applicable Utilities:	–
System Capacity Limit:	–
Aggregate Capacity Limit:	–
Net Excess Generation:	–
REC Ownership:	–
Meter Aggregation:	–

Recommendation:

» The state should adopt IREC's model net metering rules

Interconnection

– 2007	– 2008	– 2009	B 2010	B 2011

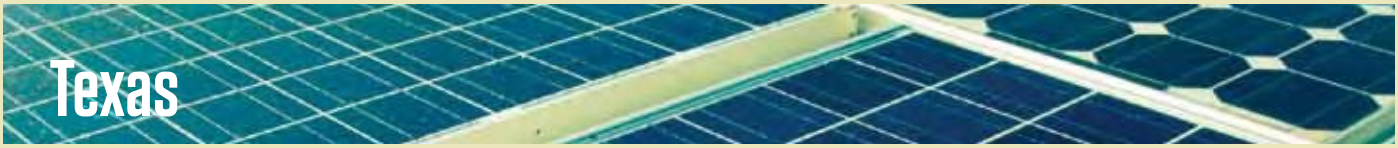
Eligible Renewable/Other Technologies:	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, CHP/Cogeneration, Anaerobic Digestion, Small Hydroelectric, Fuel Cells using Renewable Fuels, Microturbines, Other Distributed Generation Technologies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

Recommendation:

» 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				
D 2007	– 2008	– 2009	– 2010	– 2011

Eligible Renewable/ Other Technologies:	–
Applicable Sectors:	–
Applicable Utilities:	–
System Capacity Limit:	–
Aggregate Capacity Limit:	–
Net Excess Generation:	–
REC Ownership:	–
Meter Aggregation:	–

Recommendation:

» The state should adopt IREC's model net metering rules

Interconnection				
D 2007	D 2008	D 2009	C 2010	C 2011

Eligible Renewable/Other Technologies:	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
Applicable Sectors:	Commercial, Industrial, Residential
Applicable Utilities:	Investor-owned utilities
System Capacity Limit:	10 MW
Standard Agreement:	Yes
Insurance Requirements:	Not addressed
External Disconnect Switch:	Required
Net Metering Required:	No

Recommendation:

» 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

F 2007	D 2008	A 2009	A 2010	A 2011

Eligible Renewable/ Other Technologies:	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
Applicable Sectors:	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
Applicable Utilities:	Investor-owned utilities, electric co-ops
System Capacity Limit:	2 MW for non-residential; 25 kW for residential
Aggregate Capacity Limit:	20% of 2007 peak demand for Rocky Mountain Power; 0.1% of utility's 2007 peak demand for co-ops
Net Excess Generation:	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
REC Ownership:	Customer owns RECs
Meter Aggregation:	Allowed at same or adjacent location

Recommendation:

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

» Allow net metering for shared or community systems

Interconnection

F 2007	F 2008	F 2009	A 2010	A 2011

Eligible Renewable/Other Technologies:	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
Applicable Sectors:	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
Applicable Utilities:	Investor-owned utilities, electric co-ops
System Capacity Limit:	20 MW
Standard Agreement:	Varies by system size
Insurance Requirements:	Not addressed
External Disconnect Switch:	Not required for inverter-based systems up to 25 kW; required for all other systems
Net Metering Required:	No

Recommendation:

» Prohibit external disconnect switch requirements for all inverter-based systems

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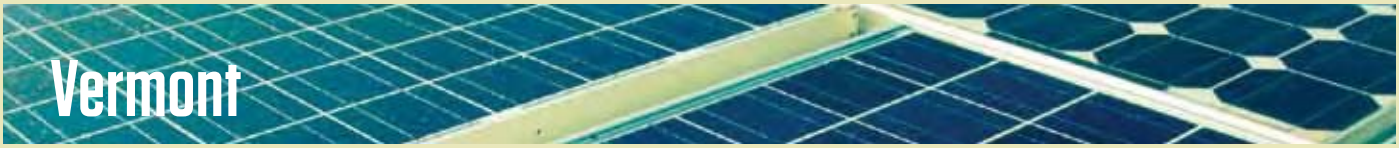
Utah began requiring all investor-owned utilities and co-ops to allow interconnection and net metering for systems up to 25 kW in 2002. In March 2008, non-residential net metering was expanded to 2 MW, but co-ops serving fewer than 1,000 customers were allowed to discontinue offering net metering. The 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				
C 2007	B 2008	B 2009	B 2010	A 2011

Interconnection				
C 2007	C 2008	C 2009	C 2010	C 2011

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

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

Recommendation:

» 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

Recommendation:

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

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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

C 2007	C 2008	B 2009	B 2010	B 2011

Eligible Renewable/ Other Technologies:	Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, Municipal Solid Waste, Small Hydroelectric, Tidal Energy, Wave Energy
Applicable Sectors:	Commercial, Residential, Nonprofit, Schools, Local Government, State Government, Institutional
Applicable Utilities:	Investor-owned utilities, electric co-ops
System Capacity Limit:	500 kW for non-residential (may be higher if a utility chooses); and 10 kW (20 kW with standby charges) for residential
Aggregate Capacity Limit:	1% of utility's adjusted Virginia peak-load forecast for the previous year
Net Excess Generation:	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
REC Ownership:	Customer owns RECs
Meter Aggregation:	Not addressed

Recommendation:

» 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

F 2007	F 2008	A 2009	A 2010	A 2011

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

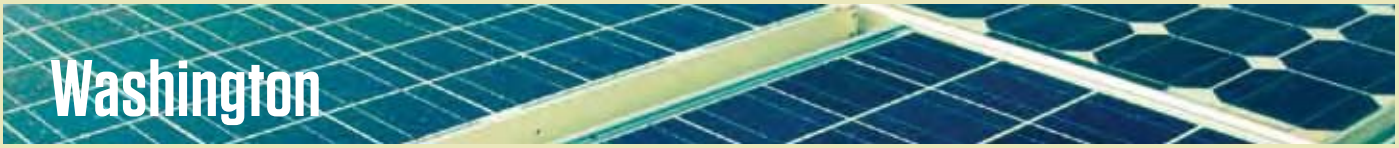
Recommendation:

» 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

D 2007	D 2008	C 2009	B 2010	B 2011

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

Recommendation:

» 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

F 2007	D 2008	D 2009	D 2010	D 2011

Eligible Renewable/Other Technologies:	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
Applicable Sectors:	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional
Applicable Utilities:	Investor-owned utilities
System Capacity Limit:	20 MW
Standard Agreement:	Yes
Insurance Requirements:	"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.
External Disconnect Switch:	Generally required for systems up to 300 kW; not addressed for larger systems
Net Metering Required:	No

Recommendation:

» 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

F 2007	F 2008	D 2009	A 2010	A 2011

Eligible Renewable/ Other Technologies:	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, Small Hydroelectric, Renewable Fuels
Applicable Sectors:	Commercial, Industrial, Residential, Agricultural
Applicable Utilities:	All utilities
System Capacity Limit:	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.
Aggregate Capacity Limit:	3% of peak demand during the previous year
Net Excess Generation:	Credited to customer's next bill at retail rate with no annual true-up (perpetual rollover)
REC Ownership:	Not addressed
Meter Aggregation:	Allowed

Recommendation:

» 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	– 2008	– 2009	B 2010	B 2011

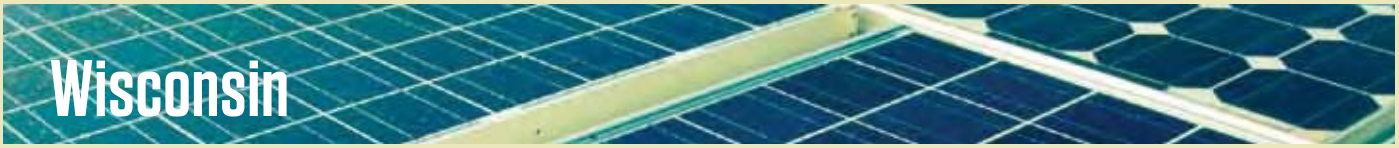
Eligible Renewable/Other Technologies:	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, Small Hydroelectric, Renewable Fuels
Applicable Sectors:	Commercial, Industrial, Residential, Agricultural
Applicable Utilities:	All utilities
System Capacity Limit:	2 MW
Standard Agreement:	Yes
Insurance Requirements:	Vary by system size and/or type; levels established by PSC
External Disconnect Switch:	Not required for inverter-based systems up to 25 kW; utility's discretion for all other systems
Net Metering Required:	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

F 2007	D 2008	D 2009	C 2010	C 2011

Eligible Renewable/ Other Technologies:	Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, Municipal Solid Waste, CHP/ Cogeneration, Small Hydroelectric, Other Distributed Generation Technologies
Applicable Sectors:	Commercial, Industrial, Residential
Applicable Utilities:	Investor-owned utilities, municipal utilities
System Capacity Limit:	20 kW (100 kW for wind for We Energies customers)
Aggregate Capacity Limit:	No limit specified
Net Excess Generation:	Generally credited at retail rate for renewables and avoided-cost for non-renewables
REC Ownership:	Not addressed
Meter Aggregation:	Not addressed

Recommendation:

» 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

D 2007	D 2008	D 2009	D 2010	C 2011

Eligible Renewable/Other Technologies:	Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, Municipal Solid Waste, CHP/ Cogeneration, Microturbines, Other Distributed Generation Technologies
Applicable Sectors:	Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government
Applicable Utilities:	Investor-owned utilities, municipal utilities
System Capacity Limit:	15 MW
Standard Agreement:	Yes
Insurance Requirements:	Vary by system size and/or type; levels established by PSC
External Disconnect Switch:	Required
Net Metering Required:	No

Recommendation:

» 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				
B 2007	B 2008	B 2009	B 2010	B 2011

Eligible Renewable/ Other Technologies:	Photovoltaics, Wind, Biomass, Hydroelectric, Small Hydroelectric
Applicable Sectors:	Commercial, Industrial, Residential
Applicable Utilities:	Investor-owned utilities, electric co-ops, irrigation districts
System Capacity Limit:	25 kW
Aggregate Capacity Limit:	No limit specified
Net Excess Generation:	Credited to customer's next bill at retail rate; excess reconciled annually at seasonal avoided-cost rate
REC Ownership:	Not addressed
Meter Aggregation:	Not addressed

Recommendation:

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

» Allow customers to own RECs

Interconnection				
F 2007	F 2008	F 2009	– 2010	– 2011

Eligible Renewable/Other Technologies:	–
Applicable Sectors:	–
Applicable Utilities:	–
System Capacity Limit:	–
Standard Agreement:	–
Insurance Requirements:	–
External Disconnect Switch:	–
Net Metering Required:	–

Recommendation:

» The state should adopt IREC's model interconnection procedures

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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
Tennessee
Wyoming

* *Voluntary net metering available*


Customer Service
Previous Bill
Electric Charges

Worst Practices

In Focus: Standby Charges

The imposition of additional charges, such as standby charges or access fees, on net metering customers can have a significant negative impact on the economics of distributed, clean energy systems. For that reason, we examined this issue closely in determining a state's net metering score.

The justification for standby charges for net metering customers typically follows this rationale: if a generator meeting all or part of a customer's energy needs fails, the utility will then be required to meet that customer's energy needs. The utility must at all times be ready to meet this customer's load, including the load that is currently offset by on-site generation. Accordingly, a standby charge can be justified to recoup the costs of the utility standing ready to serve.

While no one would argue that a utility should not be able to recover its costs to serve its customers, the issue of standby charges requires careful consideration of the costs—if any—actually imposed by net metering customers. Historically, standby charges were designed for customers who operated onsite generation or combined heat and power plants (CHP). Typical onsite generation or CHP systems range in size from small (<1 MW) to large (20–100 MW) in capacity and have the capability to produce electricity in a stable, 24/7 manner. From a utility's viewpoint, a significant load is now being served by the onsite generation, and scheduled downtime or outage will require the utility to meet the entire host customer's load over the period of time in which the onsite system is not operating. From the customer's perspective, having the choice of standby service is an important consideration for the times that onsite generation may be inoperative, so long as these costs take into account high reliability of CHP and the low probability that customer generation at different sites may be down at the same time. The costs of the utility standing by to meet this load are rightfully recovered from the respective onsite generator or CHP customer in these situations.

Intermittent resources, like PV, operate in a much different fashion. First, as their name suggests, intermittent resources produce power only when their fuel source, such as the sun, is available and their output varies over time based on a multitude of factors. Because of this, the utility continues to meet the host customer's demand at periods when the plant is not productive, such as nighttime and in low production hours where a customer's energy needs are greater than the energy supplied by their renewable energy resource. In this way, the utility is not "standing by" in the same sense as a CHP customer, but rather serving a customer with a load that varies over time—just as other customer's loads vary over time. Second, given this situation, it's not entirely clear that standby charges, which were developed for much larger onsite-generation customers whose expected load profiles are fundamentally different than the load profiles of customers installing intermittent generation resources, would appropriately recover any additional costs a utility experiences in serving customers with intermittent generation.

Simply put, without a careful cost-of-service study to certify the claim that customers installing net metering systems impose costs on a utility, it is inappropriate to impose standby charges on customers investing in renewable energy generation that were designed for an entirely different class of customer. A utility or commission cannot know whether a standby charge is justified for a class of customers or generators until it performs a comprehensive cost-of-service study.

Such a study should employ a methodology that considers both the costs and benefits of an intermittent generator, including load diversity benefits, transmission and distribution facility upgrade deferral, avoided capacity, avoided fuel costs and any environmental or social benefits. Moreover, research on the topic is showing that customers who install renewable generation actually impose less of a cost on a utility than other utility customers because of changes in their load profiles versus a utility's peak.

Therefore, a policy that imposes a per-kWh fee on all renewable energy production in the absence of a cost-of-service study (to justify the charge) received the most significant penalty available in *Freeing the Grid*—a five point deduction. Standby charges should only be allowed where they are justified on a cost-causation basis.

Moreover, *Freeing the Grid* awards three points to states that create a "safe harbor" provision in their net metering statutes or rules, thereby protecting customers from the unilateral imposition of these fees because of the ambiguity surrounding the appropriateness of imposing standby or other similar charges on customers who invest in renewable energy resources.

Finally, to avoid discriminating against distributed generation, standby charges must be based on a methodology that gives a true representation of the costs of serving customer-generators. Recently, legislatures in Virginia and New Mexico approved procedures for utilities to impose standby charges on customer-generators. Because the methodology for calculating the standby charges is not well defined, these bills leave a great deal of uncertainty as to how the charges will be calculated. Accordingly, this cost uncertainty makes these standby charge bills an obstacle to new generation and a worst practice.

In Focus: Virginia Standby Charges

In March 2011, Virginia enacted House Bill 1983 (H 1983), which authorizes utilities to seek Commission approval to impose standby charges on net-metered customers. Under the bill, customer-generators with systems over 10 kW may face standby charges where the utility can show that it is only recovering the "portion of the supplier's infrastructure costs that are properly associated with serving such eligible customer-generators."

"Additional charges or fees can have a significant negative impact on the economics clean energy systems."

In Focus: New Mexico Access Fee

New Mexico enacted HB 181 in 2010 which, similarly to Virginia, authorizes utilities to seek approval of "interconnected customer rate riders to recover the costs of ancillary and standby services." HB 181 requires the Public Regulation Commission to consider the "reasonably determinable embedded and incremental costs of the utility to serve new interconnected customers and the reasonably determinable benefits to the utility system provided by new interconnected customers. The Public Service Company of New Mexico (PNM) recently proposed a $0.08/kWh rider (pursuant to HB 181); even though the cost-of-service study showed that the benefits of distributed generation to the system *exceeded* the utility's costs of service for DG customers. PNM's methodology spread the benefits of DG to all customers (resulting in a low per-kWh benefit) and assigned the costs associated with DG solely to DG customers. The proposal was ultimately withdrawn, but this example highlights why it is so important to review any claims of costs very carefully.

Best Practices

In Focus: Delaware

Delaware's road to best practices began in 1999 with the creation of limited net metering as part of Delaware's electric restructuring. Unfortunately, the state legislature's initial net metering program was limited to renewable energy systems with a capacity of less than 25 kW, and only residential and small commercial customers could participate. Since then, however, the legislature has actively pursued best practices in the state's net metering policy that, among other things, expanded the availability of net metering to all customer classes, increasing the individual system size limit to 2 MW, and increasing the program capacity limit to 5% of utility peak demand. At each move through the years, Delaware has taken steps to adopt best practices in net metering with the end result being a *Freeing the Grid* score of "A" for Delaware since 2009.

As noted before, strong net metering rules are only one component of a comprehensive renewable energy policy. Robust interconnection procedures, utility rate polices, and incentives are also necessary to have a renewables program firing on all cylinders. Unfortunately, while Delaware's Renewable Portfolio Standard (RPS) program provides solid incentives for renewable DG, including net-metered systems, the state's interconnection procedures have historically fallen far short of best practices, receiving a grade of "F" in last year's edition of *Freeing the Grid*. Intriguingly, this situation occurred despite legislation in 2005 requiring that interconnection procedures be modeled after IREC's model interconnection procedures and best practices promulgated by the U.S. Department of Energy.

In July 2010, an opportunity arose to bring Delaware's interconnection procedures in line with best practices with the enactment of S.B. 267. This legislation expanded the state's already solid net metering program to allow for aggregate net metering and community renewables. As part of the development of rules to implement these new policies, staff at the Public Service Commission committed to taking a hard look at the state's interconnection procedures to bring them into compliance with the 2005 legislation.

The results of this effort are outstanding. As of mid-2011, Delaware is poised to adopt interconnection procedures that are among the strongest in the country and have received a score of "A" in *Freeing the Grid* 2011. In addition, the adoption of rules for aggregate metering and community renewables has greatly expanded opportunities for investment in renewable energy among customer groups who previously would have been unable to fully utilize the state's solid net metering program. Most importantly, Delaware's renewable energy policies are finally aligned to bring significant investment in renewable energy to the state.

Features of Delaware's Programs

Delaware's net metering rules and interconnection procedures are among the best in the country and are poised to significantly expand the number of participating customers and renewable capacity in the state.

» **Simplified Interconnection Procedures** Within Delaware's interconnection procedures is a review process that is based on the complexity of the system under consideration. Smaller systems receive a fast track through the process using simplified, objective screening.

» **High System Size Limits**
High system size limits allow non-residential customers, which typically have larger loads, to install systems capable of meeting their entire energy needs if they so choose, resulting in installation of systems with a lower cost per-kW and allowing these systems to contribute to meeting the state's RPS goals.

» **Aggregate Net Metering**
Meter aggregation allows customers, such as farmers or universities who may have more than one meter on their property to combine net metering credits generated by a multiple renewable energy systems onto one meter to offset consumption at multiple meters, allowing for more cost effective systems.

» **Community Renewables**
Community renewables programs allow customers who are unable to host an on-site renewable energy system for various reasons to receive net metering credits from a renewable energy system located off-site. States adopting a community renewables program allow renters, homeowners with a shaded roof, and those residing in historic homes, for example, to invest in renewable energy resources as other utility customers do. This is fair given that, just as other utility customers, they are paying into renewable programs through their utility bills.

» **Third-party Ownership Allowed**
Under this scenario, customers interested in investing in renewable energy systems are allowed to contract with a third-party for the ownership and management of the system. This allows customers to avoid the large upfront costs of purchasing a system and allows customers to make the most efficient use of available incentives. Both of these benefits have made third-party ownership an increasingly important part of renewable energy development.

In Focus: Community Renewables—Expanding the Benefits of Net Metering

As interest in renewable energy continues to grow, states are seeking ways to expand access to renewable energy for customers interested in investing in greening their energy supply. Community renewables is an emerging vehicle by which renters, customers with shaded roofs, residents of multitenant properties and other customers that may not have an ideal location of their own for installation of renewables can invest in a renewable energy system and reap the benefits of net metering. In fact, a recent study by the National Renewable Energy Laboratory found that only 22-27% of residential rooftops by area are a good fit for hosting an on-site solar energy system. With less than a third of the potential residential market available to participate in on-site solar programs, other program options are going to be necessary in order for renewables to continue their breakneck pace of growth. Moreover, as a matter of equity, programs should be developed that allow all ratepayers to participate as they all contribute to the cost of the programs.

Community renewables programs are addressing these issues by removing the requirement that a system be located on a customer's site in order for the customer to net meter. In this sense, community renewables programs allow groups of customers to participate jointly in a single renewable energy system, such as a solar garden, and receive the benefits of their investment.

Moreover, community renewables programs are often coupled with meter aggregation to allow customers with multiple meters to more cost-effectively invest in renewable energy resources. The combination of these two program concepts has allowed net metering to expand out of its traditional function as a mechanism to efficiently offset onsite customer load at a single facility and into a policy that more fully enables all customers—and their varied situations—to participate in renewable energy programs to help their state reach its renewable energy goals.

States that are creating or that have implemented community renewables programs often have different variations on the idea to suit their states' specific policy goals. For example, while many municipal utilities have undertaken community solar initiatives in order to offer customer shares in a single, large

solar facility and the ability to gain credits based on the size of the share and the facility's output, they don't always offer the same types of programs. The Sacramento Municipal Utility District's (SMUD) Solar Shares program offers customers access to blocks of solar capacity for a fixed fee each month depending on the size of the system they choose.[1] Customers receive a net metering credit on their monthly bill based on the estimated production from the amount of capacity they've enrolled in under the program. Florida Key Electric Coop (FKEC) offers a similar program called Simple Solar.[2] However, under the FKEC's program, customers lease panels from FKEC and the customer's net metering credit is based on the actual production of the panel(s) they have leased.

One common feature between these two programs however, is that they use "virtual" net metering to distribute the benefits to participants. Net metering of system output under programs such as these is considered "virtual" because the renewable energy system is not directly connected to the participant's meter. Rather, credits are assigned to customer accounts as part of the billing process rather than having a physical meter that spins backward when production exceeds consumption. Aside from this feature, net metering of community renewables facilities operates similarly to onsite programs.

Programs differ in other ways including ownership of the community renewables facilities, the maximum system size that could be installed under the program, and the value given to the net metering credits produced by the system; all issues that must be handled carefully to insure program success. To assist with the development of successful community renewables programs that run smoothly, a number of resources have been designed for stakeholders to use while creating a program.

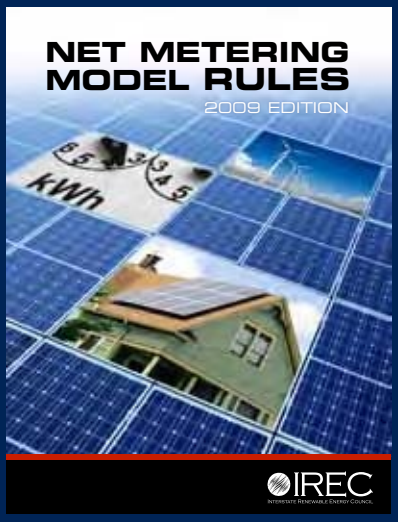
One of the most comprehensive resources is "A Guide to Community Solar: Utility, Private, and Non-profit Project Development" published by the U.S. Department of Energy.[3] This guidebook contains a host of information on community solar project models, state policies to support community solar, tax and legal issues and model rules developed by IREC. The guide was designed to assist stakeholders in developing community solar programs that meet each jurisdiction's diverse needs.

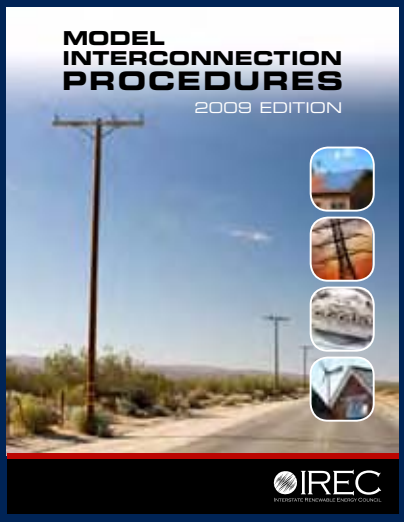
End Notes

1. See SMUD's Solar Shares website at: http://www.smud.org/en/community-environment/solar/pages/solarshares.aspx.

2. See FKEC's Simple Solar website at: http://www.fkec.com/Green/simplesolar.cfm

3. A Guide to Community Solar: Utility, Private, and Non-profit Project Development is available at: http://www.solaramericacommunities.energy.gov/pdfs/A_Guide_to_Community_Solar.pdf.


NET METERING
MODEL RULES
2009 EDITION
kWh
IREC


MODEL
INTERCONNECTION
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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

State	Total	Grade	System Capacity	Program Capacity	Rollover	Metering Issues	RECs	Eligible Tech	Eligible Customers	Aggregate Meters	Community Renewables	Safe Harbor	Rule Coverage	Retail Choice	PPA Treatment
Colorado	22	A	5	2.5	1.5	2	1	1	2	1	1	3	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
IREC model rules	24.5	A	5	2.5	1.5	4	1	1	2	1	1	3	1	0.5	1
Delaware	19.5	A	4	2.5	1.5	2	1	1	1	1	1	2	1	0.5	1
California	18.5	A	3.5	2	0.5	2.5	1	1	2	1	1	2.5	0.5	0	1
New Jersey	18.5	A	5	2.5	0.5	2	1	1	2	0	0	3	0	0.5	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
Maryland	17	A	5	2.5	0.5	0	1	1	2	0	0	3	1	0	1
Ohio	17	A	5	2.5	-1	2	1	1	2	0	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
Florida	16	A	5	2.5	0.5	2	1	1	2	0	0	3	0	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
Michigan	15.5	A	2	1	1	1.5	1	1	2	1	0	3	0.5	0.5	1
Rhode Island	14	B	5	2	-2	2	1	1	2	1	0	3	0	0	-1
New Hampshire	13	B	3	1	0	2	-1	1	2	0	0	3	1	0	1
New York	13	B	3	1	1	2	-1	1	1	1	0	3	0	?	1
Illinois	12.5	B	0	1	0.5	2	1	1	2	0.5	0	3	0	0.5	1
Nevada	12.5	B	3	1.5	1.5	2	-0.5	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
DC	12	B	3	2.5	0.5	2	-1	1	2	0	0	0	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

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

State	Total	Grade	System Capacity	Program Capacity	Rollover	Metering Issues	RECs	Eligible Tech	Eligible Customers	Aggregate Meters	Community Renewables	Safe Harbor	Rule Coverage	Retail Choice	PPA Treatment
Maine	12	B	2	1	0	2	1	1	2	1	–	0	1	0	1
Hawaii	11.5	B	2	2	0	2	-1	1	2	0	0	3	0.5	0	0
Indiana	11.5	B	3	1	1.5	1	-1	1	2	0	–	3	0	0	0
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
Minnesota	2	F	0	2.5	1	-0.5	-1	1	2	0	0	-5	1	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
Virginia	9	B	2	1	0.5	3	1	1	1	0	0	-2	0.5	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
Alaska	6	C	0	1.5	-1.5	2	-1	1	2	0	0	1	0	0	1
North Carolina	5.5	D	3	2.5	0	2	-3	1	2	0	0	-1	0	0	-1
Wisconsin	6.5	C	0	2.5	+1	1.5	-1	1	2	0	0	0	0.5	0	-1
North Dakota	3.5	D	1	2.5	-2	0	-1	1	2	0	0	0	0	0	0
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
Georgia	0	F	1	0	-2	2	-2	1	1	0	0	-1	1	0	-1
Idaho	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Mississippi	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Alabama	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
South Dakota	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Tennessee	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Texas	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Appendix A:

Interconnection

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.
Delaware	18.5	A	0	-0.5	1	-1	0.5	0	0.5	1	2	2	1.5	1	2	0	1
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
Virginia	16.5	A	0	0	1	0	1	0	-1	1	1	2	0.5	0.5	2	1	0
Utah	16	A	0	0	0	0	1	1	0.5	1	1	0	0.5	1	2	0.5	0
IREC model rules	21	A	0	0	1	1	1	1	1	0	1	2	1.5	1	2	1	0
New Jersey	14	B	-1	-1	0	1	1	1	1	1	0	2	0.5	1	0	0	0
Oregon	14	B	0	-0.5	0.5	1	0.5	1	0.5	1	1	1	-0.5	1	0	0	0
DC	13.5	B	0	-0.5	1	0	0.5	0	0.5	0	1	1	-0.5	0	2	0	1
Illinois	13.5	B	0	0	1	0	0.5	0	-1	0	1	3	-0.5	-1	2	0	1
Iowa	13.5	B	0	-0.5	1	-1	0.5	0	-1	0	1	3	-0.5	0.5	2	0	1
New York	13.5	B	0	-1	0	0.5	2	1	0.5	1	-2	1	1	1	2	0	-1
California	11.5	B	0	0	-1	0	3	1	0	1	-1	1	0	1	0	0	-1
Colorado	10.5	B	0	-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
Maryland	10	B	0	-0.5	1	-1	0.5	0	-2	1	-1	3	-0.5	0	2	1	-1
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	-0.5	1	-1	0.5	0	-1	0	1	2	-0.5	-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	-0.5	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
Pennsylvania	9	B	0	-1	1	-1	0.5	1	-2	0	-1	2	0	1	2	0	-1
Michigan	8	C	0	0	0	-1	1	0	0	0	-2	3	-0.5	0.5	0	0.5	-1
Vermont	8	C	0	0	1	0	1	0	-1	0	0	-1	-0.5	0	0	1	0
Florida	7.5	C	-1	-1	0	0	0	0	0.5	0	1	0	0	0.5	0	0	0

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

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.
Texas	7.5	C	0	-1	1	-1	1	0	-2	0	-2	3	0	1	1	0	-1
Montana	7	C	0	-0.5	0	0	-1	0	-2	0	1	2	-0.5	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	7.5	C	0	-0.5	1	-1	2	0.5	-1	0	-2	1	0.5	0	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
Minnesota	4	D	0	-0.5	-2	0	3	0	-2	0	-1	-2	0	-1	1	1	0
New Hampshire	4	D	0	-4	-2	-1	1	1	0.5	0	0	-1	0	1	0	1	0
Washington	3	D	0	0	-1	-1	0	0	-1.5	0	-2	1	-0.5	0.5	1	0	-1
Kentucky	0.5	F	-1	-4	-1	-1	3	0	-1	0	-1	-2	0	0.5	0	0.5	0
Hawaii	0	F	0	0	-1	-1	0	0	-2	0	-2	0	-1	0.5	0	0	-1
South Carolina	-5.5	F	0	-4	-2	-1	1	0	-2	0	-2	-2	-0.5	0.5	0	0	-1
Arizona	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Arkansas	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Georgia	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Idaho	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Kansas	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Louisiana	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Mississippi	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Missouri	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Nebraska	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
North Dakota	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Oklahoma	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Tennessee	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Wyoming	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Alabama	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Alaska	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

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.

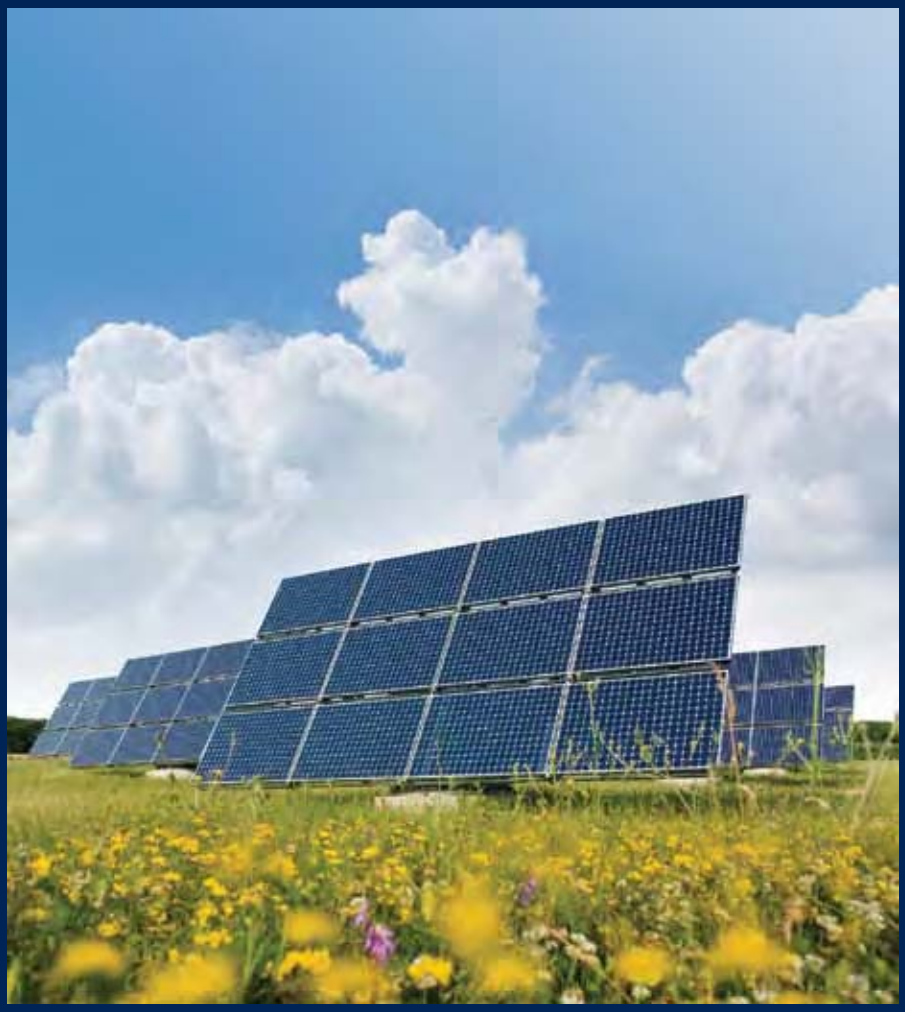
These standards are available at: http://www.irecusa.org/ICmodel09

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

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



About Us

Interstate Renewable Energy Council

www.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

America's energy problems — from economic crisis to global climate change — will only be solved by a national transition to renewables. Clean, homegrown, reliable solar energy is ready to play a large part of the solution. It is the fastest growing energy source in the world, but we have still just scratched the surface of solar's vast energy potential. In order to bring the technology to scale, we need to bring down costs. Vote Solar works to build the economies of scale necessary to bring solar into the mainstream.

The North Carolina Solar Center

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

www.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.

The Vote Solar Initiative

300 Brannan St, Suite 609
San Francisco, CA 94107
tel: 415 817 5062
info@votesolar.org
www.votesolar.org

Network for New Energy Choices

215 Lexington Avenue, Suite 1001
New York, NY 10016
tel: 212 726 9161 | fax: 212 726 9160
info@newenergychoices.org
www.newenergychoices.org