



SIEMENS



www.usa.siemens.com/microsolar

Solar Distributor Toolkit

Answers for Infrastructure

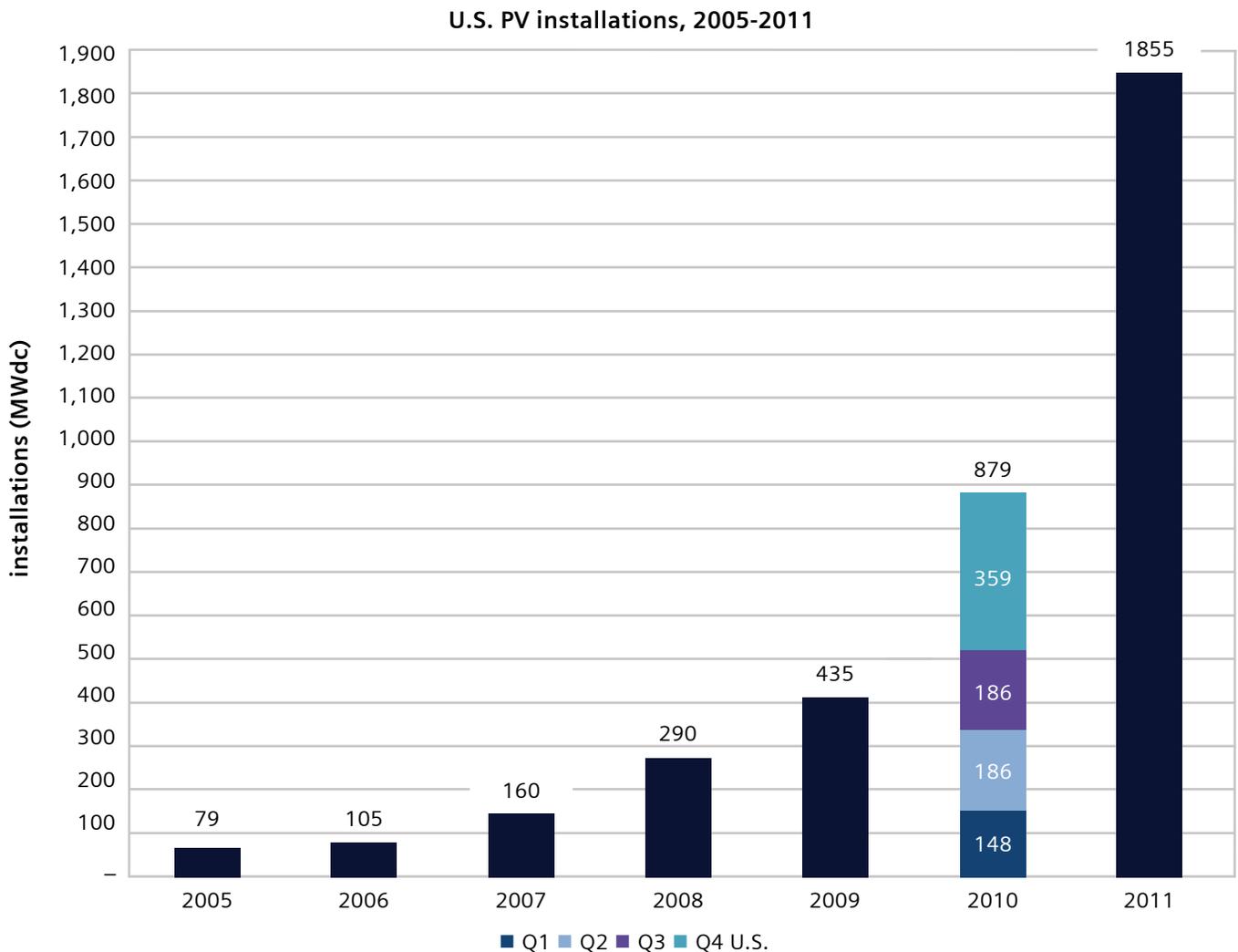
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Introduction

The solar power market in the US has been growing at a very healthy rate for the past three years, due in part from beneficial incentives from electric utilities and governments as well as reductions in the price of solar power. This has all occurred while the greater economy has struggled to grow. Because the price of solar modules, roughly half the cost of a solar installation, have dropped nearly 75% over the past 2 years, the market looks attractive for many years to come.

We at Siemens, a provider of microinverters for the conversion of DC solar power to usable AC power and other balance of system components, have put together a list of invaluable resources for anyone from those just entering the market to industry veterans. These resources range from ways to help find leads to stocking tips to resources on actually doing that first job.



NOTE - These materials do not purport to cover all details or variations in equipment, or to provide for every possible contingency to be met in connection with installation, operation or maintenance. Should further information be desired or should particular problems arise, which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the local Siemens sales office. The contents of these materials shall not become part of or modify any prior or existing agreement, commitment or relationship. The sales contract contains the entire obligation of Siemens. The warranty contained in the contract between the parties is the sole warranty of Siemens. Any statements contained herein do not create new warranties or modify the existing warranty.

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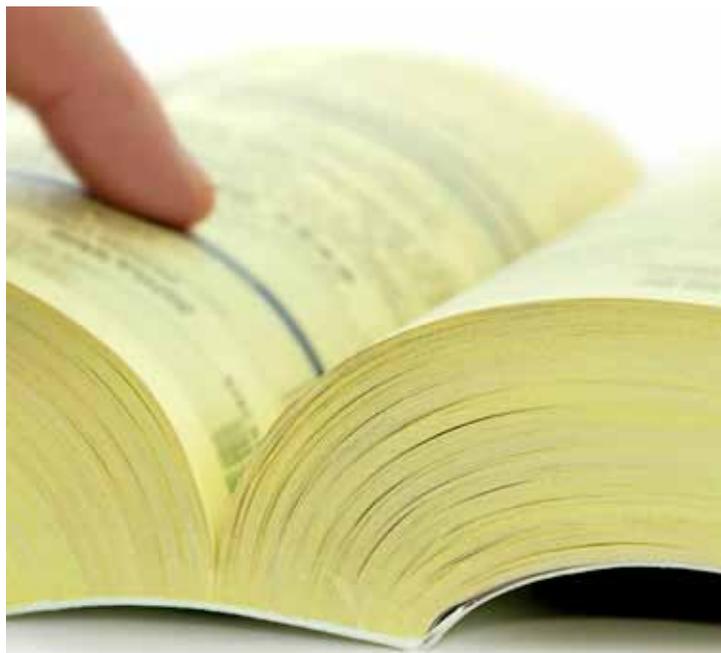
Lead generation

- Canvas your existing network
- Building a new network
 - Get your name on solar directories – usually free press
 - Distributor
 - A list of solar contractor, installers, engineering firms, etc. is included in this document
 - Join local American Solar Energy Society (ASES) or Solar Energy Industry of America (SEIA) chapter to connect with contractors and installers in your area
 - Attend local energy expo/energy saving events with contractors
 - Contractor
 - Maintain an up to date website with options to give non binding quotes or sign up for a binding quote/site assesment
 - Attend local community events and talk about the benefits of solar
 - Generate interest through local news – offer a reporter a free quote on their home
 - Get involved in social media – solar buyers tend to be more tech savvy and hungry for information
 - Buy leads at <http://pros.coolerplanet.com/> or other solar lead website



Solar yellow pages

- National directories of solar contractors, installers, and distributors can be found at:
 - <http://www.solarworksforamerica.com/States/>
 - http://www.seia.org/cs/membership/member_directory
 - <http://www.nabcep.org/installer-locator>
 - <http://www.solarpowerdirectory.com/>
- For State directories, please refer to the back of this brochure.



CRM tools

- Many solar jobs will involve multiple iterations and quotes to help find the best balance of system size, cost, and payback period
- We recommend a tool to track when the last quote was given, status of buying decision, project management, etc.
 - Siemens Solar Pro
 - Existing CRM or tracking tool
 - Paid services
 - Salesforce.com or Oracle Siebel
 - CPF Tools (www.cleanpowerfinance.com)



Site layout and shading analysis

A major piece in early assessment of whether a solar system is feasible and the payback of the system is the site assessment. This involves surveying the area, slope, and direction of the roof or ground and sources of shading. There are a variety of tools to help make this process easy and include different types of tools:

Site Assessment Hardware

Solar Pathfinder - \$250

Wiley Electronics Acme Solar Site Evaluation tool (ASSE) (camera included) - \$600

Solmetric Suneye (camera included) - \$1400

Drafting

Siemens simplified site layout tool

AutoCAD or other 2D drafting systems

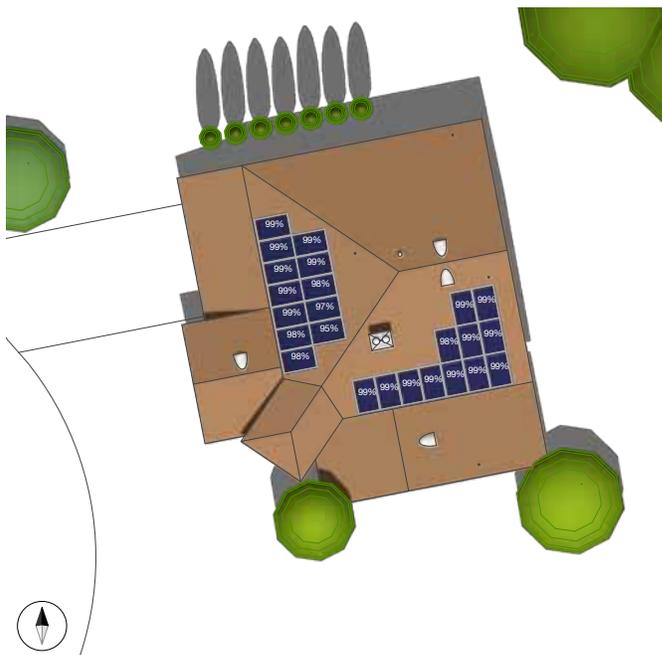
Less accurate but less expensive and time consuming options

■ Free online tools

- Google SketchUp is a free online modeling program offered by Google at <http://sketchup.google.com/>
- Array-o-matic is an addon to Google SketchUp that allows you to easily calculate how many modules will fit on a roof based off aerial or satellite images, such as from Google Maps. The tool is available at: <http://brightharvestsolar.com/array-o-matic/>

■ Online paid services

- Tools available online that take satellite photography data and determine the amount of shading over the year and solar insolation
 - Precigeo (www.precigeo.com)
 - Bright Harvest Solar (www.brightharvestsolar.com)



Other solar hardware

The Siemens Microinverter System and other Siemens electrical distribution product are only a portion of any solar installation. The other major product decisions are the solar modules and racking system. Below are a couple manufacturers we have had success with in the past:

Modules

US manufacturer		Tier 1 Chinese manufacturer	
Solar World, Ecosolargy, Suniva		Trina, Suntech, Yingli	
Pro:	Con:	Pro:	Con:
US made qualifies for "Buy America" content and is immune from potential tariffs on foreign product"	Usually a few percent more expensive	Best price	Potential increases from tariffs
Willing to ship in pallet quantities (20 modules/pallet)			Usually will only ship by containers (500 modules/container)

Racking and Mounts

Unirac (www.unirac.com)		DPW Solar (www.dpwsolar.com)		Mounts	
Pro:	Con:	Pro:	Con:	S-5 (www.S-5.com)	Quick Mount PV
Number 1 market share	High yearly dollar commitment	Good price	Not the most feature rich	Designed for standing seam metal roof	Designed for shingle, tile, and shake roofs
Feature rich product		Will to deal in smaller quantities			



Incentive types

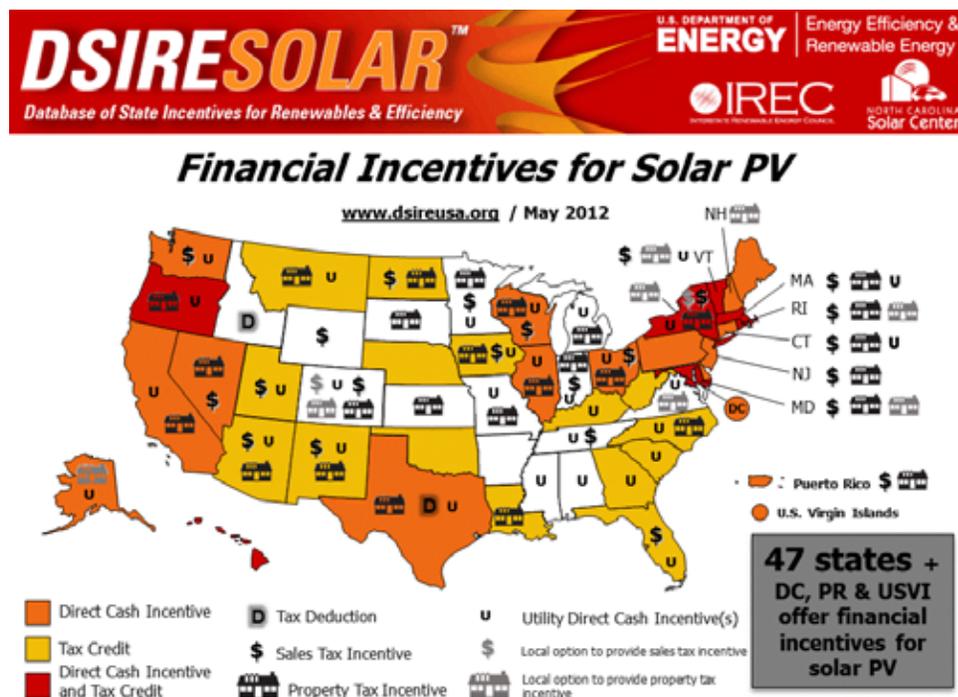
While the cost of going solar is drastically declining every day, incentives still play a role in making solar even more attractive. It is good practice to familiarize yourself with incentives in your region. These incentives can come in many different forms and can affect the payback period of solar project. They usually fall into two categories; cost based where they are usually calculated as a percentage of the system cost, and performance based which is determined by how much energy the system produces.

Cost based

- Tax credit
 - Credit against income tax
 - Different than deduction (depends on tax rate while credit is against the bottom line)
 - Not always refundable (if you have more credit than income tax due, you can not get a refund that year but can roll over to the next year)
- Tax abatement
 - Many states have waived sales and property tax on solar equipment
- Rebates
- Accelerated depreciation
 - Acts like a timing incentive
 - Owner can claim the cost of a 25 year asset in 5 years or less

Performance based

- Feed in Tariff (FIT)
 - Energy from solar system is metered separately from energy consumed
 - Price paid for solar electricity by utility is greater than the retail rate paid for using electricity
- Solar Renewable Energy Credit (SREC)
 - Used to meet state Renewable Portfolio Standards (RPS)
 - The output of 1 MWh is usually equal to one credit and the value of the credit depends on the open market price (~\$20-\$600)
- Net metering
- Accelerated depreciation
 - Owner is credited for power generated in excess of their load (spins the meter backward)



Incentive sources

The incentive types mentioned previously can come from a variety of different sources, though usually from the government or electric utilities. Some are standard and in place for a while, like the Federal Investment Tax Credit, and others can come be in place for less than a day, like some cash rebate programs. Research these early and often.

Federal government

- Tax credit for 30% of the installed cost of the system
- No cap, includes equipment cost and installation
- In place until 2016

State government

- Varies by state (5% to 15%)
- Usually tied to state renewable portfolio standards

Local government

- Varies by jurisdiction (0%-10%)
- Opportunity to create “green communities”

Electric utility

- Varies by utility (0%-40%)
- Utilities are being required by state Public Utility Commissions (PUC) to offer solar
- Value of distributed solar is greater than other forms of renewables because it is generated during the middle of the day when power is most expensive and is consumed where it is generated so it doesn't affect transmission capacity

More information:

- www.dsireusa.org

Financing a system

Sometimes the large up front cost of solar can cause a bit of sticker shock. Certain companies in regions of the country have offered some creative financing solution including:

- Buy or home equity loan
 - Often the best long term value but also the highest upfront cost
 - Owner buys the system outright or gets a loan from lender using home equity as collateral (think second mortgage)
 - Owner responsible for maintenance, though little is required
- Lease
 - 3rd party owned and maintained
 - Monthly payments to 3rd party based on total cost of system with option to buyout at end of lease
 - Check for escalation in lease payments over time
 - Performance guarantee and system monitoring usually included
 - System must be bought out or contract transferred to new homeowner if property is sold
- PPA
 - 3rd party owned and maintained
 - Payments to 3rd party based on the power output of the system. (i.e. solar power costs \$0.XX/kWh) Solar power cost is usually lower than the retail rate from the local utility.
 - Usually option to buyout at end of contract
 - Check for escalation in energy rate over time
 - Performance guarantee and system monitoring usually included
 - System must be bought out or contract transferred to new homeowner if property is sold

The Siemens Microinverter System is the most bankable solution for solar financing providers; some of the prominent solar leasing providers include: www.SunRunHome.com or www.BrightGrid.com

Quoting a system

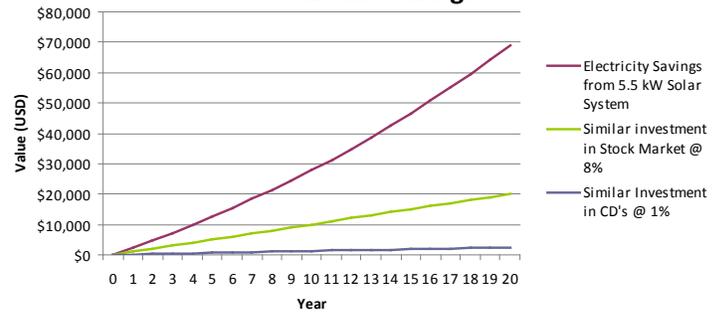
■ Tips

- Focus on payback period and not upfront cost
 - Many times a financed system can have greater monthly utility savings than the monthly loan payment - it pays the homeowner from day one
- Be sure to note rise in utility bills in your region and savings on utility bills
- Compare to any other investment, like stocks or bonds
 - Return is almost always much better than average
- Use solar lease option if upfront cost is too large to overcome
 - Buying out a system usually has the best ROI but some still prefer financing

■ Tools

- Siemens Solar Pro
- Quickbooks for Solar
- Microsoft Excel or Word
- ModSolar, OnGrid, etc.

Financial Return from Solar System versus Stocks and Savings



Earning expectations

■ Distributor

- 5-8% margin on inverters and modules and 12-15% on racking and balance of system
- Not a get rich quick scheme!
- Good opportunity for pull through business (service upgrades, wiring, etc.)

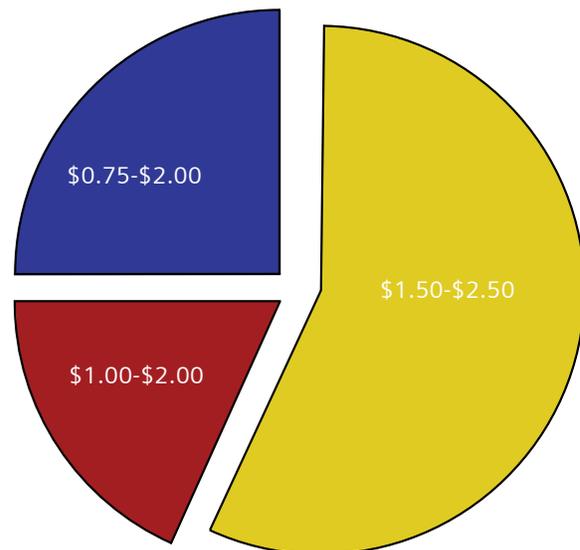
■ Contractor

- Contractors will usually bid a \$ per watt figure with all costs calculated in the figure
 - Get quotes from other local installers as well to determine market price
- A reasonable estimation, before all applicable incentives is \$4 - \$6 per watt of the PV system
- This usually broken into:
 - \$1.50 - \$2.50/watt for modules
 - \$1.00-\$2.00/watt for inverters, racking, and other balance of system (BOS) items
 - \$0.75-\$2.00/watt for installation, permits, margin, and other soft costs

■ Modules

■ Balance of system

■ Soft costs



Technical drawings and applying for permits

- Permitting can vary by locality, check with local AHJ for codes
 - Many times can be tied to rebates, check www.dsireusa.org for links to rebate requirements
- Main sections of NEC's to familiarize with:
 - Section 690: Solar Photovoltaic (PV) systems
 - Section 705: Interconnected electric power production sources
- Most permits require a site layout (which was mentioned above) and one line diagram for the electrical design. Two tools for this include:
 - Siemens simplified site diagrams
 - AutoCAD or modelling software of your choice
- Voltage rise calculations
 - Solar inverters act as current source and as such cause voltage to rise at the microinverters versus the Point of Common Connection (PCC)
 - For generic systems, use the Siemens Voltage Rise Calculation tool at www.usa.siemens.com/microsolar
 - For more complex systems, use Excel or other calculation tool with the walkthrough provided at www.usa.siemens.com/microsolar
- Roof, wind, and snow load calculations
 - We recommend you follow the American Society of Civil Engineers (ASCE) stand 7-05 which has calculations for these loads solar ABCs has a helpful guide for this at: <http://www.solarabcs.org/about/publications/reports/wind-load/index.html>. Many times the racking provider also has useful load calculators. One such packet is provided by Unirac at: www.unirac.com/pdf/ii227.pdf

Installation training

We recommend anyone installing a solar system follow all state and local requirements, which may include general contractor, master electrician, and other licensing. There are however options for solar specific licenses. These include:

- North American Board of Certified Energy Practitioners (NABCEP) (www.nabcep.org)
 - Most recognized name in the solar industry for certification
 - Have certified PV installer and PV technical sales courses
 - Some states are requiring or recommending this certification to qualify for rebates
 - Alabama, Colorado, Connecticut, Kentucky, North Carolina, Utah, New York, Maine, Pennsylvania all have some language related to NABCEP
- Underwriters Laboratories (UL)

Training providers

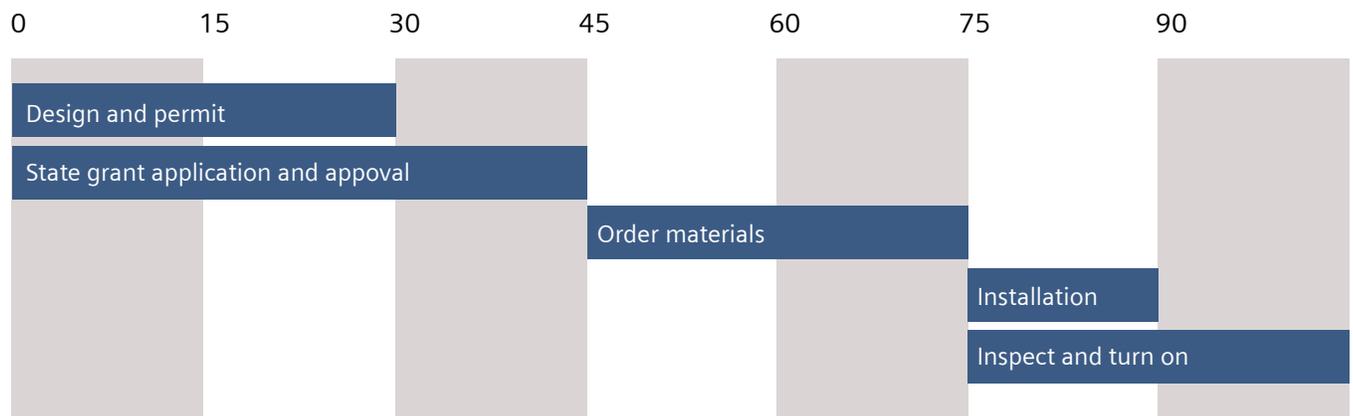
- Siemens
- Local technical college



Doing that first job

- Installation training
 - See previous page
- Partner with a local roofer
 - Roof penetrations and roof safety are the main issues facing electrical contractors
 - Visit your local Allied Building Products or other roofing distributor to find a local roofer
- Project management
 - Call us to find out of 3rd party companies who offer solar project management services
 - Risk still stays with the contractor
 - Perform all the required checks on the Siemens Microinverter Inspector Checklist

Installation schedule in days



Distributor initial stocking tips

If you are completely new to microinverters, here are a couple tips and formulas for determining how many difference pieces to stock. Disclaimer: use at your own risk!

- Microinverters
 - ~90% of systems use a MC4 style inverter (will be different if you stock modules with Tyco connectors like some Samsung, Schott, and Trina models)
- Cabling
 - Usually require 1.3-1.4 drops per microinverter
 - Depending on your customer base, stock 70/30 split of 240/208 if residential or 70/30 of 208/240 if commercial
 - 60-70% of systems use portrait cabling to save cost
- Accessories
 - Recommend about 25-35 microinverters per envoy (25 if you serve more residential, 35 if more commercial)
 - Recommend 1 install kit (ETINSTL) per contractor/installer and then order individuals pieces after that
 - Recommend 1 termination cap (ETTERM10) per 14-16 drops is a common demand
 - Recommend 1 disconnect tool (ETDISC05) per 80 drops is an common demand
 - Recommend 1 seal (ETSEAL10) per 6-8 drops is a common demand
 - Recommend 1 clip (ETCLIP100) per 4 drops

State directory

State	Solar MW in 2010	Links
Alabama	0.2	http://www.al-solar.org/solarites/index.html http://www.gsreia.org/findsolar/
Alaska	~	http://www.solarpowerdirectory.com/city/Alaska.html
Arizona	273	http://www.azsolarcenter.org/directory/companies.html?catid=27
Arkansas	0.6	http://www.arkansasrenewableenergyassoc.org/partners.html
California	542	http://calseia.org/solar-energy-experts http://www.norcalsolar.org/index.php/business-members http://sdres.org/files/memberslinks.html http://www.ocrenewables.org/helpfullinks.html#link2
Colorado	91	http://www.cres-energy.org/member_directory.html
Connecticut	4	http://www.solarconnecticut.org/yellowpages.php http://www.nesea.org/greenpages/
DC	3.5	http://mdvseia.camp7.org/Directory http://www.nesea.org/greenpages/
Delaware	18	http://www.mseia.net/directory/members/view_all http://www.nesea.org/greenpages/
Florida	14	http://www.flaseia.org/Directory/all.html
Georgia	1.6	http://www.gasolar.org/solar_pv_installer.php
Hawaii	40	http://www.hsea.org/membership/member-companies
Idaho	0.2	http://www.idahosolar.org/BusinessMembers.aspx
Illinois	1	http://www.illinoisolar.org/BusinessMembers https://www.midwestrenew.org/businessdirectory http://www.sebane.org/sebane_info/members_overview.asp
Indiana	0.2	http://www.indianarenew.org/about/member-directory/
Iowa	~	http://www.irenew.org/Business_Members.html https://www.midwestrenew.org/businessdirectory
Kansas	~	http://www.kansasenergy.org/solar.htm
Kentucky	0.2	http://kysolar.org/kentucky_solar_installers http://www.kyses.org/id16.html
Louisiana	~	http://www.lses.org/la-solar-pro-sponsors/solar-pros/ http://www.lses.org/la-solar-pro-sponsors/sponsors/ http://www.gsreia.org/findsolar/
Maine	~	http://www.mainesolar.org/Market.html http://www.sebane.org/sebane_info/members_overview.asp http://www.nesea.org/greenpages/
Maryland	22	http://mdvseia.camp7.org/Directory http://www.nesea.org/greenpages/

State directory cont.

State	Solar MW in 2010	Links
Massachusetts	28	http://www.sebane.org/sebane_info/members_overview.asp http://www.nesea.org/greenpages/
Michigan	1.9	http://www.glrea.org/bizMemCategories/contractors.html https://www.midwestrenew.org/businessdirectory
Minnesota	1.7	http://mnrenewables.org/mres-supporters https://www.midwestrenew.org/businessdirectory
Mississippi	0.1	http://www.gsreia.org/findsolar/
Missouri	0.5	http://adminmoseia.hypermart.net/index.php?page=find-a-moseia-installer http://adminmoseia.hypermart.net/index.php?page=alias-2
Montana	~	http://www.solarpowerdirectory.com/city/Montana.html
North Carolina	55	http://energync.org/membership/member-directory
Nebraska	0.2	http://www.ceen.unomaha.edu/NSES/
Nevada	44	http://www.solarpowerdirectory.com/city/Nevada.html
New Hampshire	1.3	http://www.nhsea.org/resource/resource_guide.php http://www.sebane.org/sebane_info/members_overview.asp http://www.nesea.org/greenpages/
New Jersey	313	http://www.mseia.net/directory/members/view_all http://www.nesea.org/greenpages/
New Mexico	116	http://www.nmsea.org/Directory/index.php
New York	60	http://nyseia.memberclicks.net/index.php?option=com_community&view=search&searchId=85238 http://www.sebane.org/sebane_info/members_overview.asp http://www.nesea.org/greenpages/
Ohio	11	http://www.greenenergyohio.org/page.cfm?pageID=1311
Oklahoma	~	http://www.solarpowerdirectory.com/city/Oklahoma.html
Oregon	18	http://solaroregon.org/find-a-professional/
Pennsylvania	88	http://www.mseia.net/directory/members/view_all http://www.nesea.org/greenpages/
Rhode Island	~	http://www.sebane.org/sebane_info/members_overview.asp http://www.nesea.org/greenpages/
South Carolina	~	http://www.solarbusinessalliance.com/index.php/join-sba
Tennessee	18	http://solar.tennessee.edu/images/docs/publications/tnsvc_forprofit_list_oct2011.pdf http://www.tenneseia.com/members.html
Texas	47	http://www.txses.org/solar/content/texas-solar-energy-society%E2%80%99s-business-members
Utah	1.4	http://utsolar.org/index.php/directory/

State directory cont.

State	Solar MW in 2010	Links
Vermont	5	http://www.revermont.org/main/?s=Solar http://www.sebane.org/sebane_info/members_overview.asp http://www.nesea.org/greenpages/
Virginia	2.1	http://mdvseia.camp7.org/Directory
Washington	5	http://solarwa.org/membership/our-members
Wisconsin	5	https://www.midwestrenew.org/businessdirectory
West Virginia	~	http://www.solarpowerdirectory.com/city/WestVirginia.html
Wyoming	0.1	http://www.solarpowerdirectory.com/city/Wyoming.html

Notes:

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