FREEING THE GRID

2007 EDITION

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FREEING THE GRID

2007 Edition

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Note: This report was prepared with the best information available at the time of printing. We welcome any new information as we strive to make each edition of Freeing the Grid as accurate and up-to-date as possible.

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FOREWORD BY MICHAEL DWORKIN

Since the 2006 edition of *Freeing the Grid*, there have been great strides in bringing more clean energy to the grid. Many states have taken the lead with reforming their clean energy policies and goals. But we are still far from conquering the "Energy Trilemma"—a world of energy strained by the three forces: financial stress, environmental constraints and security risks.

As a former rate-regulator, I know it is a tough situation when a utility comes to say, "We need to increase rates to cover new investments in transmission and distribution." So, when we have a chance to recruit and encourage folks who will install their own small, clean generation that serves its own load, the message is: "Many hands make lighter work; welcome to the task that we all face!"

In this 2007 edition, the Network for New Energy Choices teamed up with the Solar Alliance, the Vote Solar Initiative, and the Interstate Renewable Energy Council to bring the most up-to-date analysis of statewide interconnection standards and net-metering rules. These groups, in the forefront of the field, bring with them more than twenty-five years in institutional experience to draw on best policies and practices.

What are some of the key lessons of this edition?

- States are taking up the challenge of meeting our national needs; Colorado and Pennsylvania have joined New Jersey in the top ranks of net-metering rules.

- Interconnection standards and good net-metering policies are vital parts of a larger effort to supplement our current centralized, fossil-fired, electric grid with clean, secure, and cost-effective energy resources. States that have poor net-metering rules and interconnection standards are essentially telling the clean energy industry—with its great potential for job creation—that they are, "Closed for Business".

- States can take on the best practices, detailed within, to ensure success in fulfilling clean energy goals.

- Last, but certainly not least, to encourage, not discourage, small, clean, distributed investments that can help on all three fronts of our energy trilemma—finance, environment, and security.

As we think back on the past year, it is important to remember that each state still needs the tools offered here. So my message, to the legislatures and commissions, is: "Let's put these tools and lessons to work now."

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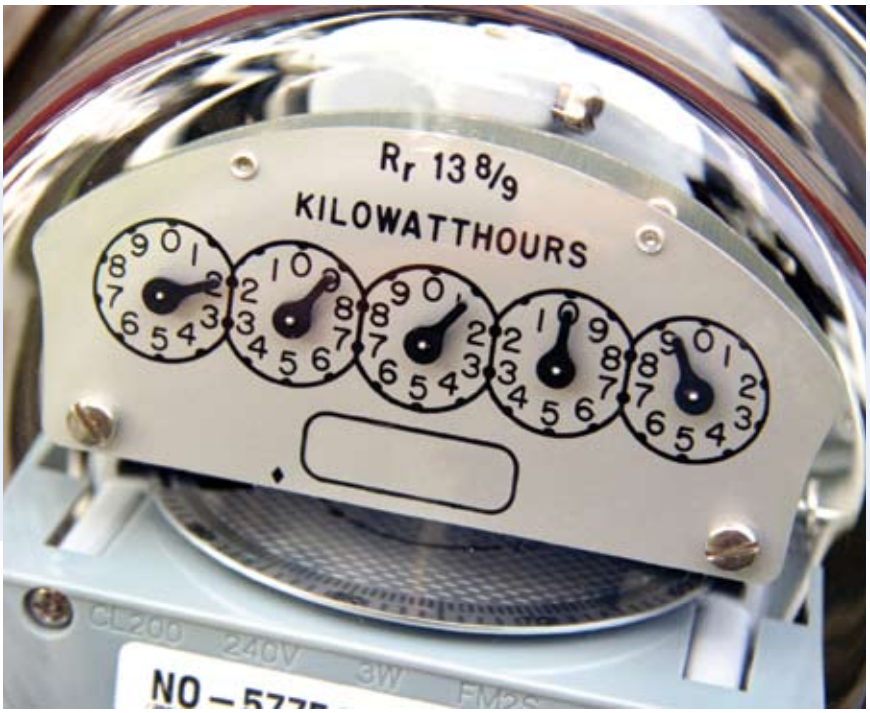

EXECUTIVE SUMMARY

U.S. consumers face a crisis at the electrical outlet that is every bit as significant as the crisis at the pump. When faced with the threat of a seventy-two percent increase in electricity rates, Maryland ratepayers protested, resulting in a more modest fifteen percent increase. Still that did little to curb demand once another increase hit in June 2007. Meanwhile utilities in the state are scrambling for millions of dollars for investment in efficiency and conservation measures, while at the same time Governor Martin O'Malley is vying for a fifteen percent reduction in electricity consumption statewide.[1]

States will be the Source for Innovative Energy Policies

Given the legal and financial complexities of the fragmented U.S. electricity industry, paired with a general lack of direction from the U.S. federal government, consumers are taking matters into their own hands. A record number of homeowners and small businesses are declaring their independence from utility monopolies by finding ways to meet their electricity needs more cheaply (and more cleanly) on their own. And more state governments are assuming control of their energy future by acting to encourage energy self-reliance.

For nearly twenty-five years, states have been the crucible for innovative policies to promote small-scale, renewable energy generation. There are two key policy issues that enable consumers to use the grid to achieve or advance their own energy self-reliance: interconnection and net metering.

Interconnection:

Each state regulates the process under which a generator can connect to the distribution grid. These policies seek to keep up the stability of the grid as well as the safety of those who use and maintain it.

However, if not implemented properly, these policies may pose a barrier to the development of customer-sited renewable energy and other forms of Distributed Generation (DG). Customers who seek to generate their own electricity—with a photovoltaic (PV) system or wind turbine, for example—and hook up to the grid must first go through this interconnection process.

Many customers encounter unworkable interconnection requirements employed by utilities. In some cases, the interconnection process is so lengthy, arduous and/or expensive that it thwarts the development of customer-sited generators—especially in the case of smaller systems.

Even so, a significant number of states have simplified and streamlined this process for the most standardized and robust small DG systems. Consumers considering renewables in states with well-crafted interconnection standards participate in a process that is transparent, equitable and scaled (i.e., complex studies are required only for large generators).

Net Metering:

Net metering has been described as "providing the most significant boost of any policy tool at any level of government…to decentralize and 'green' American energy sources."[2] By compensating customers for reducing demand and sharing excess electricity, net-metering programs are powerful, market-based incentives that states use to encourage energy independence.

As of September 2007, thirty-nine states had adopted statewide programs that established rules for compensating consumers who own grid-tied renewable-energy systems. These programs award owners of small, grid-tied renewables the same savings as one would expect from conserving energy on-site.

Lessons Learned

The federal Energy Policy Act of 2005 (EPAct 2005) requires state public utility commissions and certain "non-regulated" utilities to consider standards for net metering and interconnection. (In general, "non-regulated" utilities are those that are not subject to state regulatory jurisdiction and that have annual retail sales exceeding five-hundred million kilowatts per hour (kWh.) Section 1251 of EPAct 2005 requires states and "non-regulated" utilities to have commenced consideration of a net-metering standard on or before August 8, 2007, and to have made a determination regarding this standard on or before August 8, 2008. Section 1254 of EPAct requires states and "non-regulated" utilities to have commenced consideration of an interconnection standard based on the Institute for Electrical and Electronics Engineers' (IEEE) 1547 standard on or before August 8, 2006, and to have made a determination regarding this standard on or before August 8, 2007. Some states are still in the process of "considering" the federal net-metering standard.

Grading Net Metering and Interconnection:

The Interstate Renewable Energy Council (IREC) developed a methodology that the Network for New Energy Choices (NNEC) used to compare and grade existing statewide net-metering and interconnection policies according to the standards of an emerging national consensus on best practices. We have analyzed which states' programs are most effective and how states that have ineffective programs can adopt best practices to empower customers to generate their own clean energy.

STATE GRADES

NET METERING

STATE	Grade
IREC Model	**A**
New Jersey	A
Colorado	A
Pennsylvania	A
Maryland	A
California	A
Oregon	B
Delaware	B
Iowa	B
Nevada	B
Connecticut	B
Ohio	B
New Mexico	B
Arkansas	C
New Hampshire	C
Rhode Island	C
Hawaii	C
Maine	C
Louisiana	C
Virginia	C
North Dakota	C
Minnesota	C
Massachusetts	C
Montana	C
Vermont	C
Missouri	C
Washington	D
New York	D
Texas	D
Kentucky	D
Michigan	D
Wyoming	D
Oklahoma	D
Indiana	D
West Virginia	D
Utah	F
D.C.	F
Georgia	F
North Carolina	F
Wisconsin	F

INTERCONNECTION

STATE	Grade
IREC Model	**A**
New Jersey	B
Arizona	B
California	C
Ohio	C
Texas	C
New York	C
Colorado	C
Oregon*	C
Massachusetts	C
Georgia	C
New Mexico*	C
Vermont	C
Minnesota	C
Rhode Island	D
Wisconsin	D
West Virginia	D
Arkansas	D
New Hampshire	D
Virginia	D
Iowa	D
Maryland*	D
Montana	D
Michigan	D
Indiana	D
Pennsylvania	D
Connecticut	D
North Carolina	F
D.C.	F
Wyoming	F
Louisiana	F
Delaware	F
Hawaii	F
Utah	F
Washington	F
Missouri	F

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

NOTE: 7.5 points were added to normalize interconnection to net metering.

Details of the Grading and Scoring Methodology are located in the 'Our Scoring Methods' chapter.

* OR graded on June 2007 rules. Newly adopted rules appear to be a significant improvement.

* MD graded on workgroup report currently before the Commission; final rules have not yet been adopted.

* NM graded on existing rules. A consensus working group report is expected to significantly improve this grade.

By analyzing the components of effective and ineffective state policies, we have identified pitfalls in the rulemaking process and suggestions to overcome these pitfalls. Our analysis reveals some fundamental lessons for states considering how to improve their interconnection and net-metering policies.

Ineffective Programs Discourage Small-Scale Renewable Energy

Utilities inexperienced with customer-sited DG tend to oppose net metering, as utilities may see customer-sited DG as a potential safety or operational hazard to the grid, and/or as a threat to revenue.

Smart, forward-looking utilities should view every household and every small business as a potential contract generator that could contribute clean, renewable electricity to the grid, helping the utility ensure reliable electrical service in a market strained by rising demand.

Many policymakers are concerned with achieving a "balanced" outcome rather than the best outcome. Too often, the re-negotiation of existing successful frameworks has resulted in a number of common pitfalls that have rendered interconnection or net-metering regimes unworkable. These include:

- *Restricting eligibility to certain classes of customers*
  Technical concerns have nothing to do with a customer's sector. Many commercial customers have successfully tied renewable energy systems, in the megawatt (MW) level, to the grid.

- *Limiting the size of individual eligible renewable-energy systems*
  The size of a system should be determined by a customer's load and by the nature of the grid. In comparison, policymakers would never limit the amount of energy efficiency savings a customer could realize.

- *Preventing customers from receiving credit for excess electricity*
  Excessive limitations on excess generation and rollover credits could mean that a customer's system becomes a charitable donation machine for their utility as soon as the customer leaves the house.

- *Capping the total combined capacity of all customer-sited generators*
  Any comprehensive interconnection regime—using objective engineering criteria, not arbitrary limits—must ensure that participants do not strain the grid. Hard limits are incompatible with the aggressive renewable portfolio standards (RPS) embraced by many states.

- *Charging discriminatory or unclear fees and standby charges*
  Fees for interconnection should be reasonable and proportional to a system's size. In the case of net metering, it is unreasonable to charge customers for reducing their electrical demand and/or consumption from utilities.

- *Demanding unreasonable, opaque or redundant safety requirements, such as an external disconnect switch*

- *Creating an excessively prolonged or arbitrary process for system approval*

- *Requiring different technical provisions that vary by state to serve a distribution grid that is homogeneous nationwide*

- *Requiring unnecessary additional liability insurance*

- *Failing to promote the program to eligible consumers*

Efforts to protect the economic interests of one sector (electrical utilities) often harm other sectors (such as manufacturing).

Example: Indiana

Indiana's program does not allow net metering for commercial or industrial customers. Indiana utilities argued that these customers, who could generate a substantial amount of their electricity demand themselves, would represent too great of a revenue loss. As a result, with no option to net meter electricity use, Indiana's technology and manufacturing companies could suffer from higher operational costs that might limit their economic competitiveness.

Commissions that attempt to balance utility concerns with customer interests often undermine the intent of state legislators and adopt regulations that effectively destroy the program.

Effective Programs Open the Door for Renewable Energy Businesses

Several states have experienced extremely rapid growth in the number of net-metered energy systems installed. For example, California increased the limit on total customer participation in the state's net-metering program by a factor of five—from 0.5 percent to 2.5 percent of each investor-owned utility's peak demand.

What makes an effective net-metering program?

- Focusing on goals rather than interests
- Allowing monthly carryover of excess electricity
- Reducing unnecessary and burdensome red tape and special fees
- Protecting against oversized DG systems
- Encouraging substantive customer-sited deployment. Linking net metering to statewide RPS policies
- Implementing or expanding net metering as part of a comprehensive package of incentives to promote renewable energy
- Customer-sited DG should receive the same treatment as customer efficiency measures
- Ensuring customers receive credit at the utility's full retail rate.

What makes an effective interconnection program?

- Setting fair fees that are proportional to a project's size
- Allowing interconnected net-metered systems up to two megawatts (2-MW), and "screening" applications by degree of complexity
- Ensuring policies are transparent, uniform, detailed and public
- Adopting plug-and-play rules for residential-scale systems and expedited procedures for other systems
- Processing applications quickly
- Standardizing and simplifying forms

Example: New Jersey

In 2004, the New Jersey Board of Public Utilities (BPU) amended the state's net-metering rules, in part to help achieve the state's ambitious RPS. Jeanne Fox, president of the BPU, evaluated proposed changes with a singular focus: Do the changes encourage or impede the development of a statewide renewable energy industry? With this in mind, the state expanded the eligible customer classes, instituted fair credits for customer net excess generation (NEG) and at that time adopted the highest cap for individual net-metered systems in the United States. As a result, New Jersey has enjoyed the highest rate of enrollment of any state.

Simple Solutions: Model Regulations

Applying the lessons we have learned from thirty-nine statewide net-metering programs, IREC has crafted model interconnection standards and net-metering regulations for use by state utility commissioners. As states consider adopting or revising programs in 2008, these models provide an easy way to emulate effective programs and to avoid wasteful mistakes.

END NOTES

1. Adams, Paul (2007). *Tough to Unplug,* The Baltimore Sun. September 30. http://www.baltimoresun.com/business/bal-bz.power30sep30,0,5663745.story
2. Ferrey, Steven (2003). *Nothing but net: Renewable energy and the environment, MidAmerican legal fictions, and supremacy doctrine*, Duke Environmental Law & Policy Forum. 14:1-120.

INTRODUCTION TO THE SECOND EDITION

> **"It is one of the happy incidents of the federal system that a single courageous State may, if its citizens choose, serve as a laboratory; and try novel social and economic experiments without risk to the rest of the country"**
>
> *– Justice Louis Brandeis, 1932*

Since the initial publication of the Network for New Energy Choices' (NNEC) *Freeing to the Grid* report in 2006, the use of customer-sited DG has surged nationwide. Some state governments have embraced these new technologies as a means of encouraging in-state economic development, enhancing the security and operability of the electric grid, reducing air pollution and greenhouse-gas emissions, reducing price volatility in the power sector, and/or expanding customer control over energy use. In fact, a clear vanguard of best practices has emerged in the state arena—those that go beyond merely enabling customer-sited generation to encouraging it proactively.

A National Consensus is Emerging Around State Interconnection and Net-Metering Policies

As NNEC examined these policies and spoke with DG developers nationwide, we concluded that three major factors warranted a revision of the original *Freeing the Grid report:*

1. There is an increasing consensus on state-level best practices for net metering and interconnection standards. As states get serious about promoting renewable DG, they have developed integrated policies with significant similarities.

2. Because of the surging development of solar energy and other customer-sited renewable energy in the United States, reports detailing the number of installed systems only two years ago may reflect less than half the number of installed systems operating today.

3. It has become increasingly clear that well-crafted, simplified interconnection standards promote net metering and the broader deployment of customer-sited DG.

Accordingly, NNEC has reached out to some of the leading organizations in the field in order to develop a new methodology that highlights the salient *content* of net-metering policies—rather than the results of these policies, which are commonly influenced by an

array of other factors (including the presence of generous financial incentives). The new methods also addresses the significant components of interconnection standards.

We sincerely hope that this guide will serve as a resource for advocates and others seeking to implement winning policies without reinventing the wheel. The states acting as laboratories have come up with the answer; let's bring the answer into the world!

What Is Interconnection?

An interconnection standard is the set of rules under which a customer-generator interfaces with the electricity grid. Generally, the distribution utility must study and approve the generator within a framework established by the state utilities commission. Therein lies the conflict. Utilities have the authority to decide how many systems may connect to the grid, and under what circumstances. This situation can result in a significant barrier, because utilities either apply a set of complicated procedures—better suited to a two-gigawatt nuclear power plant—to a two-kilowatt (kW) residential solar generator, or impose steep fees, redundant safety requirements, or other preventative measures.

While the underlying engineering standards and requirements are well-known (generally, the Institute for Electrical and Electronics Engineers' (IEEE) 1547 standard covers all the bases), an engineering standard is not a complete procedure. A full procedure must address fees, timelines, insurance requirements and indemnification, forms and certain other issues, to provide a comprehensive procedure that supports investment in small generation—either by individuals or by project development investors.

Sunshine Solar Inc. INVOICE

Solar Panels (2,500 Watts)	$	11,700
Racks, Wiring, and Hardware	$	1,250
Inverter	$	1,950
Installation Labor	$	1,650
Redundant Disconnect + Labor	$	400
Interconnection Forms & Fees + Labor	$	1,000
Total Cost	$	17,950

Wherever the standard is unclear, or where redundant or unnecessary tests or steps are piled on the existing national standards, the results can be costly. The impact of these costs on small generators can be significant.

Consider the table above. Assume Ray McSolar purchases a 2.5-kW solar system—more expensive per watt than a larger solar roof, but enough for his needs. His state's interconnection rules force him to endure significant testing, pay extensive fees to the electric company, and install an external disconnect switch.

With $48.50 earned for electricity produced each month, he would have to run that system for more than two years just to pay off the red tape!

What Is Net Metering?

Imagine the simplest possible metering arrangement: a single, 1950s-standard electromechanical meter. Now imagine that a residential customer, Ray McSolar, added a rooftop photovoltaic (PV) system (also known as a solar-electric system) to his home, on his side of this meter. Ray wakes up pretty early for his job; on most days, he's up and out of the house before the sun rises. In these dark morning hours, Ray makes his coffee and breakfast while watching some morning news on the TV. In this case, the meter spins forward as Ray is consuming electricity from the grid.

As the sun rises, Ray heads off to work. Making sure not to waste a drop of electricity, he shuts off all his appliances. His meter spins in reverse as the solar panels churn out electricity—electricity Ray sends back to the overstressed grid. When Ray returns at night to cook dinner and relax in front of the TV, the meter spins forward again while he consumes electricity.

The result? Ray benefits because his bill will only show his net consumption of electricity from the grid. Should it be a hot sunny month (the sort of months when the grid needs the most help), or a month in which Ray's electricity use is low, he can carry any excess electricity his system generated to the next bill, just as he might roll over excess cell phone minutes.

The result of net metering is to allow for the production of electricity that a strained grid did not have to produce. This is, in fact, exactly the same result Ray would get if he had installed a more efficient refrigerator. The only way his utility would know the difference between the use of more efficient technologies (like that refrigerator) and the use of on-site generation (such as a PV system) is if the utility installed a costly additional meter at Ray's home and undertook the burden and expenses of reading both meters and billing Ray for the results.

In effect, net metering is the simplest possible billing arrangement for customer-sited DG. Without exception, significant deployment of clean, customer-sited DG occurs only in states with modern interconnection and net-metering policies.

Interconnection and Net Metering: *What's the Difference?*

Interconnection – the technical rules for 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.

For over two decades, states have served as the crucible for innovative policies to promote small-scale renewable energy. Some states have seen remarkable success. Others have failed.

Metrics of Success

A Standard Policy Framework

Most states that have revised their interconnection and net-metering policies have done so in pursuit of the same goals:

- To encourage greater renewable-energy generation
- To promote customer-sited DG
- To reduce demand on an ever increasingly strained grid
- To reward investment in renewable technologies
- To facilitate energy self-reliance
- To improve air quality and public health
- To promote in-state economic development

Across the board, the most successful states share certain policy provisions; others seeking to duplicate their success have created substantially identical systems. The result is a clear emerging consensus on best practices in many states and a patchwork of ineffective and heterogeneous rules in others.

One significant lesson that becomes clear upon reviewing the wide variety of existing standards is that inconsistency is the enemy of development. Successful interconnection and net-metering policies must support the development of hundreds of small generators. It is entirely possible to stymie the development of these technologies by allowing one or more counterproductive provisions to link into the process of policy development.

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. Innovation and customer choice flourish in the marketplace, and the use of one consistent engineering standard ensures safe and practical daily application.

Increasingly, several states—as well as the Federal Energy Regulatory Commission (FERC)—are approaching a consensus on just this type of standard for interconnection. The vast majority of state and federal interconnection standards are based on consensus safety and engineering standards from the Institute of Electrical and Electronics Engineers (IEEE) and Underwriter's Laboratories (UL).

It is important to note that utility interests have had strong, expert representation throughout state and federal proceedings. The best of the standards cited here have already been negotiated with strong utility representation; there is no need to renegotiate these provisions in dozens of regulatory arenas.

OUR SCORING METHODS

In our evaluation of statewide interconnection and net-metering programs, we developed an index that rewards program elements that promote participation, expand renewable energy generation, or otherwise advance the goals sought by net metering. Conversely, the index assigns demerits to program components that discourage participation or limit renewable energy generation.

We measured program components and assigned numerical values to each component. Negative values represent factors that undermine the effectiveness of the net-metering program. Positive values represent additional incentives that contribute to program effectiveness.

Applying these numerical values to program components allows us to separately plot the effectiveness of each interconnection and net-metering program, and to assign a letter grade to each.

An analysis of the provisions of many state programs demonstrates a distinctive distribution: perhaps a dozen "best practices" states where the framework is more or less standardized and small-scale generation is already flourishing or about to begin surging; a large undifferentiated middle where development is limited; and a few states where customer-sited DG is actively discouraged or impossible outside of isolated demonstration projects.

Policy Points: Net Metering

Individual System Capacity

In certain cases, statutory limitations on the size of eligible technologies prevent customer-generators from correctly sizing a system to meet their own demand.

Uniform size limits reduce regulatory confusion while promoting the broadest population of renewable energy generating systems. Increasing the eligible facility size for non-residential systems also could encourage participation in net-metering programs by large investors. It is no longer uncommon to see renewable energy systems in the 100-kW to 2-MW range. Several project developers in Oregon, for example, argued that the transactional cost of systems less than 100-kW are too great to interest large investment partners.[1]

There is no policy justification for limiting system size to an arbitrary level. Customer load and demand should determine the system design parameters. It is simple to prevent "oversizing" without recourse to arbitrary distinctions that may exclude the most cost-effective projects.

While the most progressive state standards embrace this concept, many are converging on a consensus level of 2-MW.

Points	System Capacity
+5	Greater than 1-MW
+4	Between 750-kW and 1-MW
+3	Between 500-kW and 750-kW
+2	Between 100-kW and 500-kW
+1	Between 50-kW and 100-kW
0	Not greater than 50-kW
-1	Residential systems capped below 20-kW
Notes	Some permit up to 80 MW on very large loads (such as a military base or corporate headquarters campus)

Total Program Capacity Limits

In a nod to utility concerns that on-site generation represents lost revenues (an intuitive but short-sighted view of the arrangement), many states have limited the total capacity eligible for net metering either statewide or for any given utility.

It makes little sense to limit the total amount of clean energy that customers may generate and contribute to the electricity grid. Capacity limits artificially restrict the expansion of on-site renewable generation and curtail the market for new renewable energy DG systems. They may also prove incompatible with aggressive targets for renewable energy deployment set by several states.

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, based on a percentage of a utility's service territory's peak demand, create uncertainty for new 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.[2] This regulatory uncertainty inhibits renewable energy investment.

Points	Total Program Limit as Percentage of Peak Demand
+2.5	> 5% or no limit
+2	Between 2% and 5%
+1.5	Between 1% and 2%
+1	Between 0.5% and 1%
+0.5	Between 0.2% and 0.5%
0	Between 0.1% and 0.2%
-0.5	Less than 0.1%
Bonus +1	For excluding generators that don't export electricity, or measuring basing measurement on energy produced instead of total capacity.

Restrictions on "Rollover"

When customers generate more electricity during a monthly billing period than they consume, some states allow customers to "roll over" the excess generation. The utility carries forward any excess generation until it is used up. Some of the least effective programs allow zero rollover, granting the utility excess electricity generated by customers each month. In these states, customers undersize their system so that the system produces less energy than the customer's monthly minimum load. Other states limit the time over which rollover can be used.

Restricting rollover to a single month is more a function of utility billing cycles than public policy. In fact, it is very easy for the administrative costs associated with paying for small amounts of excess generation (withdrawing bills, hand-billing, etc.) to overwhelm any saved revenue for the utility. To be successful, a net-metering program must facilitate rollover so that customer-generators can receive credit for excess energy generated during the seasons when renewable output is highest and apply it toward their consumption when output is lowest, striving towards a zero bill.

In the worst possible case, a so-called net-metering tariff could actually require customers to pay utility transmission and distribution fees even on generation they never rolled over, in effect paying the utility a fee in exchange for not using their services.

Remember Ray McSolar and his 1950s meter? That's the best implementation of rollover — to read this kind of meter annually would provide the lowest administrative cost and best equity for the customer.

Points	Rollover Provisions
+1.5	Indefinite rollover at retail rates.
+1	Monthly rollover for one year, annual payment at retail rates (It is key to limit payout in this case so that customers do not oversize their generator beyond their own needs. Indefinite rollover is easier.)
+0.5	Monthly rollover for one year; annual payment at wholesale or avoided cost
0	Monthly rollover for one year; excess energy donated to utility annually
-2	Monthly payment at wholesale or avoided cost
-4	No rollover permitted; excess energy donated to utility monthly

Metering Issues

Requiring customer-generators to pay for additional meters adds no value to the customer-generator or the utility. Once again, if a customer could save twenty percent of their usage with a better air conditioner, would it be reasonable to meter the savings and compensate them differently?

Some states compel customers that choose to net meter to switch to a time-of-use (TOU) rate, where they pay differing amounts depending on the time of day. This can either reflect the reality of the grid (and reward generators who produce during constrained peaks) or disadvantage customers by having a fixed TOU rate.

Points	Metering Provisions
+2	Single meter
+1	Dual meters or dual registers – utility pays for the additional meter
0	Dual meters or dual registers – customer pays for the additional meter
	Metering Provisions Under Time of Use
+2	TOU meters with time bin carryover
+1	TOU meters with segregated time periods
-1	Fixed TOU rate disadvantages small generators

Renewable Energy Credit Ownership

Customer–generators that install renewable resources have done so with their own investment of money and effort. Often these customer-generators qualify for renewable-energy credits (RECs) that can be used for marketing purposes or to meet legal renewable energy targets. Utilities that have simply permitted these customer-generators to reduce their net usage from the grid should not be permitted to seize these credits without paying for them.

Points	REC Ownership
+1	Owned by customer
-5	Transferred to utility

Eligible Technologies

In accordance with appropriate interconnection standards, there is no reason to exclude any type of renewable customer-generators from net metering; some states even permit non-renewable generators to address particular local power concerns.[3]

Points	Eligible Technologies
+1	All renewable and zero-emission technologies
+0.5	Solar and wind included, one or more other renewables excluded
+0.5	All renewables, plus one or more non-renewable technologies
0	Solar only
-0.5	Solar excluded from standard

Eligible Customers

Some state net-metering rules restrict the customer classes that are eligible to participate. Some state rules exclude commercial customers who may have the most substantial effect on reducing demand on the strained grid, and who often enjoy the lowest costs for installed systems.

The Texas State Energy Conservation Office has noted, "It would make more sense to limit the eligibility of a technology for a period of time, say five or ten years, in order to give the technology a period in which it has the opportunity to become commercially viable, than to limit the size of the initial market, when the goal is creating a critical mass of market demand."[4]

Allowing commercial and industrial customers to be eligible for net metering is essential to jump-starting new renewable energy markets.

Points	Eligible Classes
+2	No eligible class restrictions
+1	Commercial at overall net-metering limits, and residential larger than 10-kW permitted
0	Residential only, larger than 10-kW permitted
0	Commercial only
-1	All other restrictions

Bonuses for additional net-metering provisions

Points	Reason for Bonus
+1	One customer can aggregate net meter within contiguous property
+1	Utility provides a meter change if needed at utility cost
+3	"Safe harbor language" protects customers from unspecified additional equipment, fees, requirements to change tariffs, etc

Standby Charges or Other Fees

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

Standby charges are illogical. Some researchers have noted that they are "analogous to assigning standby fees to residential customers who purchase high efficiency air conditioning units,"[5] 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. Utilities only need to provide a negligible amount of back-up power for these customers. Nevertheless, standby fees may be so costly that they diminish most, if not all, of the economic incentive net metering was intended to offer smaller generators.

There are a variety of other idiosyncratic fees and charges that can render net metering unworkable.

Points	Fees
-1	Minor additional fees for net metering
-5	Significant additional charges or fees[6]
-5	Per kWh fee on all production (in addition to other fees)[7]

Policy Points: Interconnection

Eligible Technologies

While public policy may suggest an emphasis on 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 it interconnection.

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

Individual System Capacity

Technical standards can and should become significantly more stringent as system sizes increase. However, they should also permit systems that are sized to meet even large onsite loads. Office parks, prisons, or college campuses can potentially accommodate installations of 2-MW or more just to serve a portion of native load, and increasingly, forward-thinking states facilitate this option.

Points	System Capacity
0	Generators from 2-MW to 20-MW permitted
-1	1-MW to 2-MW
-2	500-kW to 1-MW
-3	100-kW to 500-kW
-4	Less than 100-kW
Notes	Larger generators generally fall under federal jurisdiction and do not need to be considered here.

"Breakpoints" for Interconnection Process

Many technical considerations and studies become 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 fragment applicants at four breakpoints: 10-kW, 2-MW, 10-MW (non-export), and 20-MW.

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

Timelines

Time is money, and for a device like a rooftop solar generator, (where physical installation may take just two working days) paperwork and permits represent the single largest obstacle to quick installation.

The Federal Energy Regulatory Commission (FERC) adopted a model interconnection standard (Order 2006) establishing a timeline for the application process, for each type of generator. There is room for improvement, 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 the application with small generators using pre-certified equipment.

Points	Timelines
+1	Timelines Quicker than FERC's
0	Timelines the Same as FERC's
-1	Timelines Longer than FERC's

Interconnection Charges

Interconnection processing and study fees can easily add up to "death by a thousand cuts." Fees of $100 here and $250 there quickly add up for small systems. What's more, uncapped or unknown fees can make it impossible to obtain financing for larger projects, as their total cost may be under the control of a hostile utility.

Again, we refer to the FERC process, which established reasonable fee levels through an extensive compromise and negotiation process.

Points	Fees
+1	Fees lower than FERC's
0	Fees the same as FERC's
-1	Fees greater than FERC's

Engineering Charges

An interconnection standard may require engineering review; where it does, it is key that the fees associated with that review are known beforehand.

Points	Fees
+1	Engineering Fees Fixed
0	Engineering Fees Not Fixed

External Disconnect Switch

In theory, a customer-generator presents a safety hazard if the grid goes down and an interconnected 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 to require that net metered customers install and test external disconnect switches on any interconnected system. However, the practical effect is that, like hidden interconnection fees, requiring additional external disconnect switches only adds unnecessary costs and discourages customers from investing in renewable energy systems.[8]

It is important to note that not one accident resulting from the islanding of net metered renewable energy systems has been reported.[9] 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.[10] 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 worker is following proper protocol, none of the levels of safety preceding an external disconnect switch will ever be needed, much less the switch itself.[11]

Requiring additional external disconnect switches is made unnecessary since all inverters that meet IEEE standards have automatic shut-off capabilities integrated within the system.[12] In the event of a grid failure, all modern inverters shut down interconnected systems automatically.[13]

Points	Requirement
+1	Redundant External Disconnect Switch Prohibited
0	Redundant External Disconnect Switch Not Addressed
-1	Redundant External Disconnect at Utility's Discretion
-2	Redundant External Disconnect Switch Required

Certification

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.

The relevant standards have been developed jointly by utilities, equipment manufacturers, national laboratories and testing facilities, and governmental representatives.

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 impact the safety and security of the grid. Still others have added idiosyncratic or unspecified "blanket" clauses that introduce uncertainties. Potential purchasers or investors in these systems do not know when such a clause might arise to disqualify them.

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

Technical Screens

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 the generator connects and the ratings of the protective equipment installed. These factors determine how complex the interconnection process needs to be.

FERC Order 2006 provides a thorough set of technical screens that have been copied by many jurisdictions; any significant revision of these guidelines introduces difficulties to the process (and may increase system expense, as configurations or programming must be changed to differ from these widely-used benchmarks).

Points	Screen
0	FERC screens used
-1	Partial adoption of screens
-2	No screens used or utility discretion
Penalties:	Used more conservative screen than FERC = -1 for each
Bonus:	Dropped one or more FERC screens that do not affect safety or used more liberal screen element that does not affect safety = +1 for each

Spot Network Interconnection / Area Network Interconnection

A "spot network" might be 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 networks are designed to increase reliability by creating more potential paths from generation to load. However, the types of systems that can be connected are usually restricted, as these networks are much less tolerant of any export.

Some jurisdictions extended the concern about export to ban these types of interconnections completely. However, the very area networks that jurisdictions aim to protect are those most in need of the relief that DG—or distributed generation—can bring. A more appropriate approach would be to create more stringent technical standards for these types of systems, or simply require that they install specified high-speed equipment that disconnects systems in case of any outage.

Spot Network Interconnection

Points	Terms
+1	Allowed for all systems with a single customer, or systems above 50-kW allowed
0	Allowed, but limited to 50-kW
-1	Not allowed
Bonus:	Separate standards for one customer vs. multi-customer spot networks – with single customer more liberal than FERC standard = +1
Bonus:	Systems allowed provided they install high-speed network protectors = +1

Area Network Interconnection

Points	Terms
+1	Allowed for systems 500-kW or greater and 10% minimum load
0	Not addressed or allowed but at utility discretion or only after study
-1	Not allowed
Bonus:	Allowed for systems that do not export power = +1

Standard Form Agreement

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.

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

Insurance Requirements

Because of potential personal injury and property damage liability risks associated with interconnection, many states allow utilities to impose liability insurance requirements on customer-generators. Some states want customer-generators to carry $100,000 or more in coverage to protect utilities from being held financially responsible for problems caused by interconnected systems.

However, to our knowledge there has never been a documented case of a small-scale net metered system causing electrical failure or creating potential personal injury or property damage liabilities for a utility.[14] Renewable energy technologies manufactured and installed in compliance with interconnection standards significantly reduce the risk of potential safety issues.[15] Product liability insurance carried by equipment manufacturers, as well as the ability of these manufacturers to indemnify customers or utilities, further negates the need for additional insurance.[16]

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

Points	Requirements
+1	Insurance requirements prohibited
+0.5	Insurance required, but not more than typical customer would carry
0	Not addressed
-2	Additional insurance required

Dispute Resolution

Inevitably, some requests for interconnection will result in disputes. The best standards provide a low-cost means of accessing an expert judgment (for instance, through a telephone call to a technical master employed by the state utility commission). Others are more administratively burdensome or complex.

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.

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

Miscellaneous

- Adverse system impact check needed on 2-MW expedited interconnections = -1 (This study addresses the potential impact of a customer-generator on the transmission network. It should not be applied to very small generators.)

- Certificate of completion required without addressing local code official refusal = -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 do so, delaying or complicating the process.)

- Interconnection process is significantly different from FERC standards = -1 (The overall framework of the FERC process is well-understood and should be the basic underpinning of any standard.)

END NOTES

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2. Pacific Gas and Electric Company, Generator Interconnection Services Department. (2006) *Pacific Gas and Electric Company's Position on the Net Energy Metering Enrollment Cap*.
3. Non-renewable technologies are usually limited to clean burning fuels, such as, combined heat and power (CHP) using natural gas and landfill gas. More polluting generators, like those that run on diesel fuel, are generally not allowed to participate in net-metering programs.
4. Texas State Energy Conservation Office. (2002) *An Analysis Working Paper on Net Metering as an Incentive for Fuel Cell Applications*. September 10, 2002. http://www.seco.cpa.state.tx.us/zzz_feulcell-initiative/fciac_incen_netmeter.pdf
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6. The fees here are typically a one time fee or flat monthly fee as differentiated from the much more problematic on-going per kWh production fee.
7. A per kWh charge effectively undoes net metering, will be administratively burdensome and requires more expensive metering than simple net metering thus resulting in the significant negative score.
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15. ibid
16. Starrs, Thomas J. and Robert K. Harmon. (2000) *Allocating Risks: An Analysis of Insurance Requirements for Small-Scale PV Systems*. http://www.puc.state.pa.us/electric/pdf/NMIC_SunEdison_Comments_Att3.pdf

GRADING

Net Metering

A Full retail credit with no subtractions. Customers protected from fees and additional charges. Rules encourage use of Distributed Generation (DG).

B Generally good net-metering rules with full retail credit but there may be certain fees or costs that detract from full retail equivalent value. There may be some obstacles to obtaining net metering.

C Adequate net-metering rules, but there may be some significant fees or other obstacles that undercut the value or make the process of net metering more difficult.

D Poor net metering with substantial charges or other hindrances. Many customers will forgo an opportunity to install DG because net-metering rules subtract substantial economic value from the DG system operation.

F Net-metering rules that hamper customer use of DG.

Interconnection

A No restrictions on interconnection of distributed generation that meet safety standards. Rules "encourage" customer-generator interconnection and represent most or all state best practices.

B Good interconnection rules that incorporate many best practices adopted by states. Few to no customer-generators will be blocked by interconnection barriers. There may remain some defects in the rules, such as, lack of standardized interconnection agreements and expedited interconnection to networks.

C Adequate for interconnection although generators incur higher fees and longer delays than necessary. There are likely a few generators that will be precluded from interconnection because of remaining barriers in the interconnection rules.

D Poor interconnection rules that leave many needless barriers to interconnection in place. A few state best practices included but many best practices options excluded. A significant number of generators will experience delays and high fees to be interconnected and a sizable percentage may be blocked from using DG because of these rules.

F Interconnection rules retain 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 rules.

DSIRE

Note: The following grade cards contain summaries of state's net-metering policies and interconnection standards, using information from the Database of State Incentives for Renewables & Efficiency (DSIRE). For further information and updates on state net-metering policies and interconnection standards, visit the DSIRE website: www.dsireusa.org

ARIZONA

NET METERING	n/a
Eligible Renewable/Other Technologies:	
Applicable Sectors:	
Limit on System Size:	
Limit on Overall Enrollment:	
Treatment of Net Excess:	
Utilities Involved:	

INTERCONNECTION	B
Eligible Renewable/Other Technologies:	**Solar Thermal Electric, Photovoltaics (PV), Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, Combined Heat and Power (CHP)/Cogeneration, Microturbines, other Distributed Generation (DG) Technologies**
Applicable Sectors:	**Commercial, Industrial, Residential**
Special Rules for Net-Metered Systems:	**No**
Limit on System Size/Overall Enrollment:	**No**
Standard Interconnection Agreement:	**No (varies by utility)**
Additional Insurance Requirements:	**Varies by utility**
External Disconnect Required:	**No**

ARKANSAS

NET METERING	C
Eligible Renewable/Other Technologies:	**Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, Microturbines using renewable fuels**
Applicable Sectors:	**Commercial, Industrial, Residential, General Public/Consumer, Nonprofit, Schools, Local Government, State Government, Federal Government, Agricultural, Institutional**
Limit on System Size:	**25-kW for residential systems; 300-kW for commercial systems**
Limit on Overall Enrollment:	**None**
Treatment of Net Excess:	**Credited at retail rate to customer's next bill; granted to utility at end of 12-month billing cycle**
Utilities Involved:	**All utilities**

INTERCONNECTION	D
Eligible Renewable/Other Technologies:	**Photovoltaics, Wind, Biomass, Hydroelectric, Fuel Cells, Microturbines**
Applicable Sectors:	**Commercial, Industrial, Residential, General Public/Consumer, Nonprofit, Schools, Local Government, State Government, Federal Government, Agricultural, Institutional**
Special Rules for Net-Metered Systems:	**Yes**
Limit on System Size/Overall Enrollment:	**25-kW (residential); 300-kW (commercial or agricultural)**
Standard Interconnection Agreement:	**Yes**
Additional Insurance Requirements:	**None specified**
External Disconnect Required:	**Yes (except for systems with inverters compliant with IEEE 1547)**

CALIFORNIA

NET METERING	A
Eligible Renewable/Other Technologies:	**Photovoltaics, Landfill Gas, Wind, Fuel Cells, Anaerobic Digestion — - –**
Applicable Sectors:	**Commercial, Industrial, Residential**
Limit on System Size:	**1-MW (10-MW for as many as three biogas digesters)**
Limit on Overall Enrollment:	**2.5% of a utility's peak demand; statewide limit of 50-MW for biogas digesters**
Treatment of Net Excess:	**Credited to customer's next bill; granted to utility at end of 12-month billing cycle**
Utilities Involved:	**All utilities (solar and wind); Investor Owned Utilities (IOUs), (biogas and fuel cells)**

INTERCONNECTION	C
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 (DG) Technologies**
Applicable Sectors:	**Commercial, Industrial, Residential**
Special Rules for Net-Metered Systems:	**Yes**
Limit on System Size/Overall Enrollment:	**No limit specified for DG; up to 10-kW for simplified rules / No limit specified for aggregate DG capacity; aggregate net-metered capacity limited to 2.5% of utility peak**
Standard Interconnection Agreement:	**Yes**
Additional Insurance Requirements:	**No**
External Disconnect Required:	**Yes, for systems > 1-kW**

COLORADO

NET METERING	A
Eligible Renewable/Other Technologies:	**Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Anaerobic Digestion, Small Hydroelectric, Fuel Cells using Renewable Fuels**
Applicable Sectors:	**Commercial, Industrial, Residential, (customers of utilities with 40,000 or more customers)**
Limit on System Size:	**2-MW**
Limit on Overall Enrollment:	**None**
Treatment of Net Excess:	**Credited to customer's next bill; utility pays customer at end of calendar year for excess kWh credits at the average hourly incremental cost for that year**
Utilities Involved:	**Utilities serving 40,000 or more customers**

INTERCONNECTION	C
Eligible Renewable/Other Technologies:	**Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, CHP/Cogeneration, Anaerobic Digestion, Fuel Cells using Renewable Fuels, Microturbines, other Distributed Generation Technologies**
Applicable Sectors:	**Commercial, Industrial, Residential, Nonprofit, Schools, Utility, Agricultural, Institutional**
Special Rules for Net-Metered Systems:	**No**
Limit on System Size/Overall Enrollment:	**Individual systems limited to 10-MW / No overall limit on enrollment**
Standard Interconnection Agreement:	**Yes**
Additional Insurance Requirements:	**No**
External Disconnect Required:	**No**

CONNECTICUT

NET METERING	B
Eligible Renewable/Other Technologies:	**Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Fuel Cells, Municipal Solid Waste, Small Hydroelectric, Tidal Energy, Wave Energy, Ocean Thermal**
Applicable Sectors:	**Commercial, Industrial, Residential, General Public/Consumer, Nonprofit, Schools, Local Government, State Government, Federal Government, Multi-Family Residential, Agricultural, Institutional**
Limit on System Size:	**2-MW**
Limit on Overall Enrollment:	**None stated**
Treatment of Net Excess:	**Credited to customer's next bill at retail rate; purchased by utility at avoided-cost rate at end of 12-month billing cycle**
Utilities Involved:	**Investor-owned utilities ("electric distribution companies providing standard offer, transitional standard offer, standard service or back-up electric generation service")**

INTERCONNECTION	D
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, Federal Government**
Special Rules for Net-Metered Systems:	**Yes**
Limit on System Size/Overall Enrollment:	**100-kW for net-metered systems; 25-MW for non-net-metered DG (revisions under development)**
Standard Interconnection Agreement:	**Yes**
Additional Insurance Requirements:	**Yes**
External Disconnect Required:	**Yes**

D.C.

NET METERING	F
Eligible Renewable/Other Technologies:	**Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, CHP/Cogeneration, Anaerobic Digestion, Tidal Energy, Microturbines**
Applicable Sectors:	**Commercial, Industrial, Residential**
Limit on System Size:	**100-kW**
Limit on Overall Enrollment:	**None**
Treatment of Net Excess:	**Credited to customer's next bill at utility's retail rate**
Utilities Involved:	**All utilities**

INTERCONNECTION	F
Eligible Renewable/Other Technologies:	**Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Fuel Cells, Municipal Solid Waste, Microturbines**
Applicable Sectors:	**Commercial, Industrial, Residential, Local Government, State Government, Federal Government**
Special Rules for Net-Metered Systems:	**Yes**
Limit on System Size/Overall Enrollment:	**100-kW**
Standard Interconnection Agreement:	**Yes (Pepco)**
Additional Insurance Requirements:	**No (Pepco)**
External Disconnect Required:	**No**

DELAWARE

NET METERING	B
Eligible Renewable/Other Technologies:	**Photovoltaics, Wind, Biomass, Hydroelectric, Fuel Cells using Renewable Fuels**
Applicable Sectors:	**Commercial, Industrial, Residential, General Public/Consumer, Nonprofit, Schools, Local Government, State Government, Federal Government, Agricultural, Institutional**
Limit on System Size:	**Residential: 25-kW; Non-residential customers of DP&L: 2-MW; Non-residential customers of Delaware Electronic Cooperative (DEC) and municipal utilities: 500-kW**
Limit on Overall Enrollment:	**1% (utilities may allow a higher limit or no limit)**
Treatment of Net Excess:	**Credited to customer's next bill at retail rate; at end of 12-month period, any remaining NEG is granted at the utility's avoided-cost rate to Delaware's Green Energy Fund**
Utilities Involved:	**All utilities (applies to electric cooperatives only if they opt to compete outside their service territories)**

INTERCONNECTION	F
Eligible Renewable/Other Technologies:	**Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, other Distributed Generation Technologies**
Applicable Sectors:	**Commercial, Residential**
Special Rules for Net-Metered Systems:	**Yes**
Limit on System Size/Overall Enrollment:	**1-MW (Delmarva); None (DEC) / Overall enrollment not specified**
Standard Interconnection Agreement:	**Yes (Delmarva)**
Additional Insurance Requirements:	**Yes (DEC): at least $1 million in liability insurance and $1 million in property-loss insurance**
External Disconnect Required:	**Required for systems between 25-W and 1-MW**

GEORGIA

NET METERING	F
Eligible Renewable/Other Technologies:	**Photovoltaics, Wind, Fuel Cells**
Applicable Sectors:	**Commercial, Industrial, Residential**
Limit on System Size:	**10-kW for residential systems; 100-kW for commercial systems**
Limit on Overall Enrollment:	**0.2% of a utility's annual peak demand during the previous year**
Treatment of Net Excess:	**Credited to customer's next bill; granted to utility at end of 12-month billing cycle**
Utilities Involved:	**All utilities**

INTERCONNECTION	C
Eligible Renewable/Other Technologies:	**Photovoltaics, Wind, Fuel Cells**
Applicable Sectors:	**Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Federal Government**
Special Rules for Net-Metered Systems:	**Yes**
Limit on System Size/Overall Enrollment:	**10-kW (residential), 100-kW (commercial) / 0.2% of utility's peak load for previous year**
Standard Interconnection Agreement:	**No (contact Georgia Power)**
Additional Insurance Requirements:	**None**
External Disconnect Required:	**Not specified**

HAWAII

NET METERING	C
Eligible Renewable/Other Technologies:	**Photovoltaics, Wind, Biomass, Hydroelectric**
Applicable Sectors:	**Commercial, Residential, Local Government, State Government, Federal Government**
Limit on System Size:	**50-kW (increase under consideration)**
Limit on Overall Enrollment:	**0.5% of a utility's peak demand**
Treatment of Net Excess:	**Credited to customer's next bill; granted to utility at end of 12-month billing cycle**
Utilities Involved:	**All utilities**

INTERCONNECTION	F
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, Federal Government**
Special Rules for Net-Metered Systems:	**Yes**
Limit on System Size/Overall Enrollment:	**Net metering limited to 0.5% of utility peak demand**
Standard Interconnection Agreement:	**Yes**
Additional Insurance Requirements:	**Yes (subject to change)**
External Disconnect Required:	**Yes**

INDIANA

NET METERING	D
Eligible Renewable/Other Technologies:	**Photovoltaics, Wind, Small Hydroelectric**
Applicable Sectors:	**Residential, Schools**
Limit on System Size:	**10-kW**
Limit on Overall Enrollment:	**0.1% of a utility's most recent peak summer load (utilities may impose this limit at their discretion)**
Treatment of Net Excess:	**Credited to customer's next bill**
Utilities Involved:	**Investor-owned utilities**

INTERCONNECTION	D
Eligible Renewable/Other Technologies:	**Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Fuel Cells, CHP/Cogeneration, Anaerobic Digestion, Microturbines, other Distributed Generation Technologies**
Applicable Sectors:	**Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Federal Government, Agricultural, Institutional**
Special Rules for Net-Metered Systems:	**Yes**
Limit on System Size/Overall Enrollment:	**No capacity limit specified**
Standard Interconnection Agreement:	**Yes**
Additional Insurance Requirements:	**Utilities may require only reasonable amounts of insurance against risks for which there is a likelihood of occurrence**
External Disconnect Required:	**Yes**

IOWA

NET METERING	B
Eligible Renewable/Other Technologies:	**Photovoltaics, Wind, Biomass, Hydroelectric, Municipal Solid Waste**
Applicable Sectors:	**Commercial, Industrial, Residential**
Limit on System Size:	**500-kW**
Limit on Overall Enrollment:	**None**
Treatment of Net Excess:	**Credited to customer's next bill**
Utilities Involved:	**Investor-owned utilities (MidAmerican Energy, Interstate Power and Light)**

INTERCONNECTION	D
Eligible Renewable/Other Technologies:	**Photovoltaics, Wind, Biomass, Hydroelectric, Municipal Solid Waste**
Applicable Sectors:	**Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Federal Government**
Special Rules for Net-Metered Systems:	**No**
Limit on System Size/Overall Enrollment:	**No limits specified**
Standard Interconnection Agreement:	**No**
Additional Insurance Requirements:	**No**
External Disconnect Required:	**Not specified**

KENTUCKY

NET METERING	D
Eligible Renewable/Other Technologies:	**Photovoltaics**
Applicable Sectors:	**Commercial, Residential, Nonprofit, Schools, Local Government, State Government, Agricultural, Institutional**
Limit on System Size:	**15-kW**
Limit on Overall Enrollment:	**0.1% of a utility's single-hour peak load during the previous year**
Treatment of Net Excess:	**Credited to customer's next bill (no expiration)**
Utilities Involved:	**Investor-owned utilities, rural electric cooperatives**

INTERCONNECTION	n/a

LOUISIANA

NET METERING	C
Eligible Renewable/Other Technologies:	**Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells using Renewable Fuels, Microturbines**
Applicable Sectors:	**Commercial, Residential, Agricultural**
Limit on System Size:	**25-kW for residential systems; 100-kW for commercial and agricultural systems**
Limit on Overall Enrollment:	**No limit specified**
Treatment of Net Excess:	**Credited to customer's next bill at utility's retail rate; carried over indefinitely**
Utilities Involved:	**All utilities**

INTERCONNECTION	F
Eligible Renewable/Other Technologies:	**Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells using Renewable Fuels, Microturbines**
Applicable Sectors:	**Commercial, Industrial, Agricultural**
Special Rules for Net-Metered Systems:	**Yes**
Limit on System Size/Overall Enrollment:	**25-kW (residential), 100-kW (non-residential)**
Standard Interconnection Agreement:	**Yes**
Additional Insurance Requirements:	**Not specified**
External Disconnect Required:	**Yes**

MAINE

NET METERING	C
Eligible Renewable/Other Technologies:	**Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, Municipal Solid Waste, CHP/Cogeneration, Tidal Energy**
Applicable Sectors:	**Commercial, Industrial, Residential**
Limit on System Size:	**100-kW**
Limit on Overall Enrollment:	**None**
Treatment of Net Excess:	**Credited to customer's next bill; granted to utility at end of 12-month billing cycle**
Utilities Involved:	**All utilities (investor-owned utilities, municipal utilities, electric cooperatives)**

INTERCONNECTION	n/a

MARYLAND

NET METERING	A
Eligible Renewable/Other Technologies:	**Photovoltaics, Wind, Biomass, Anaerobic Digestion**
Applicable Sectors:	**Commercial, Residential, Schools, Local Government, State Government, Federal Government**
Limit on System Size:	**2-MW**
Limit on Overall Enrollment:	**1,500-MW**
Treatment of Net Excess:	**Credited at retail rate and carried over to customer's next bill; granted to utility at end of 12-month period with no compensation for the customer**
Utilities Involved:	**All utilities**

INTERCONNECTION	D
Eligible Renewable/Other Technologies:	**Photovoltaics, Wind, Biomass**
Applicable Sectors:	**Commercial, Residential, Schools, Local Government, State Government, Federal Government**
Special Rules for Net-Metered Systems:	**Yes**
Limit on System Size/Overall Enrollment:	**2-MW / 1500-MW (both limits apply to net-metered systems)**
Standard Interconnection Agreement:	**No**
Additional Insurance Requirements:	**No**
External Disconnect Required:	**No**

MASSACHUSETTS

NET METERING	C
Eligible Renewable/Other Technologies:	**Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, Municipal Solid Waste, CHP/Cogeneration**
Applicable Sectors:	**Commercial, Industrial, Residential**
Limit on System Size:	**60-kW**
Limit on Overall Enrollment:	**None**
Treatment of Net Excess:	**Credited to customer's next bill at average monthly market rate**
Utilities Involved:	**Investor-owned utilities**

INTERCONNECTION	C
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, Federal Government**
Special Rules for Net-Metered Systems:	**Yes**
Limit on System Size/Overall Enrollment:	**No**
Standard Interconnection Agreement:	**Yes**
Additional Insurance Requirements:	**No**
External Disconnect Required:	**Yes (utility discretion)**

MICHIGAN

NET METERING	D
Eligible Renewable/Other Technologies:	**Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Municipal Solid Waste**
Applicable Sectors:	**Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Tribal Government, Federal Government, Agricultural, Institutional**
Limit on System Size:	**Less than 30-kW**
Limit on Overall Enrollment:	**0.1% of a utility's peak load or 100-kW (whichever is greater)**
Treatment of Net Excess:	**Credited to customer's next bill; granted to utility at end of 12-month billing cycle**
Utilities Involved:	**Voluntary**

INTERCONNECTION	D
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, Federal Government**
Special Rules for Net-Metered Systems:	**Yes**
Limit on System Size/Overall Enrollment:	**No**
Standard Interconnection Agreement:	**Yes**
Additional Insurance Requirements:	**No**
External Disconnect Required:	**Yes**

MINNESOTA

NET METERING	C
Eligible Renewable/Other Technologies:	**Photovoltaics, Wind, Biomass, Hydroelectric, Municipal Solid Waste, CHP/Cogeneration**
Applicable Sectors:	**Commercial, Industrial, Residential**
Limit on System Size:	**40-kW**
Limit on Overall Enrollment:	**None**
Treatment of Net Excess:	**Customer receives a check for NEG at the end of each month, calculated at the average retail utility energy rate**
Utilities Involved:	**All utilities**

INTERCONNECTION	C
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, Federal Government**
Special Rules for Net-Metered Systems:	**Yes**
Limit on System Size/Overall Enrollment:	**10-MW (40-kW for net-metered systems)**
Standard Interconnection Agreement:	**Yes**
Additional Insurance Requirements:	**$300,000 for systems under 40-kW**
External Disconnect Required:	**Yes**

MISSOURI

NET METERING	C
Eligible Renewable/Other Technologies:	**Solar Thermal Electric, Photovoltaics, Wind, Hydroelectric**
Applicable Sectors:	**Commercial, Industrial, Residential, General Public/Consumer, Nonprofit, Schools, Local Government, State Government, Federal Government, Agricultural, Institutional**
Limit on System Size:	**100-kW**
Limit on Overall Enrollment:	**5% of a utility's single-hour peak load during the previous year**
Treatment of Net Excess:	**Credited to customer's next bill at utility's avoided-cost rate; granted to utility at end of 12-month period**
Utilities Involved:	**All utilities**

INTERCONNECTION	F
Eligible Renewable/Other Technologies:	**Photovoltaics, Wind, Biomass, Fuel Cells**
Applicable Sectors:	**Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Federal Government**
Special Rules for Net-Metered Systems:	**No**
Limit on System Size/Overall Enrollment:	**100-kW / 10-MW or 0.1% of utility's peak demand for previous year, whichever is less**
Standard Interconnection Agreement:	**Yes**
Additional Insurance Requirements:	**No**
External Disconnect Required:	**Yes**

MONTANA

NET METERING	C
Eligible Renewable/Other Technologies:	**Photovoltaics, Wind, Hydroelectric**
Applicable Sectors:	**Commercial, Industrial, Residential**
Limit on System Size:	**50-kW**
Limit on Overall Enrollment:	**None**
Treatment of Net Excess:	**Credited to customer's next bill; granted to utility at end of 12-month billing cycle**
Utilities Involved:	**Investor-owned utilities**

INTERCONNECTION	D
Eligible Renewable/Other Technologies:	**Photovoltaics, Wind, Hydroelectric**
Applicable Sectors:	**Commercial, Industrial, Residential, Schools, Local Government, State Government**
Special Rules for Net-Metered Systems:	**Yes**
Limit on System Size/Overall Enrollment:	**50-kW / None specified**
Standard Interconnection Agreement:	**None specified**
Additional Insurance Requirements:	**Not specified**
External Disconnect Required:	**Yes (except for systems with inverters compliant with IEEE 1547)**

NEVADA

NET METERING	B
Eligible Renewable/Other Technologies:	**Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric**
Applicable Sectors:	**Commercial, Industrial, Residential**
Limit on System Size:	**1 MW (utilities may impose fees on systems greater than 100 kW)**
Limit on Overall Enrollment:	**1% of each utility's peak capacity**
Treatment of Net Excess:	**Carried over to customer's next bill indefinitely as a kilowatt-hour credit**
Utilities Involved:	**Investor-owned utilities**

INTERCONNECTION	n/a

NEW HAMPSHIRE

NET METERING	C
Eligible Renewable/Other Technologies:	**Photovoltaics, Wind, Hydroelectric**
Applicable Sectors:	**Commercial, Industrial, Residential**
Limit on System Size:	**100-kW**
Limit on Overall Enrollment:	**1.0% of a utility's peak demand**
Treatment of Net Excess:	**Credited to customer's next bill**
Utilities Involved:	**All utilities**

INTERCONNECTION	D
Eligible Renewable/Other Technologies:	**Photovoltaics, Wind, Biomass, Hydroelectric**
Applicable Sectors:	**Commercial, Industrial, Residential**
Special Rules for Net-Metered Systems:	**Yes**
Limit on System Size/Overall Enrollment:	**100-kW / 1.0% of utility's annual peak demand**
Standard Interconnection Agreement:	**Yes**
Additional Insurance Requirements:	**None**
External Disconnect Required:	**Required for systems larger than 10-kW**

NEW JERSEY

NET METERING — A

Eligible Renewable/Other Technologies:	**Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Anaerobic Digestion, Tidal Energy, Wave Energy, Fuel Cells using Renewable Fuels**
Applicable Sectors:	**Commercial, Residential**
Limit on System Size:	**2-MW**
Limit on Overall Enrollment:	**No limit**
Treatment of Net Excess:	**Credited to customer's next bill at retail rate; purchased by utility at avoided-cost rate at end of 12-month billing cycle**
Utilities Involved:	**Electric distribution companies (does not apply to municipal utilities or electric co-ops)**

INTERCONNECTION — B

Eligible Renewable/Other Technologies:	**Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Anaerobic Digestion, Tidal Energy, Wave Energy, Fuel Cells using Renewable Fuels**
Applicable Sectors:	**Commercial, Residential**
Special Rules for Net-Metered Systems:	**Yes**
Limit on System Size/Overall Enrollment:	**2-MW for net-metered systems / 0.1% of state peak demand or total impact of $2 million**
Standard Interconnection Agreement:	**No**
Additional Insurance Requirements:	**No**
External Disconnect Required:	**No**

NEW MEXICO

NET METERING — B

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**
Limit on System Size:	**80-MW**
Limit on Overall Enrollment:	**None**
Treatment of Net Excess:	**Credited to customer's next bill at utility's avoided-cost rate or purchased by utility at avoided-cost rate monthly**
Utilities Involved:	**Investor-owned utilities and electric cooperatives**

INTERCONNECTION — C

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, Federal Government**
Special Rules for Net-Metered Systems:	**Yes**
Limit on System Size/Overall Enrollment:	**80-MW (under development) / 100-kW (simplified rules)**
Standard Interconnection Agreement:	**Yes**
Additional Insurance Requirements:	**Public Regulatory Commission (PRC) may require customer to purchase general liability insurance**
External Disconnect Required:	**Yes**

NEW YORK

NET METERING	D
Eligible Renewable/Other Technologies:	**Photovoltaics, Wind, Biomass**
Applicable Sectors:	**Residential, Agricultural**
Limit on System Size:	**10-kW for solar; 25-kW for residential wind; 125-kW for farm-based wind; 400-kW for farm-based biogas**
Limit on Overall Enrollment:	**0.1% of 1996 demand per IOU for solar; 0.2% of 2003 demand per IOU for wind; 0.4% of 1996 demand per IOU for farm-based biogas**
Treatment of Net Excess:	**Credited monthly at retail rate, except for wind greater than 10-kW, which is credited monthly at avoided-cost rate. Accounts reconciled annually at avoided-cost rate.**
Utilities Involved:	**All utilities**

INTERCONNECTION	C
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, Agricultural**
Special Rules for Net-Metered Systems:	**Yes**
Limit on System Size/Overall Enrollment:	**2-MW**
Standard Interconnection Agreement:	**Yes**
Additional Insurance Requirements:	**No**
External Disconnect Required:	**Yes**

NORTH CAROLINA

NET METERING	F
Eligible Renewable/Other Technologies:	**Photovoltaics, Landfill Gas, Wind, Biomass, Anaerobic Digestion, Small Hydroelectric**
Applicable Sectors:	**Commercial, Industrial, Residential**
Limit on System Size:	**20-kW for residential systems; 100-kW for non-residential systems**
Limit on Overall Enrollment:	**0.2% of each utility's North Carolina retail peak load for the previous year**
Treatment of Net Excess:	**Credited to customer's next bill at retail rate; granted to utility (annually) at beginning of each summer season**
Utilities Involved:	**Investor-owned utilities (Progress Energy, Duke Energy, Dominion North Carolina Power)**

INTERCONNECTION	F
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, Federal Government, Agricultural, Institutional**
Special Rules for Net-Metered Systems:	**Yes**
Limit on System Size/Overall Enrollment:	**20-kW for residential / 100-kW for non-residential**
Standard Interconnection Agreement:	**Yes**
Additional Insurance Requirements:	**No**
External Disconnect Required:	**Yes**

NORTH DAKOTA

NET METERING	C
Eligible Renewable/Other Technologies:	**Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, Municipal Solid Waste, CHP/Cogeneration**
Applicable Sectors:	**Commercial, Industrial, Residential**
Limit on System Size:	**100kW**
Limit on Overall Enrollment:	**None**
Treatment of Net Excess:	**Purchased by utility at avoided-cost rate**
Utilities Involved:	**Investor-owned utilities**

INTERCONNECTION	n/a

OHIO

NET METERING	B
Eligible Renewable/Other Technologies:	**Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Fuel Cells, Microturbines**
Applicable Sectors:	**Commercial, Industrial, Residential**
Limit on System Size:	**No limit specified (system must be sized to match some or all of customer's load)**
Limit on Overall Enrollment:	**1% of a utility's peak demand**
Treatment of Net Excess:	**Credited at utility's unbundled generation rate to customer's next bill; customer may request refund of NEG credits accumulated over a 12-month period**
Utilities Involved:	**All electric distribution utilities and competitive retail electric service providers**

INTERCONNECTION	C
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, Federal Government**
Special Rules for Net-Metered Systems:	**20-MW / None specified**
Limit on System Size/Overall Enrollment:	**Yes**
Standard Interconnection Agreement:	**None specified**
Additional Insurance Requirements:	**Yes**
External Disconnect Required:	**Yes (except for systems with inverters compliant with IEEE 1547)**

OKLAHOMA

NET METERING	D
Eligible Renewable/Other Technologies:	**Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, Municipal Solid Waste, CHP/Cogeneration**
Applicable Sectors:	**Commercial, Industrial, Residential, General Public/Consumer**
Limit on System Size:	**100-kW or 25,000-kWh/year (whichever is less)**
Limit on Overall Enrollment:	**None**
Treatment of Net Excess:	**Granted to utility monthly or credited to customer's next bill (varies by utility)**
Utilities Involved:	**Investor-owned utilities, electric cooperatives regulated by the Oklahoma Corporation Commission**

INTERCONNECTION	n/a

OREGON

NET METERING	B
Eligible Renewable/Other Technologies:	**Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Fuel Cells, Anaerobic Digestion**
Applicable Sectors:	**Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Federal Government, Agricultural, Institutional**
Limit on System Size:	**Residential: 25-kW / Non-residential customers of PGE and PacifiCorp: 2-MW / Non-residential customers of municipal utilities, electric cooperatives, people's utility districts: 25-kW**
Limit on Overall Enrollment:	**PGE and PacifiCorp: no limit Municipal utilities, electric cooperatives, people's utility districts: 0.5% of a utility's historic single-hour peak load**
Treatment of Net Excess:	**Varies by utility (see below)**
Utilities Involved:	**All utilities (except Idaho Power)**

INTERCONNECTION	C
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, Federal Government, Agricultural, Institutional**
Special Rules for Net-Metered Systems:	**Yes**
Limit on System Size/Overall Enrollment:	**Residential: 25-kW / Non-residential customers of PGE and PacifiCorp: 2-MW / Non-residential customers of municipal utilities, electric cooperatives, people's utility districts: 25-kW**
Standard Interconnection Agreement:	**Yes (PGE and PacifiCorp only)**
Additional Insurance Requirements:	**No**
External Disconnect Required:	**Yes (certain small, inverter-based systems are exempt)**

PENNSYLVANIA

NET METERING	A	INTERCONNECTION	D
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, other Distributed Generation Technologies	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, other Distributed Generation Technologies**
Applicable Sectors:	**Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Federal Government, Agricultural, Institutional**	Applicable Sectors:	**Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Federal Government, Agricultural, Institutional**
Limit on System Size:	**50-kW for residential systems; 3-MW for non-residential systems; Customers with systems that are part of microgrids or are available for emergency use: 5-MW**	Special Rules for Net-Metered Systems:	**No**
Limit on Overall Enrollment:	**No limit specified**	Limit on System Size/Overall Enrollment:	**Not specified**
Treatment of Net Excess:	**Credited to customer's next bill at retail rate; Public Utility Commission (PUC) to address treatment of NEG remaining at end of 12-month period**	Standard Interconnection Agreement:	**Yes**
Utilities Involved:	**Investor-owned utilities**	Additional Insurance Requirements:	**No**
		External Disconnect Required:	**Yes**

RHODE ISLAND

NET METERING	C	INTERCONNECTION	D
Eligible Renewable/Other Technologies:	**Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, Municipal Solid Waste, CHP/Cogeneration**	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**	Applicable Sectors:	**Commercial, Industrial, Residential, Schools, Local Government, State Government**
Limit on System Size:	**1.65-MW for systems owned by cities, towns or the Narragansett Bay Commission; 1-MW for all other customers**	Special Rules for Net-Metered Systems:	**No**
Limit on Overall Enrollment:	**5-MW (1-MW of this limit is reserved for systems under 25-kW)**	Limit on System Size/Overall Enrollment:	**25-kW for net-metered systems; 1-MW total enrollment**
Treatment of Net Excess:	**Credited at utility's avoided-cost rate to customer's next bill; granted to utility at end of 12-month period**	Standard Interconnection Agreement:	**Yes (Narragansett Electric/National Grid)**
Utilities Involved:	**Narragansett Electric (National Grid)**	Additional Insurance Requirements:	**No**
		External Disconnect Required:	**No**

TEXAS

NET METERING	D
Eligible Renewable/Other Technologies:	**Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Tidal Energy, Wave Energy, Ocean Thermal**
Applicable Sectors:	**Commercial, Industrial, Residential**
Limit on System Size:	**100-kW for qualifying facilities; 50-kW for renewables (see summary)**
Limit on Overall Enrollment:	**None**
Treatment of Net Excess:	**Purchased by utility for a given billing period at avoided-cost rate**
Utilities Involved:	**Applies only to all integrated IOUs that have not unbundled in accordance with Public Utility Regulatory Act § 39.05; does not apply to municipal utilities, river authorities and electric cooperatives**

INTERCONNECTION	C
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**
Special Rules for Net-Metered Systems:	**Yes**
Limit on System Size/Overall Enrollment:	**10-MW at 60-kV or less / No limit on overall enrollment**
Standard Interconnection Agreement:	**Yes**
Additional Insurance Requirements:	**None specified**
External Disconnect Required:	**Yes**

UTAH

NET METERING	F
Eligible Renewable/Other Technologies:	**Solar Thermal Electric, Photovoltaics, Wind, Hydroelectric, Fuel Cells**
Applicable Sectors:	**Commercial, Industrial, Residential**
Limit on System Size:	**25-kW**
Limit on Overall Enrollment:	**0.1% of a utility's peak demand in 2001**
Treatment of Net Excess:	**Credited to customer's next bill at utility's avoided-cost rate; granted to utility at end of 12-month billing cycle**
Utilities Involved:	**Investor-owned utilities and cooperatives (municipal utilities are excluded)**

INTERCONNECTION	F
Eligible Renewable/Other Technologies:	**Solar Thermal Electric, Photovoltaics, Wind, Hydroelectric**
Applicable Sectors:	**Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Federal Government**
Special Rules for Net-Metered Systems:	**Yes**
Limit on System Size/Overall Enrollment:	**25-kW; 0.1% of 2001 peak demand**
Standard Interconnection Agreement:	**No**
Additional Insurance Requirements:	**None**
External Disconnect Required:	**Not specified**

VERMONT

NET METERING	C
Eligible Renewable/Other Technologies:	**Solar Thermal Electric, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Anaerobic Digestion, Fuel Cells using Renewable Fuels**
Applicable Sectors:	**Commercial, Residential, Nonprofit, Schools, Local Government, State Government, Fed. Government, Agricultural, Institutional**
Limit on System Size:	**150-kW for farm systems (systems may be larger, but net metering applies only up to 150-kW); 15-kW for others**
Limit on Overall Enrollment:	**1% of 1996 peak demand or peak demand during most recent calendar year (whichever is greater)**
Treatment of Net Excess:	**Credited to customer's next bill; granted to utility at end of 12-month billing cycle**
Utilities Involved:	**All utilities**

INTERCONNECTION	C
Eligible Renewable/Other Technologies:	**Photovoltaics, Wind, Biomass, Fuel Cells, CHP/Cogeneration, Anaerobic Digestion, Microturbines, other Distributed Generation Technologies**
Applicable Sectors:	**Commercial, Residential, Agricultural**
Special Rules for Net-Metered Systems:	**Yes**
Limit on System Size/Overall Enrollment:	**Net-metered systems: 15-kW or 150-kW (farm systems) / The greater of 1% of a utility's 1996 peak demand or the utility's peak demand from the previous year / Non-net-metered systems: no capacity limit specified for individual systems or overall enrollment**
Standard Interconnection Agreement:	**Yes**
Additional Insurance Requirements:	**No**
External Disconnect Required:	**Yes**

VIRGINIA

NET METERING	C
Eligible Renewable/Other Technologies:	**Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, Municipal Solid Waste, Tidal Energy, Wave Energy**
Applicable Sectors:	**Commercial, Residential, Nonprofit, Schools, Local Government, State Government, Institutional**
Limit on System Size:	**10-kW for residential systems; 500-kW for non-residential systems**
Limit on Overall Enrollment:	**1% of each utility's adjusted Virginia peak-load forecast for the previous year**
Treatment of Net Excess:	**Credited to following month at utility's retail rate; either granted to utility annually or credited to following month**
Utilities Involved:	**Investor-owned utilities, electric cooperatives**

INTERCONNECTION	D
Eligible Renewable/Other Technologies:	**Photovoltaics, Wind, Hydroelectric**
Applicable Sectors:	**Commercial, Industrial, Residential, Nonprofit, Schools, Local Government, State Government, Federal Government**
Special Rules for Net-Metered Systems:	**Yes**
Limit on System Size/Overall Enrollment:	**10-kW for residential systems; 500-kW for non-residential systems / 0.1% of a utility's peak load for previous year**
Standard Interconnection Agreement:	**Yes**
Additional Insurance Requirements:	**No**
External Disconnect Required:	**Utility's discretion**

WASHINGTON

NET METERING	D
Eligible Renewable/Other Technologies:	**Solar Thermal Electric, Photovoltaics, Wind, Hydroelectric, Fuel Cells, CHP/ Cogeneration**
Applicable Sectors:	**Commercial, Industrial, Residential**
Limit on System Size:	**100-kW**
Limit on Overall Enrollment:	**0.25% of 1996 a utility's peak demand (increases to 0.5% of a utility's peak demand on January 1, 2014)**
Treatment of Net Excess:	**Credited to customer's next bill; granted to utility at end of 12-month billing cycle**
Utilities Involved:	**All utilities**

INTERCONNECTION	F
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, Federal Government, Agricultural, Institutional**
Special Rules for Net-Metered Systems:	**No**
Limit on System Size/Overall Enrollment:	**25-kW / 0.25% of 1996 peak (increases to 0.5% of a utility's peak demand on January 1, 2014)**
Standard Interconnection Agreement:	**No**
Additional Insurance Requirements:	**Not allowed for systems eligible for net metering**
External Disconnect Required:	**Yes**

WEST VIRGINIA

NET METERING	D
Eligible Renewable/Other Technologies:	**Photovoltaics, Landfill Gas, Wind, Biomass, Fuel Cells, Small Hydroelectric**
Applicable Sectors:	**Commercial, Residential**
Limit on System Size:	**25-kW**
Limit on Overall Enrollment:	**0.1% of utility's total load participation (utility tariff provision)**
Treatment of Net Excess:	**Credited to customer's next bill at utility's retail rate**
Utilities Involved:	**All utilities**

INTERCONNECTION	D
Eligible Renewable/Other Technologies:	**Eligible Generators**
Applicable Sectors:	**All Classes**
Special Rules for Net-Metered Systems:	**2-MW**
Limit on System Size/Overall Enrollment:	**No**
Standard Interconnection Agreement:	**Must carry $100,000 in liability insurance**
Additional Insurance Requirements:	**None specified**
External Disconnect Required:	**Yes (except for systems with inverters compliant with IEEE 1547)**

WISCONSIN

NET METERING	F
Eligible Renewable/Other Technologies:	**Solar Thermal Electric, Photovoltaics, Wind, Biomass, Hydroelectric, Geothermal Electric, Municipal Solid Waste, CHP/Cogeneration, other Distributed Generation Technologies**
Applicable Sectors:	**Commercial, Industrial, Residential**
Limit on System Size:	**20-kW (We Energies allows net metering for wind-energy systems up to 100-kW)**
Limit on Overall Enrollment:	**None**
Treatment of Net Excess:	**Varies by utility. Generally credited at retail rate for renewables; generally credited at avoided-cost for non-renewables.**
Utilities Involved:	**Investor-owned utilities, municipal utilities**

INTERCONNECTION	D
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, Federal Government**
Special Rules for Net-Metered Systems:	**Yes**
Limit on System Size/Overall Enrollment:	**15-MW**
Standard Interconnection Agreement:	**Yes**
Additional Insurance Requirements:	**Yes**
External Disconnect Required:	**Yes**

WYOMING

NET METERING	D
Eligible Renewable/Other Technologies:	**Photovoltaics, Wind, Biomass, Hydroelectric**
Applicable Sectors:	**Commercial, Industrial, Residential**
Limit on System Size:	**25-kW**
Limit on Overall Enrollment:	**None**
Treatment of Net Excess:	**Credited to customer's next bill; purchased by utility at avoided-cost rate at end of 12-month billing cycle**
Utilities Involved:	**Investor-owned utilities and electric cooperatives**

INTERCONNECTION	F
Eligible Renewable/Other Technologies:	**Photovoltaics, Wind, Biomass, Hydroelectric**
Applicable Sectors:	**Commercial, Industrial, Residential**
Special Rules for Net-Metered Systems:	**Yes**
Limit on System Size/Overall Enrollment:	**25-kW; limit on enrollment not specified**
Standard Interconnection Agreement:	**Yes (Pacific Power)**
Additional Insurance Requirements:	**No**
External Disconnect Required:	**Yes (except for systems with inverters compliant with IEEE 1547)**

WORST PRACTICES: INDIANA

Indiana's net-metering policy provides a useful illustration of how the good intentions of state legislators can go astray during the evolution of policy through the regulatory process. While this analysis did not give Indiana's net-metering policy an 'F', the analysis found that the Indiana Utility Regulatory Commission (IURC) failed to establish an effective net-metering program largely because of deference given to utilities during the rule-making process.

The process started when the Indiana General Assembly handed over the task of developing net-metering rules to the IURC. The IURC released a draft proposal for public comment and held at least one public hearing during which staff heard comments on net metering from state utilities, individual customers, public-interest groups and other stakeholders. Concerns by utilities in Indiana led the IURC to adopt very restrictive limits on eligible system sizes and exclude many customer classes altogether.

Despite overwhelming support for a net-metering bill passed unanimously by the Indiana House of Representatives in February 2004, State Senator James Merritt, Chair of the Indiana Senate Utility and Regulatory Affairs Committee, refused to consider the issue,[1] claiming that it "invaded the province of IURC" and that the commission alone should be responsible for developing net-metering rules.[2]

In September 2004, the IURC adopted a formal net-metering rule for Indiana, "albeit on a more modest basis," than proposed under the bill or requested by the specific state legislators.[3] Unlike the bill passed in the Indiana House, which would have required the state's electric utilities to make net metering available to any customer with a renewable energy system up to 2-MW in size, the net-metering provisions issued by IURC only require the state's investor-owned utilities to make net metering available for residential customers or K-12 schools with systems up to 10 kW. In addition, the IURC gave utilities the discretion to require an additional external disconnect switch to be at the customer's expense.

In 2002, long before adopting net-metering rules, IURC began collecting information about DG that was to be used in the development of the state's comprehensive net-metering rules.[4] The IURC issued a request for responses to a list of technical questions associated with initiating a statewide net-metering program. By March of 2002, eight of the state's utilities as well as the Citizen Action Coalition (CAC) submitted comments in response to the IURC's request.[5] Although the IURC initially intended for the program to provide incentives for individual customers to invest in small-scale renewables,[6] the language of its final rules reflects substantially the comments made by the state's utilities.

One main argument made by Indiana's utilities involved unfounded claims that net metering results in "the subsidization of customers with net metering by other customers and by the utility," an argument known as "cross-subsidization."[7,8] In order to limit this "problem," the utilities suggested that "net metering should be limited to a small generator for primarily residential or small commercial application," with a maximum capacity of 10-kW.[9] The

final rules reveal that the utilities were effective at persuading the IURC to limit eligible system sizes to 10-kW, despite entreaties by the state legislature to allow net metering for systems up to 2-MW.

One Indiana utility, Richmond Power and Light, argued for restricting eligible customer classes because "in the context of industrial or commercial customers," who may be capable of generating a substantial amount of their electricity demand on-site, allowing month-to-month banking would be "disastrous and confiscatory."[10] Indiana Technology and Manufacturing Companies (ITAMCO), with seventy-five employees in its 100,000 square-foot factory, "where precision work requires costly air conditioning," countered that on-site power generation would reduce operational costs and make the company more economically competitive.[11] David Neidig, marketing VP at ITAMCO, explained that the company's interest in participating in net metering was partly because it "is a great way for (ITAMCO) to be more competitive as an Indiana manufacturer, and at the same time be environmentally conscious, and be a good neighbor of the community."[12] ITMACO noted that, because a 1.5-MW wind turbine would cost the company about $1.5 million, net metering was "essential to (ITAMCO's) cost equations" when planning to invest in a renewable-energy system. In the end, IURC's net-metering rules excluded commercial and industrial customers, and Indiana companies like ITAMCO are unable to benefit from net metering.

Indiana's experience with net metering reflects how state regulations crafted to protect the economic interests of one sector (electrical utilities) may have unintended negative consequences on other sectors (such as manufacturing). More importantly, Indiana's experience reveals how, in the absence of explicit statutory guidance, state public utility commission proceedings can upend the intention of state legislators.

DERAILING NET METERING: CROSS-SUBSIDIZATION

"Cross-subsidization" is a term utilities use to describe how non-participating customers ultimately "pay" for some of the benefits that accrue to customers that net-meter. When meters run backwards, net-metered customers are essentially being credited for the full retail price of a utilities electricity, which includes the actual costs of several components of electricity sales (i.e., transmission lines, maintenance, administration, etc). Utilities argue that net-metered customers continue to benefit from the use of transmission lines, distribution lines and certain other utility amenities even though these customers are supplying their own electricity. Therefore, the cost of these other things is borne by non-participating customers who, as a result, must pay higher electricity rates. In a 1999 report on net metering for the Solar Energy Society of Canada, Andrew Pape explains the cross-subsidization argument as follows:

> There are three types of subsidies implicit in net metering. First, bundled retail rates typically include fixed costs. By crediting customer-generators based on retail rates, they may effectively avoid some of these fixed costs (e.g., fixed transmission and distribution costs), although they continue to benefit from them (e.g., standby service). Second, power production from customer-generators that is credited by the utility may coincide with periods of the day or year when power is less valuable, yet customer-generators may consume utility power at zero net cost during periods when power is more valuable. Finally, net-metering programs may entail additional costs that are recovered from all ratepayers, not just program participants.[13]

While couched in a level of economic sophistication, the cross-subsidization argument is a contortion of logic. It is akin to arguing that customers who use less electricity, and thus pay less, should have to pay a monthly fee to make up the difference. Otherwise, the utility will increase costs for the customers that use more electricity.

Do customers owe their utility for using less energy?

Whatever merit exists with respect to the cross-subsidization argument stems entirely from the fact that utilities enjoy a monopoly on the transmission and distribution systems that consumers are required to use. Utilities do not enjoy a monopoly on transmission by divine right. Since utility monopolies are the result of policy developed to promote the public good, policymakers may surely change the policy in pursuit of even greater public good.

For the cross-subsidization argument to make sense, utilities must categorize net metering as a separate electricity sale, rather than as an offset of electricity demand. The cross-subsidization argument is irrelevant until a net-metered system generates more electricity than the net-metered customer consumes. Until then, there is no more cross-subsidy inherent in the arrangement than there would be when a utility customer, for example, installs an energy efficient air conditioner. Not demanding as much electricity from the grid is not the same thing as requiring the utility to credit excess electricity at the retail rate. It is simply demanding less.

Even when net-metered customers are generating excess electricity over a specific period of time, there is little justification for limiting net metering in some crude attempt to spread the fixed costs of transmission and distribution equitably among ratepayers. To begin with, many utilities already "unbundle" fixed costs by charging an initial connection fee and/or delineating separate transmission and distribution charges on a customer's bill. Under these circumstances, the fixed transmission, distribution and administration costs associated with managing the grid are not subsumed by the retail rate of electricity.

Cross-subsidization already occurs as a result of fixing distribution costs in the first place. Presumably, customers benefit from the distribution grid in ways not reflected by their electricity bill. It costs much more to distribute electricity to some areas than others. Customers that consume electricity close to a substation subsidize the distribution of electricity to customers who reside farther from the substation. Retail prices do not reflect the unequal costs of distribution lines and load losses. Instead, all customers are charged as if they contributed equally to distribution expenses. Even today, system controllers must use brownouts and rolling blackouts rather than electricity prices to manage demand in excess of capacity.[14] These crude tools require some ratepayers to subsidize electric reliability for others. Utilities remain silent about these inherent inequities until the issue of net-metering is raised.

The second component of the cross-subsidization argument—that crediting excess generation rewards off-peak generation at on-peak prices—is even less tenable. Multiple empirical studies demonstrate that distributed renewable-energy systems (particularly PV systems) generate excess electricity during peak demand periods.[15] Far from getting credit for excess electricity when it is "cheap" and applying the credit when electricity is "expensive," in practice the opposite has been the case. By providing excess electricity to the grid during periods of peak demand, the net-metered customer is not only helping the resource-constrained utility meet its demand, but is also offsetting the most expensive type of electricity—peak electricity. What's more, if the utility fails to credit excess generation at retail rates, then the utility will simply be taking the excess generation from net-metered consumers and charging other customers the full price. Without paying for any additional infrastructure investment, the utility is simply commandeering the energy generated by net-metered customers and selling it to non-net metered customers.

The final component of the cross-subsidization argument raises the specter of unspecified "additional costs" associated with net metering that must be recovered from all customers, not just participants. One can only speculate what these fees may entail, if not the same fixed costs already discussed above. Some possibilities (application processing fees, interconnection safety, insurance and indemnification) simply constitute hidden participation fees that we have already demonstrated as unnecessary. Whatever nominal costs result from interconnecting net-metered systems are overwhelmed by the benefits to electricity reliability, security and the environment that accrue from expanding small-scale renewable energy in the United States.[16]

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BEST PRACTICES: NEW JERSEY

Since 2004, New Jersey's incentives for small-scale renewable energy, including its exemplary net-metering program, have been widely considered the best in the country. Our analysis of thirty-nine statewide net-metering policies confirms that New Jersey's policy is the most effective.[1, 2]

New Jersey is experiencing a tremendous rate of growth in both customer participation and the cumulative capacity of installed renewable-energy systems.[3] In 2004, the first year under New Jersey's restructured net-metering program, the installed capacity per year jumped from 757-kW in 2003 to 2,144-kW in 2004.[4]

New Jersey was the winner of the 2006 'Golden Meter Award'

In part, the rapid growth of grid-tied renewable energy in New Jersey can be traced to the process by which the state restructured its program. By testing proposed changes against objective research and a clearly defined goal, New Jersey was able to craft net-metering regulations that avoided the pitfalls bedeviling many other state programs.

Development of New Jersey's Legislation

New Jersey first adopted net metering in 1999. Then, in 2004, New Jersey's Board of Public Utilities (BPU) adopted amendments that significantly strengthened the state's policy.[5] Without a doubt, the strength of New Jersey's current net-metering policy is due largely to how the policy originated as part of a comprehensive strategy—which also includes generous rebates and tax incentives—to expand renewable energy statewide.

■ A Foundation of Support from the Governor

Although New Jersey already had demonstrated a strong commitment to clean energy, in 2003 Governor James McGreevey created a Renewable Energy Task Force charged with making recommendations on how the state could increase its consumption of renewable energy.[6] The task force concluded that the state should double its requirements for renewable-energy production by 2008, and also recommended a statewide goal of producing 22.5% of its energy from renewable sources by 2021.[7] Although the task force did not specifically recommend new net-metering regulations, the recommendations laid the foundation for significant amendments to the state's policy.

Strong Leadership from the Commission

The BPU was charged with implementing the recommendations of the Governor's task force. Although the task force had recommended a substantial increase in renewable-energy generation, especially solar, the task force had not specified exactly how to accomplish the increase. BPU President, Jeanne Fox, who had also served as task force's chairwoman, felt that stronger net-metering rules were necessary to meet the task force's goal of 22.5 percent renewable production by 2021.[8] Fox believed that it was necessary to enable customers to purchase and install larger systems than the state's (previous) net-metering regulations permitted if the state sought to meet its RPS. Accordingly, the BPU adopted new net-metering regulations that increased the eligible system size to 2-MW, the largest limit in the United States at that time (with the possible exception of Ohio).[9]

Focusing on the Goals Rather than the Consensus

Unlike many other states, New Jersey did not begin the process of amending its net-metering regulations by trying to establish a consensus position with all stakeholders. The Renewable Energy Task Force led by the president of the state's utility commission kept as its focus the goal of allowing small-scale renewable energy to compete equally with conventional power. New Jersey began the process of revising its regulations by trying to determine what would attract more DG industry stakeholders to the state. The BPU solicited the input of utilities, but only adopted recommended changes when these changes did not compromise the primary goal of expanding the state's DG market. Changes that would have impeded the development of an in-state DG industry generally were overruled.

For example, New Jersey's statute allows only residential or "small commercial customers" to participate in the state's net-metering program. As a result, the precise definition of "small commercial customers" was critical to determining who would be eligible. A narrow definition would exclude customer classes that could provide more generation for meeting the state's goal. A broader definition would allow more potential customers to participate. The BPU reviewed net-metering programs in other states and decided on a definition of "small commercial customer" as non-residential customers with less than 10-MW of peak demand—a definition that was supported by the solar industry. The utilities, however, strenuously objected to this definition, and proposed a much smaller limit of 150-kW.[10] Had the utilities' proposal been adopted, the number of commercial customers eligible for New Jersey's net-metering program would have been significantly reduced. In the end, the BPU rejected the utilities' recommendations and adopted a final rule that allows systems up to 2-MW in size to qualify as small commercial customers.[11]

■ Part of a Package of Incentives

New Jersey treated its net-metering program as part of a broad package of incentives designed to encourage the adoption of renewable energy.[12] Recognizing that net metering alone is not sufficient to offset the high initial costs associated with on-site renewable-energy systems, New Jersey implemented additional incentives to promote the deployment of renewables.

The Clean Energy Program initially collected a "Societal Benefits Charge"—a type of public benefits fund—on electric utility customers and adopted a broad-based rebate program for small solar, wind and sustainable biomass generators. The rebate was scaled to provide greater payment for initial kilowatts capacity and less as generation increases. By making the rebate progressive in this way, New Jersey tilted the economic incentive to favor a larger number of generators that would also be eligible for the state's net-metering program. In September of 2007, New Jersey's Board of Public Utilities (BPU) created a market for production-based incentives that will further emphasize customer Solar Renewable Energy Certificates (SRECs) production. According to BPU President Jeanne M. Fox, "In making [this] decision on the future of solar in New Jersey, we are taking steps to align solar capacity and costs to be consistent with the priorities of the Governor's energy vision. Controlling the costs to the ratepayers will be a key aspect of our program. We believe this strategy will spur both private and public investment in the solar market in New Jersey."

Rather than institute a number of individual state subsidies, New Jersey linked financial incentives and an exemplary net-metering program to create a market-based approach for investment in small-scale renewable energy.

Under best practices interconnection and net-metering regimes, California and New Jersey have installed more than 20,000 and 3,000 distributed solar systems, respectively—with no reported safety issues, and with sustained utility profitability.

Features of New Jersey's Program

In addition to generous individual system size limits, New Jersey's net-metering policy includes specific components that help expand both the number of participating customers and the total amount of renewable capacity that is eligible.

■ Streamlined Application Process

A hallmark of New Jersey's net-metering program is its streamlined and transparent application process. New Jersey designed its application regulations both to overcome customer concerns about the complexity of the process and to minimize

the extent to which utilities may delay applications. Prior to New Jersey's 2004 program amendments, the U.S. Department of Energy published research indicating that customers who encountered major delays in application processing were ultimately discouraged from participating in net metering.[13] To address this issue, New Jersey requires utilities to respond promptly to customer applications. If a utility does not approve or deny a standard residential customer's application within 20 days of having received the application, the application will be considered automatically approved.[14] (Utilities objected to this proposal and requested a longer period to review applications.[15] Ultimately, the BPU rejected an extended review period and adopted the twenty-day rule.)

■ Simplified Interconnection Standards

Interconnection standards govern the manner in which customers can connect to the power grid. An effective net-metering policy is only possible if interconnection standards enable customer-generators to connect to the grid with minimal difficulty. The BPU understood the importance of interconnection standards to net metering and adopted model standards developed by IREC and NARUC.[16] New Jersey's standards allow all DG technologies to interconnect, do not require the customer to purchase additional insurance, and impose a minimal application fee (which is waived altogether in certain cases).[17]

■ Reduced Unnecessary Safety Requirements[18]

When the BPU was revising its net-metering policy in 2004, drafters recognized that many utilities were using safety concerns to require customers to install external disconnect switches that could be accessed easily by utility company workers. New Jersey's policymakers suspected that the external disconnect switch might be redundant with safety mechanisms inherent in all certified inverters and feared that the requirement was acting as a disincentive to customers who wanted to take advantage of renewable-energy systems.

With a grant from the nationwide Million Solar Roofs campaign, the BPU contracted with Chris Cook, a national expert in the development of interconnection standards, to investigate the issue.[19] Cook thoroughly researched external disconnect switches and found that the switches were rarely, if ever, used by utility company workers and that these switches did almost nothing to protect the workers anyway.

In fact, Cook found that the external disconnect switch requirement may even be harmful to workers—both by giving them a false sense of security and by requiring them to traverse private property to access the switches. In addition, the added expense of external disconnect switches created an incentive for customers to connect unauthorized systems, which presents a much greater safety concern to workers.

Two utilities with significant solar experience have dispensed with the switch entirely. Pacific Gas & Electric—one of the nation's largest electric utilities, which operates in California and has the highest number of interconnected PV systems—and the Sacramento Municipal Utility District (SMUD), have voluntarily dispensed with the requirement for an external disconnect switch on inverter based systems with a self-contained meter.[20] Furthermore, the switch is not a requirement in Colorado and a number of other states.

In the end, New Jersey prohibited utilities from requiring unnecessary and expensive additional safety equipment. Pre-tested, off-the-shelf renewable-energy systems are certified as safe, and this certification removes the necessity for additional equipment. By basing its policy on a thorough investigation of utility concerns, New Jersey helped pave the way for customer-friendly interconnection standards that better protect utility industry workers.[21, 22]

■ High System Size Limits

New Jersey allows renewable-energy systems up to 2-MW to net meter which, until 2007, was the highest limit of any state in the nation (with the possible exception of Ohio). A high system size limit allows non-residential customers, which typically have greater loads than most residential customers, to participate and gives business owners an incentive to install systems capable of generating their entire on-site demand. In New Jersey, many businesses and schools have taken advantage of the 2-MW limit and installed DG systems up to the allowable limit. Because these non-residential customers consume larger amounts of power, their DG systems have the added benefit of significantly reducing demand on the transmission grid while furthering New Jersey's goal of expanding statewide production of renewable energy to 22.5 percent by 2021.

■ Broad Customer Classes

High system size limits alone are not sufficient to enable commercial classes to participate in net-metering programs. As mentioned, New Jersey provides an expansive definition of "small commercial customers". Without this explicit customer class, commercial customers may have been restricted and the high system size limit would have been rendered largely irrelevant since residential customers would likely never approach a load of 2-MW. New Jersey's regulations allow no room for interpretations that would exclude larger consumers.

■ Monthly Banking of Excess Generation

Monthly banking of Net Excess Generation (NEG) is one of the most important factors in the effectiveness of any net-metering policy. For customers that net meter, the grid acts like an energy bank; customers deposit energy into the grid when their system produces more than they consume and withdraw energy when demand exceeds what their systems can supply. To be successful, a net-metering policy must facilitate

banking of customer credit so that the customer receives credit for excess energy generated during the seasons when renewable energy output is highest and then may apply the excess toward consumption when output is lower.

In New Jersey, for the first 12 months of a customer's participation, the utility is required to credit customers for NEG at the utility's retail rate. This is important because the excess power contributed to the grid by net-metered customers is sold to other consumers at the retail price. By allowing customers to retain credits of renewable energy, New Jersey's net-metering policy provides a strong incentive for customers to purchase systems large enough to produce enough clean power to satisfy their load. These larger systems, in turn, help reduce demand on the grid.

At the end of a twelve-month period, the added economic incentive created by the requirement to credit NEG at the retail rate disappears. At this point, utilities are required to purchase NEG at their wholesale rate (or "avoided cost" rate). That is, no net-metered customers can receive actual payment for excess energy at more than the wholesale rate.[25] Since the wholesale rate of electricity is considerably less than the retail rate, the incentive for consumers to install systems that generate more than on-site demand is diminished.

■ Does Not Limit Total Capacity

Some states place a cap on the total amount of electricity that can be generated by all net-metered systems (e.g. 0.1 percent of a utility's peak demand). This limits the total amount of electricity produced by renewable DG systems. Placing a cap on aggregate net-metering capacity is counter-productive, potentially impeding the growth of the very technologies net metering is designed to promote. New Jersey places no limit on capacity from net-metered customers.

■ Inclusive Definition of Eligible Technologies

New Jersey's inclusive definition of eligible technologies in its net-metering policy is a great asset. PV and wind power are the two most popular DG technologies for residential use; some states' net-metering policies include only those two technologies. But New Jersey's policy includes a broad array of renewable technologies (fuel cells, biomass, small hydro, landfill gas, tidal and wave energy), which is important for two reasons:

1. A broad definition of renewable energy helps spur the further development of novel ways of harnessing diverse renewable resources. One of the most important goals of net metering is to encourage the adoption and use of distributed renewables. While most state programs include common renewable technologies, New Jersey's program allows multiple renewable energy technologies.

2. An inclusive definition of renewable energy also facilitates a more diverse net-metering customer base. For example, farmers can use biomass resources that generally are unavailable to residential consumers. It is important to include all customer classes in a net-metering program since many nonresidential customers use substantially more energy than residential customers and their participation can lead to significant reductions in electricity demanded from the grid.

■ Regular Performance Measurements

Virtually all state net-metering policies incorporate a reporting requirement. New Jersey requires utilities to submit annual reports that include information on all customer generators in general, and net-metering customers in particular. This information is valuable in judging the effectiveness of a state's policy and in determining the true costs and benefits of net metering to customers and utilities.

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17. Interstate Renewable Energy Council. (2007) *Interconnection Standards for Distributed Generation Table*. IREC's Connecting to the Grid Project. August. http://www.irecusa.org/fileadmin/user_upload/ConnectDocs/IC_Table.pdf

18. This section is based on a Department of Energy/Million Solar Roofs publication. For more information see: National Renewable Energy Laboratory. (2005) *Million Solar Roofs Case Study: Overcoming Net Metering and Interconnection Objections New Jersey MSR Partnership*. September. http://www.nrel.gov/docs/fy05osti/38666.pdf

19. ibid.

20. PG&E Press Release, available http://www.pge.com/suppliers_purchasing/new_generator/solar_wind_generators/disconnect_switches/ SMUD Press Release available at http://www.smud.org/news/releases/07archive/02_21solar.pdf

21. National Renewable Energy Laboratory. (2005) *Million Solar Roofs Case Study: Overcoming Net Metering and Interconnection Objections New Jersey MSR Partnership*. September. http://www.nrel.gov/docs/fy05osti/38666.pdf

22. 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, ASES Solar 2003, Proceedings of 32nd ASES Annual Conference.

23. New Jersey's Clean Energy Program. (2006) Supported Solar Installations. March.

24. New Jersey's Clean Energy Program. (2006) Supported Solar Installations. March. It is questionable whether it is even legal for states to pass legislation that would require utilities to purchase net excess generation at anything other than the avoided cost. The federal Public Utilities Regulatory Policies Act (PURPA) requires utilities to purchase electricity from qualified renewable energy facilities at the avoided cost and states that mandate any other price may be deemed in violation of PURPA. Courts have yet to settle whether states have ultimate jurisdiction to determine the rate at which net metered electricity must be purchased or if net metered customers constitute PURPA qualified facilities, in which case Congress would have to amend PURPA to allow states to set rates that exceed avoided costs.

SIMPLE SOLUTIONS: MODEL RULES

Applying the lessons we have learned from thirty-nine statewide net-metering programs, IREC has crafted model interconnection standards and net-metering regulations for use by state utility commissioners. As states consider adopting or revising programs in 2008, these models provide an easy way to emulate effective programs and to 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 our view that to negotiate 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.

The website links for IREC's model rules are located in Appendix B.

NOTES FOR THE FUTURE

We observe that despite scores of policy developments in 2006 and 2007, and in some cases vast improvements in the interconnection standards and net-metering rules and regulations in several notable states, New Jersey continues to maintain a leadership role among all states in both of these critical policy areas. (This is not to say that the New Jersey rules cannot be enhanced or that there are not state rules that have improved upon the New Jersey rules in certain discrete areas.) In several areas, New Jersey has adopted policies that go beyond the simple removal of barriers to actual encouragement of the use of consumer-sited DG. In order to advance the use of clean and renewable distributed generation, we encourage states to improve upon the best practices in New Jersey—that is, to adopt those rules as a starting point and then adopt additional best practices developed in more recent state rulemaking proceedings.

As states continue to discuss and implement new interconnection standards and net-metering policies, there will invariably be improvements in standard practices that were not anticipated when we developed the point and grading scale used for this report. As those improvements arise, our point and grading scale will be modified to accommodate them. Conversely, the scale may also need to be revised to downgrade states that erect unforeseen new barriers. In sum, the grading and point scale is subject to ongoing revision to address evolution and devolution in the interconnection and net-metering policy arena. Of course, best practices have a way of becoming commonplace, and this, too, will require a scoring adjustment. For example, as we approach one dozen states with a 2-MW system capacity limit for net metering, this once aggressive policy stance will be regarded as commonplace, and only larger limits will obtain maximum points.

APPENDIX A: STATE SCORING SPREADSHEET

NET METERING

STATE	Total	Grade	System Capacity	Program Capacity	Rollover	Metering Issues	RECs	Eligible Tech	Eligible Customers	Aggregate Meters	Meter Change	Safe Harbor	Bonus	Standby	Per KWh Fee
IREC Model	17.5	A	5	2	0.5	2	1	1	2		1	3			
New Jersey	17.5	A	5	2.5	1	2	1	1	1		1	3			
Colorado	17.5	A	5	2	1	2	1	0.5	2	1		3			
Pennsylvania	17	A	5	2.5	0	2	1	0.5	1	1	1	3			
Maryland	16	A	5	2.5	0	2	1	0.5	2			3			
California	15.5	A	4	2	1	2	1	0.5	2			3			
Oregon	14.5	B	5	2.5	1	2	1	1	1	1					
Delaware	13.5	B	5	1	0.5	2		1	1			3			
Iowa	11	B	2	2.5	1.5	2		1	2						
Nevada	11	B	4	1	1.5	2	0.5	1	2					-1	
Connecticut	10	B	5	2.5	0.5			1	2					-1	
Ohio	10	B	5	1	-1	2		1	2						
New Mexico	9	B	5	2.5	-2	2		0.5	2					-1	
Arkansas	8.5	C	2	2.5	0	2	1	1	1					-1	
New Hampshire	8.5	C	1	1	1.5	2		1	2						
Rhode Island	8.5	C	4	0	0	2		0.5	2						
Hawaii	8	C	0	0.5	0	2		0.5	2			3			
Maine	8	C	1	2.5	0	2		0.5	2						
Louisiana	7.5	C	1	2.5	1.5	2		0.5	1					-1	
Virginia	7.5	C	2	1	0.5	2		1	1						
North Dakota	7	C	1	2.5	-2	2	1	0.5	2						
Minnesota	6.5	C	0	2.5	1			1	2						
Massachusetts	6.5	C	1	2.5	-2	2		1	2						
Montana	6.5	C	0	2.5	0	2		1	1						
Vermont	6.5	C	-1	1.5	0			1	2	1	0	3	0	-1	
Missouri	6	C	1	2	-2			1	1		3				
Washington	5.5	D	1	0.5	0	2		1	2					-1	
New York	5	D	2	0	0.5	2		0.5	0	0	0	0	0	0	
Texas	5	D	0	2.5	-2	2		0.5	2						
Kentucky	4.5	D	-1	0	1.5	2		0	2						
Michigan	4.5	D	0	-0.5	0	2		1	2						
Wyoming	4.5	D	0	2.5	0.5	2		0.5	-1						
Oklahoma	4	D	1	2.5	-3	2		0.5	1						
Indiana	3.5	D	-1	0	1.5	2		1	0						
West Virginia	3.5	D	1	2.5	0			1	-1						
Utah	2.5	F	0	-0.5	0	0		1	2						
D.C.	2	F	1	2.5	1.5	2	-2.5	0.5	2						-5
Georgia	0.5	F	-1	0	0			0.5	1						
North Carolina	0	F	0	0	0	-1	-1	1	1						
Wisconsin	-0.5	F	1	2.5	1.5		-5	0.5	-1						

INTERCONNECTION

STATE	Total *	Grade	Eligible Tech	System Capacity	Breakpoints	Timeliness	Interconnection $	Engineering $	External Disc.	Certification	Tech Screens	Spot Networks	Area Networks	Standard Form	Insurance	Disputes	Misc.
IREC Model	22.5	A	0	0	2	1	1	1	1	0	1	2	2	1	1	2	
New Jersey	12.5	B	-1	-1	0	1	1	1	1	0	1	1	1	-1	1	0	
Arizona	9	B	0	0	0	-1	0	0	-1	1	1	1	0	0	0.5	0	0
California	8.5	C	0	0	-1	1	1	0	-1	0	-1	0	0	1	1	0	
Ohio	8.5	C	0	0	-1	0		0	-2	-1		0	1	1	1	2	
Texas	8.5	C	0	0	1	-1			-2	-1			0	1	1	2	
New York	8.5	C	0	-1	0	-1	1	0	-2	0	-2	1	1	1	1	2	0
Colorado	8	C	-1	0	0	0	0	0	0	0	0	1	0	0	0	0.5	
Oregon	7	C	0	0	0				-1	0			0	-0.5	1	0	
Massachusetts	6.5	C	0	-4	-1	0	1		-1	0	0	1	-1	1	1	2	
Georgia	6.5	C	0	-4		0	0		0	0	0		0	0	1	2	
New Mexico	6.5	C	0	0	-1	-1	1		-2	0			0	1	-1	2	
Vermont	6.5	C	0	-3		0	1	0	-2	1	-1	0	-1	1	1	2	
Minnesota	7.5	C	0	0		0	1	1	-2	0			0	0	-2	2	
Rhode Island	5.5	D	0	-4	-1	1			1	-1			0	1	1	0	
Wisconsin	5.5	D	0	0	1	-1			-2				0	0	-2	2	
West Virginia	5	D	0	-1	-1	0	1		-2	0	0		0	0	0.5	0	
Arkansas	4.5	D	-1	-3	-2	1			-1	0			0	1	0	2	
New Hampshire	3.5	D	-1	-4		-1			-1	-1			0	1	1	2	
Virginia	4.5	D	-1	-3					-1	0			0	1	1	0	
Iowa	4	D	-1	-3		0	0	1	0	1	0	-1	-1	-0.5	1	0	
Maryland	3.5	D	-1	0	1	-1	0	0	-2	1	0	1	0	-1	1	0	-3
Montana	3.5	D	-1	-4					0	-1			0	1	1	0	
Michigan	3.5	D	1	-4		-1	1	1	-2	-1			0	1	0		
Indiana	3.5	D	0	-4			1		-2	0			0	1	-2	2	
Pennsylvania	3.5	D	-1	-1	0	-1	0	0	-2	0	-1	1	0	0	0	2	-1
Connecticut	3	D	0	-4	1	-0.5	1		-2	0		0	-1	1	-2	2	
North Carolina	2.5	F	0	-4	-1	-1	1		-2	0	-1		1	1	1	0	
D.C.	1.5	F	0	-4	-2				0	0				0	0	0	
Wyoming	1.5	F	-1	-4					-2	0			0	0	1	0	
Louisiana	0.5	F	0	-4	-1	-1			-2	0			0	0	1	0	
Delaware	0.5	F	0	-2	-1				0	0	-3		0	1	-2	0	
Hawaii	0.5	F	0	-4		1			-2	0			0	0	-2	0	
Utah	0	F	-1	-4					0	0	-2		0	-0.5	1	-1	
Washington	0	F	0	-4			1	0	-2	0	-2	1	-1	-0.5	1	-1	
Missouri	-2	F	0	-3	-1	-1	-1	0	-2	0	-2			0	0.5		

*Note: 7.5 points were added to all Interconnection scores to normalize Interconnection vs. Net Metering

APPENDIX B: IREC'S MODEL NET-METERING RULES AND MODEL INTERCONNECTION STANDARDS

Model Net-Metering Rules

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 up to 2-MW in capacity.

These rules are available for download here:
http://www.irecusa.org/fileadmin/user_upload/ConnectDocs/NM_Model.pdf

Model Interconnection Standards and Procedures for Small Generator Facilities

IREC's model interconnection rules incorporate the best practices of small-generator interconnection standards developed by various state governments, the FERC, the NARUC , and the Mid-Atlantic Distributed Resources Initiative (MADRI). IREC's model rules include four levels of interconnection for systems up to 10-MW in capacity.

These standards are available for download here:
http://www.irecusa.org/fileadmin/user_upload/ConnectDocs/IC_Model.pdf

IREC

www.irecusa.org

The Interstate Renewable Energy Council's (IREC) mission is to accelerate the sustainable utilization of renewable energy sources and technologies in and through state and local government and community activities.

IREC focuses on some of the current and often difficult issues impacting expanded renewable energy use such as rules that support renewable energy and distributed resources in a restructured market, connecting small-scale renewables to the utility grid, developing quality credentials that indicate a level of knowledge and skills competency for renewable energy professionals, and getting the right information to the right people.

IREC's members include state energy offices, city energy offices, other municipal and state agencies, national laboratories, solar and renewable organizations and companies, and individual members. In addition, IREC works with many partners including the federal government, national environmental and municipal organizations, regulatory commissions, state-appointed consumer representatives, energy service providers, utility groups, universities and research institutes.

Vote Solar Initiative

www.votesolar.org

The Vote Solar Initiative is a non-profit organization with the mission of stopping global warming and increasing energy independence by bringing solar energy into the mainstream.

Stopping global warming is the challenge of this century —and our success will hinge on our ability to transition to renewable energy. Solar energy—clean, homegrown, and reliable—has the potential to play a large part of the solution. While solar is the fastest growing energy source in the world, we've just scratched the surface of its potential.

Vote Solar is working on the key policies necessary to bring solar to scale. Vote Solar works with state governments to build sustainable solar markets, removing regulatory barriers and laying the necessary groundwork for a solar future. And Vote Solar works with cities to build large-scale and cost effective solar projects, building the economies of scale necessary to bring down costs.

Polls show that Americans overwhelmingly want greater investment in solar and other renewable energy sources. We turn that desire into results. Join us, and we'll let you know about opportunities to take action—and help jumpstart the solar revolution.

Network for New Energy Choices

www.newenergychoices.org

The Network for New Energy Choices (NNEC) promotes safe, clean, and environmentally responsible energy options. We advocate for energy conservation, energy efficiency and renewable energy as the solutions to our energy crisis and we work to transform the public consciousness about the way we produce, distribute and consume energy.

Today's energy system relies on polluting and inefficient technologies. This energy model is harming human health and the environment, with potentially catastrophic consequences for the planet's climate.

The nonprofit organization GRACE created the Network for New Energy Choices in 2006 to raise awareness about the problems with our energy system and to empower individuals and communities to choose sustainable energy solutions.

Collaborating with a growing coalition of consumers, grassroots organizations, academics, and policymakers, NNEC uses creative communication, internet advocacy, and public education to bring about a new world of energy choices.

Solar Alliance

www.solaralliance.org

The Solar Alliance is an alliance of leading photovoltaic manufacturers and installers focused on helping legislators, regulators and utilities make the transition to solar power. The Solar Alliance provides the technical and policy expertise that results in programs that best serve the interests of all residential, commercial and government ratepayers.

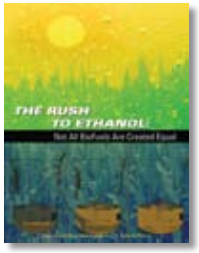
IREC
Interstate Renewable Energy Council

NNEC

Vote Solar

Solar Alliance
The PV Industries in the States

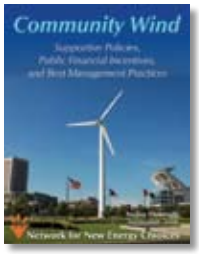
NNEC Publications



The Rush to Ethanol:

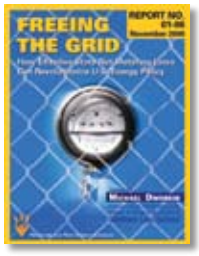
Not All Biofuels Are Created Equal

July 2007
A report by Food & Water Watch, the Network for New Energy Choices, and the Institute for Energy and the Environment at Vermont Law School provides comprehensive analysis and recommendations for U.S. biofuels and transportation policies.



Community Wind

Supportive Policies, Public Financial Incentives, and Best Management Practices
September 2006



Freeing The Grid

How Effective State Net-metering Laws Can Revolutionize U.S. Energy policy

NO 01-06 Nov. 2006
Foreword By Michael Dworkin
Professor of Law and Director of the Institute for Energy & the Environment
Vermont Law School

Renewing America:

The Case for Federal Leadership on a National RPS

NO 01-07 Jun. 2007
Christopher Cooper,
Senior Policy Strategist
Dr. Benjamin Sovacool,
Senior Research Fellow
Foreword By Marilyn Brown
National Commission on Energy Policy

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FREEING THE GRID

2007 EDITION

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