



## Solar Energy Technology and Policy Reference Guide

Increasing energy demand, rising energy costs, and climate change are growing concerns that State governments may need to address. While these issues may be addressed in a number of ways, one avenue for handling these concerns may be the incorporation of solar energy and its supporting technologies into the energy marketplace and into regulatory practices. With the proper incentives and regulations in place, solar technology can help offset growth in peak demand, avoid carbon dioxide emissions, and in some cases stabilize or reduce customer energy costs. Many of the opportunities for broadening the adoption of solar technology can be facilitated through State-level actions by legislatures, energy offices, and public utility commissions.

This reference guide is a collection of solar energy resources compiled for State regulators and policy-makers. The websites, publications, maps, and tables below represent information provided by the federal government, trade associations, and academic institutions. These resources address a wide range of topics pertaining to solar technologies and policies including solar energy potential, interconnections and net-metering standards, renewable portfolio standards, and financial incentive structures.

### Websites:

The following websites provide resources including overviews of solar energy technologies, technical and policy publications, charts and maps of state solar energy potential and policy initiatives, and research and development efforts underway around the country advancing solar energy technology deployment.

1. Database of State Incentives for Renewables & Efficiency (DSIRE): [www.dsireusa.org](http://www.dsireusa.org)
2. Department of Energy's Solar America Initiative: <http://www1.eere.energy.gov/solar/index.html>
3. Interstate Renewable Energy Council: <http://www.irecusa.org/>
4. National Renewable Energy Laboratory: <http://www.nrel.gov/solar/>
5. Network for New Energy Choices: <http://www.newenergychoices.org>
6. North Carolina Solar Center: <http://www.ncsc.ncsu.edu/>
7. Solar Electric Power Association: <http://www.solarelectricpower.org/>

### Publications:

#### *Costs and Incentives*

*Letting the Sun Shine on Solar Costs: An Empirical Investigation of Photovoltaic Cost Trends in California.*

Wiser, R., M. Bolinger, P. Cappers, and R. Margolis. LBNL-59282, NREL/TP-620-39300. January 2006.

<http://www.nrel.gov/pv/pdfs/39300.pdf>

*Designing PV Incentive Programs to Promote Performance: A Review of Current Practice.*  
Barbose, G., R. Wiser, and M. Bolinger. LBNL-61643. October 2006  
<http://eetd.lbl.gov/ea/ems/reports/61643.pdf>

*PV Incentive Design Handbook*  
Hoff, Thomas. Prepared for National Renewable Energy Laboratory. September 15, 2006.  
<http://www.solarelectricpower.org/docs/PVIncentiveDesignHandbook.pdf>

### ***Interconnection and Net Metering***

*Analysis of US Interconnection and Net-Metering Policy*  
Haynes, Rusty (NCSC) and Cook, Chris Cook (IREC). North Carolina Solar Center. 2006.  
[http://www.ncsc.ncsu.edu/research/documents/policy\\_papers/ASES2006\\_Haynes\\_Cook\\_.pdf](http://www.ncsc.ncsu.edu/research/documents/policy_papers/ASES2006_Haynes_Cook_.pdf)

*Connecting to the Grid*  
Haynes, Rusty and Whitaker, Chuck. North Carolina Solar Center and the Interstate Renewable Energy Council. 5<sup>th</sup> Edition. July 2007.  
[http://www.irecusa.org/fileadmin/user\\_upload/ConnectDocs/IC\\_Guide.pdf](http://www.irecusa.org/fileadmin/user_upload/ConnectDocs/IC_Guide.pdf)

*Freeing the Grid: How Effective State Net Metering Laws Can Revolutionize U.S. Energy Policy.*  
Network for New Energy Choices. November 2006.  
<http://www.newenergychoices.org/uploads/netMetering.pdf>

*IREC Model Net-Metering Rules*  
Interstate Renewable Energy Council. MR-NM2005. November 2006.  
[http://www.irecusa.org/fileadmin/user\\_upload/ConnectDocs/NM\\_Model.pdf](http://www.irecusa.org/fileadmin/user_upload/ConnectDocs/NM_Model.pdf)

*IREC Model Interconnection Standards and Procedures for Small Generator Facilities.*  
Interstate Renewable Energy Council. MR-I2005.  
[http://www.irecusa.org/fileadmin/user\\_upload/ConnectDocs/IC\\_Model.pdf](http://www.irecusa.org/fileadmin/user_upload/ConnectDocs/IC_Model.pdf)

*Model Interconnection Procedures and Agreement for Small Distributed Generation Resources*  
National Association of Regulatory Utility Commissioners. October 2003.  
<http://www.naruc.org/goto.cfm?returnto=displayindustrynews.cfm&industrytopicnbr=380&page=h>  
[http://www.naruc.org/associations/1773/files/dgiaip\\_oct03.pdf](http://www.naruc.org/associations/1773/files/dgiaip_oct03.pdf)

### ***RPS***

*Renewable Portfolio Standards: A Factual Introduction to Experience from the United States.*  
Wiser, R., C. Namovicz, M. Gielecki, and R. Smith. LBNL-62569. May 2007  
<http://eetd.lbl.gov/ea/ems/reports/62569.pdf>

*Who Owns Renewable Energy Certificates? An Exploration of Policy Options and Practice.*  
Holt, E., R. Wiser, and M. Bolinger. LBNL-59965. April 2006  
<http://eetd.lbl.gov/ea/ems/reports/59965.pdf>

### ***Potential Capabilities and Benefits***

*Brighter than a Hundred Suns: Solar Power for the Southwest.*

Leitner, A.; Owens, B. January 2003.: NREL/SR-550-33233.  
<http://www.nrel.gov/csp/pdfs/33233.pdf>

*Economic, Energy, and Environmental Benefits of Concentrating Solar Power in California.*  
Stoddard, L.; Abiecunas, J.; O'Connell, R. April 2006.; NREL/SR-550-39291.  
<http://www.nrel.gov/csp/pdfs/39291.pdf>

*Quantifying the Life-Cycle Environmental Profile of Photovoltaics and Comparisons with other Electricity-Generating Technologies*  
Fthenakis, V.M. and Kim, H.C. Brookhaven National Laboratory. May 2006.  
<http://www.solarelectricpower.org/index.php?page=library>

*Update: Effective Load-Carrying Capability of Photovoltaics in the United States.*  
Perez, R.; Margolis, R.; Kmieciak, M.; Schwab, M.; Perez, M. 2006.: NREL Report No. CP-620-40068.  
<http://www.nrel.gov/pv/pdfs/40068.pdf>

*Valuing the Time-Varying Electricity Production of Solar Photovoltaic Cells.*  
Severin Borenstein, University of California Energy Institute, Center for the Study of Energy Markets. March 2005.  
<http://www.ucei.berkeley.edu/PDF/csemwp142.pdf>

*Very Large-Scale Deployment of Grid-Connected Solar Photovoltaics in the United States: Challenges and Opportunities.*  
Denholm, P.; Margolis, R. (2006).; NREL Report No. CP-620-39683.  
<http://www.nrel.gov/pv/pdfs/39683.pdf>

## **Maps and Charts**

### ***DSIRE Summary Maps and Tables:***

The DSIRE website contains maps and charts highlighting various state initiatives relating to solar energy usage. The maps provide state-by-state including: net metering, RPS, and solar/distributed generation provisions in RPS policies.  
<http://www.dsireusa.org/library/includes/topic.cfm?TopicCategoryID=6&CurrentPageID=10&EE=1&RE=1>

The Financial Incentives for Renewable Energy table shows tax incentives, grants, loans, rebates, industry recruitment, bond programs, and production incentives.  
<http://www.dsireusa.org/summarytables/financial.cfm?&CurrentPageID=7&EE=1&RE=1>

The Rules, Regulations, & Policies for Renewable Energy table shows public benefits funds, renewables portfolio standards, net metering, interconnection standards, extension analysis, generation disclosure, contractor licensing, equipment certification, solar/wind access laws, construction & design standards (including building energy codes and energy standards for public buildings), requirements to offer a green power product, and green power purchasing/aggregation policies.  
<http://www.dsireusa.org/summarytables/reg1.cfm?&CurrentPageID=7&EE=1&RE=1>

### ***IREC State-by-State Tables:***

IREC's state-by-state net-metering table allows users to compare state policies and voluntary utility programs based on several key components: maximum individual system capacity, maximum aggregate net-metered capacity, eligible customer classes, eligible technologies, treatment of net excess generation (NEG), interconnection standards, and the types of utilities affected.

[http://www.irecusa.org/fileadmin/user\\_upload/ConnectDocs/NM\\_Table.pdf](http://www.irecusa.org/fileadmin/user_upload/ConnectDocs/NM_Table.pdf)

IREC's state-by-state table of interconnection standards for distributed generation (DG) allows users to compare state policies and voluntary utility programs based on several key components: eligible technologies, maximum individual system capacity, application costs, additional insurance requirements, screening processes for studies, external disconnect switch requirements, and provisions for network interconnection.

[http://www.irecusa.org/fileadmin/user\\_upload/ConnectDocs/IC\\_Table.pdf](http://www.irecusa.org/fileadmin/user_upload/ConnectDocs/IC_Table.pdf)

### ***NREL Solar Maps***

Photovoltaic Maps:

This NREL's site houses both static and dynamic maps illustrating monthly average daily total solar resource information on grid cells of approximately 40 km by 40 km in size for both PV solar radiation and direct normal solar radiation.

<http://www.nrel.gov/gis/solar.html#csp>

Concentrating Solar Power Resource Maps:

This site provides users with maps that identify the most economically suitable lands available for the deployment of large-scale concentrating solar power plans in the southwestern United States. There are both individual state maps and regional maps.

<http://www.nrel.gov/csp/maps.html>

## **Upcoming Solar Industry Events**

Solar Electric Power Association's Calendar:

<http://solarelectricpower.org/index.php?page=calendar>.

Solar Energy Industries Association's Calendar:

[http://seia.org/cs/meetings\\_and\\_events/events\\_calendar](http://seia.org/cs/meetings_and_events/events_calendar).

Interstate Renewable Energy Council's Calendar:

<http://www.irecusa.org/index.php?id=116>

American Council on Renewable Energy's Calendar:

[http://www.acore.org/conference\\_center](http://www.acore.org/conference_center)