



Launch & Grow Your Solar Business

Jeff Spies – Director of Training

*The AEE Solar training
program is sponsored by:*



High-Performance Solar Energy
Solutions for Long-Term Value



The Only Wholesale
Distributor You'll Ever Need

Biographies



- AEE Solar (est. 1979) is one of the oldest and largest wholesale distributors of renewable energy products and systems.
- David Katz (CEO and Founder) is a pioneer of residential solar PV
- Jeff Spies – AEE Solar Director of Training
 - Degree in Mechanical Engineering from Michigan State University in 1987
 - 19 years experience working with electrical & mechanical motion control systems for industrial automation applications.
 - Extensive technical product training experience throughout North America and overseas.
 - Hired in 2007 to develop training programs for AEE Solar.
 - Organized the 1st and 2nd AEE Solar dealer conferences (based in Mesa, AZ) which were the largest supplier based solar training events in North America.
 - Regularly conducts training workshops at most of the major industry tradeshows and conferences
 - The AEE Solar training webpage has been #1 search result on Google using the search term “Solar Training” for almost 2 years.

Presentation Outline



Part One

1. **History of Residential Solar**
2. **How to become a Solar Dealer**
3. **Renewable energy options**
PV, wind, micro-hydro, solar thermal, solar lighting
4. **Industry players**
5. **Solar markets**
6. **PV configurations**
7. **PV product groups**
8. **Key factors to launching a successful solar business**
9. **Training**
10. **NABCEP certification**

Part Two

11. **Site analysis & system design**
12. **The 4 key partners**
distributor, electrical contractor, roofer, inspector
13. **Incentives & financing**
14. **Dealer cost & profitability**
15. **Effective sales & marketing**
16. **Publications & textbooks**
17. **Code resources**
18. **Organizations**
19. **Helpful websites**
20. **Industry events**

Federal Solar Tax Credit Passes!



- The solar tax credit provisions will:
 - Extend the 30-percent tax credit for 8 years for both residential and commercial solar installations.
 - Eliminate the \$2,000 monetary cap for residential solar electric installations, creating a true 30-percent credit.
 - Can be carried forward 1 year.
 - Extend the credit to off-grid system owners!
 - Allow Alternative Minimum Tax (AMT) filers, both businesses and families, to take the credit.
- Coupled with state and local incentives, many solar customers in the US can get 50-80% of a system cost covered by incentives/rebates/credits.
- Many homeowners are seeing return on investments in a solar PV system within 7-15 years.
 - System life is 30-50 years with inverter replacement in 15 years.
 - Most PV systems will repay the original investment several times over the life of the system.
 - Varies based on state, local, and utility incentives and electrical rates.

AEE Solar History



MICHAEL SUGRUE

- **Founded in 1979 by David Katz – a true solar pioneer**
 - VW Beetles, music, and fire safety
- **Headquartered in Redway, California**
 - Northern California hotbed for off-grid solar PV
 - More than half of residents in Redway area are off the grid!
- **AEE Solar featured in *Inc. Magazine*, Sept 2007 and in the inaugural edition of *SolarPro* magazine, fall 2008.**

The AEE Solar Advantage



- **Proven Products at Competitive Prices**
 - *If AEE carries it, you know you can count on it!*
- **The Widest Selection in the Business**
 - *We stock it all so you don't have to!*
- **Unsurpassed Tech Support and Customer Service**
 - *Our three decades of solar experience support you at every step!*
- **Ongoing, Comprehensive Dealer Training**
 - *We help you master the skills you need to succeed!*
- **The Best Catalog in the Industry**
 - *Use our renowned catalog as your own powerful sales tool!*
- **Fast, Accurate Shipping to Your Job Site**
 - *Get what you need, when and where you need it!*

We help you succeed!



How to Become an AEE Solar Dealer



- Dealer application can be found at www.aeesolar.com
- It's solar *electricity*, so all new dealers must possess knowledge and experience with electrical systems and list this on dealer application.
- If you will be working with grid tie systems, you must either be an electrical contractor or provide information on your electrical contractor partner on the dealer application
- We require all dealer applicants complete BOTH the Beginning and Advanced PV training courses with Solar Energy International or with a comparable IREC ISPQ accredited school.
 - We do give consideration to those that are booked in an upcoming PV training class (you must tell us the training organization and class you are taking)
 - We do accept electrical and HVAC contractors prior to completion of training, but we strongly advise that you complete BOTH the Beginning and Advanced PV training.
 - Those that forgo training have a high failure rate in the industry.
- Proper business status is necessary to become an AEE Solar dealer.
 - Make sure you have all the appropriate licenses (contractor, resale tax, business) for your state.

Renewable Energy Systems



- **Solar Photovoltaic Power**

- Solar PV is most widely available renewable energy resource

- **Wind**

- Good return on investment (ROI) when there is adequate average wind speed
- Limited resource in populated areas of the US

- **Micro Hydro**

- Excellent ROI if you have sufficient head pressure
- Very limited resource - requires water flow over large vertical drop

- **Solar Thermal**

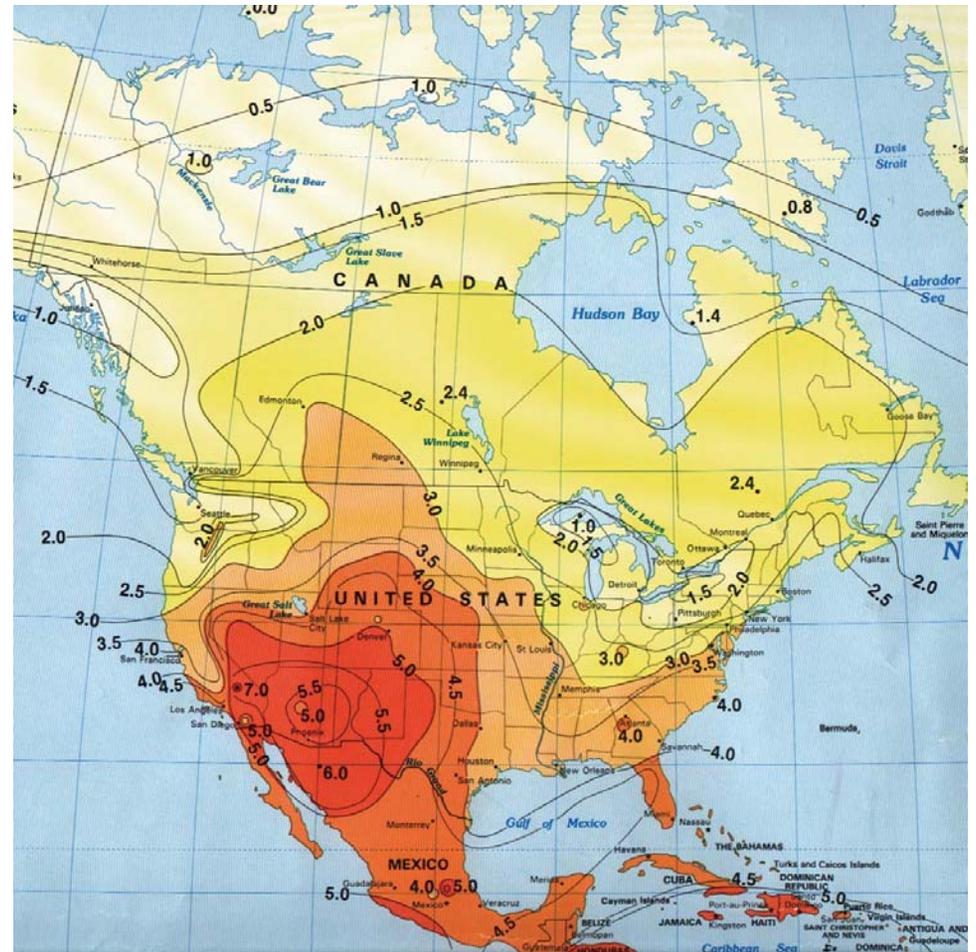
- Water heating, air heating
- High efficiency & good ROI

- **Solar Lighting**

Solar Photovoltaic Power - PV

- No moving parts, long system life, low maintenance
- Solar resource more widespread than wind or hydro
- Annualized average sun hours (for fixed array):
 - Phoenix – 6.5
 - Portland – 4.0
 - Seattle – 3.8
 - Anchorage – 3.1
 - Germany* – 3.0

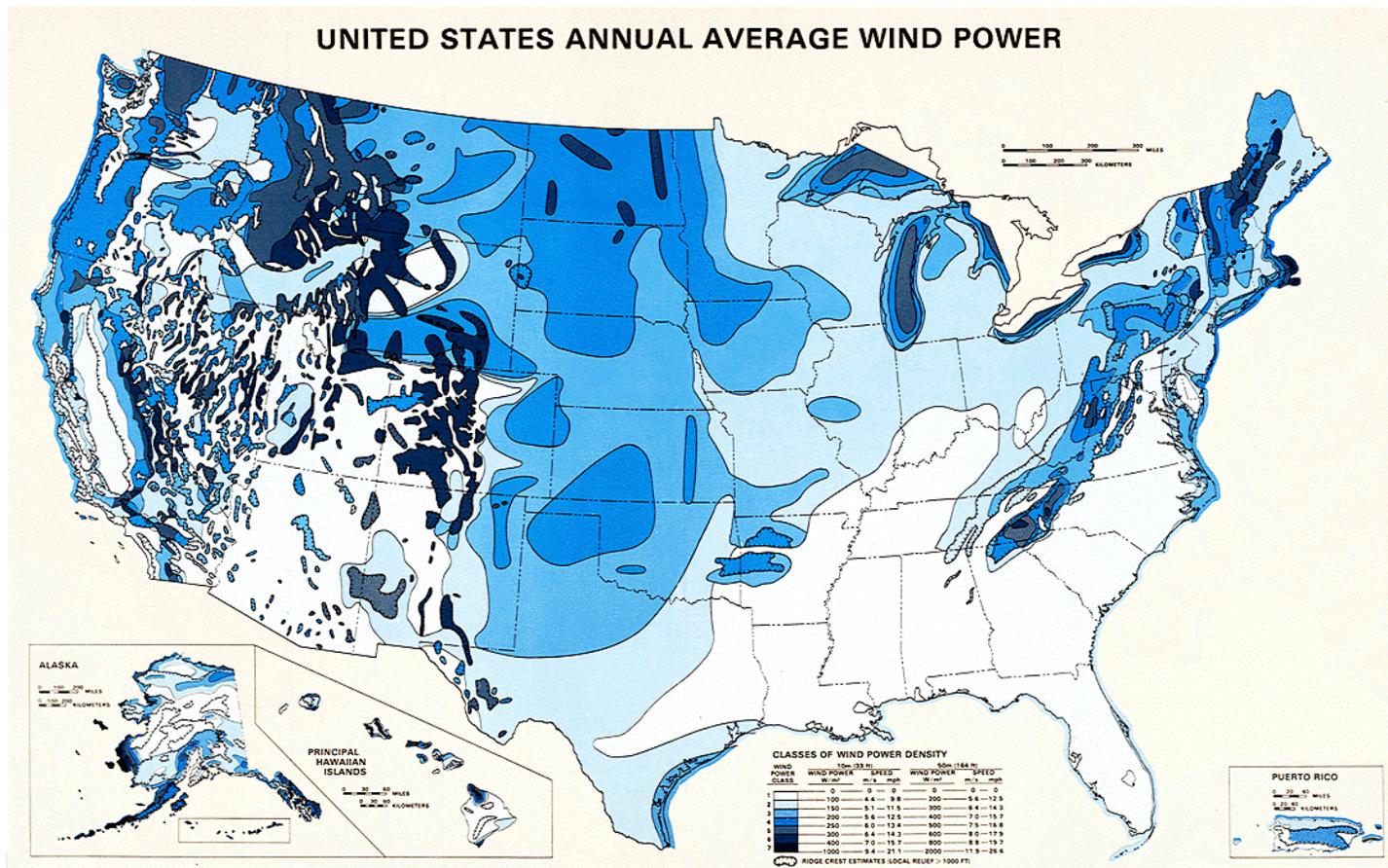
* #1 market in the world!



Above diagram shows average sun hours for month of December

Wind Energy

- Wind energy best suited to areas shaded in dark blue or black
- Wind is often used as backup in off-grid systems
- <http://rredc.nrel.gov/wind/pubs/atlas/maps/chap2/2-01m.html>



Solar Industry Business Segments



- **Manufacturer**
 - Solar modules, inverters, racking, electrical hardware, etc..
- **Distributor**
 - AEE Solar
 - Sells to dealers, resellers, installers
- **Dealer**
 - System designer/installer – represents majority of dealers
 - Reseller – sells via website or mail order
- **Service Providers**
 - System maintenance (typically provided by installer)
 - Monitoring services
 - Fat Spaniel offers 3rd party monitoring for production based incentive programs – common for larger commercial installations

Solar Market Segments



- **Mobile/Portable/Remote Power**
 - RVs
 - Traffic controls
 - Telecom power systems
- **Residential**
 - Represents majority of solar PV installations
 - New rules on federal tax credit provided full 30% credit with no cap
- **Commercial**
 - Excellent growth over past 2 years due to favorable incentives
 - Higher power rates allow faster ROI
- **Utility**
 - Specialized large scale installations designed by Solar Engineering firms buying direct from equipment manufacturers.

PV Configurations



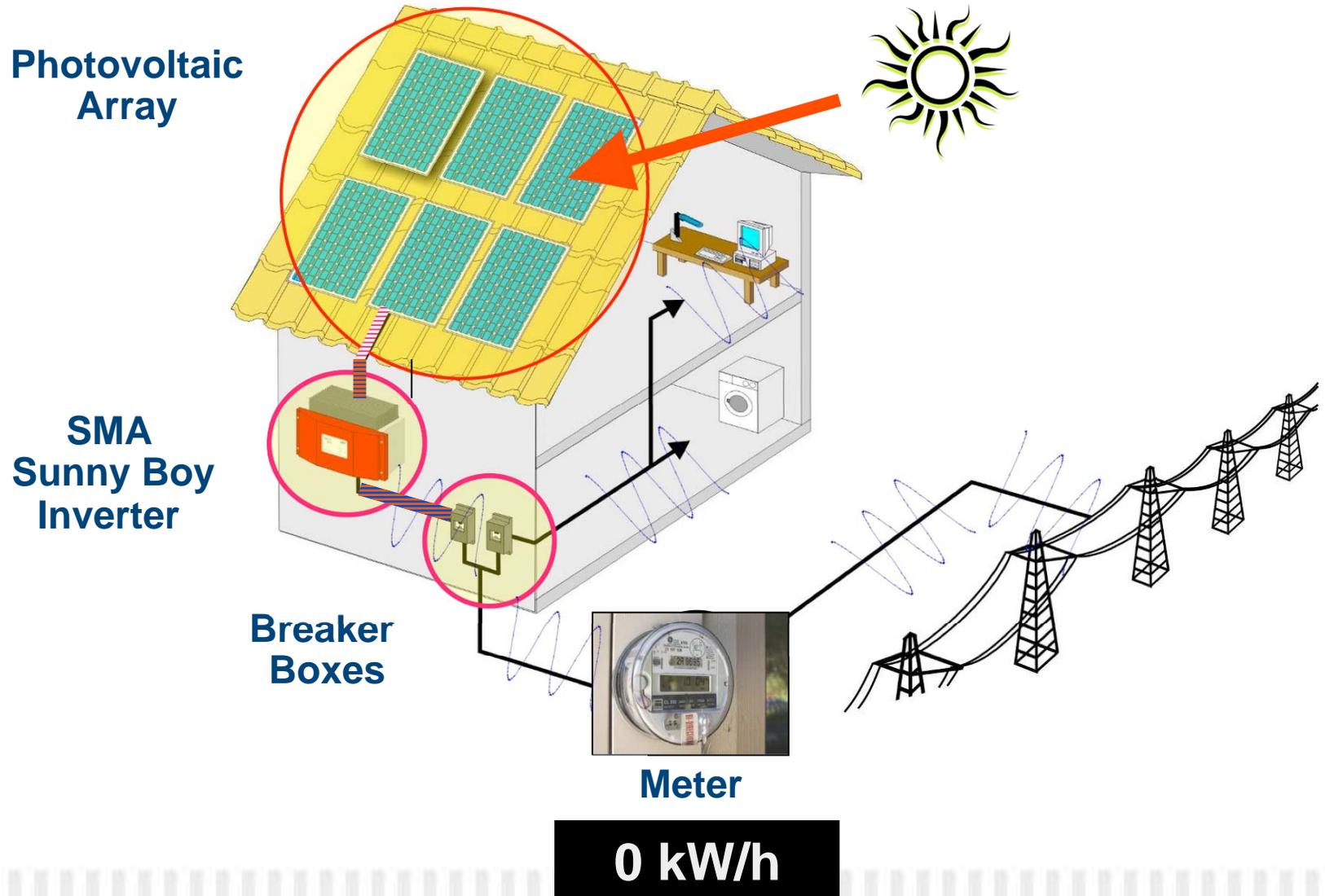
- Direct PV
 - Simple systems for water pumping and fans
- Grid-tie
 - 90% of installations are grid-tie (no batteries)
- Grid-tie with battery backup
 - Provides power when grid goes down
 - Best option for silent, RELIABLE, power production in times of grid outage
- Off-grid
 - Best choice in remote areas
 - Less expensive than connecting to grid if installation is more than ¼ mile from grid

Direct PV



- Solar module powers water pump or fan
- Direct connection of solar module to pump
 - No controller or battery required
- Best cost solution for cattle tank pumping or crop irrigation in remote areas
- Large niche market
- Direct PV systems often benefit from tracking systems

Grid-Tie PV System

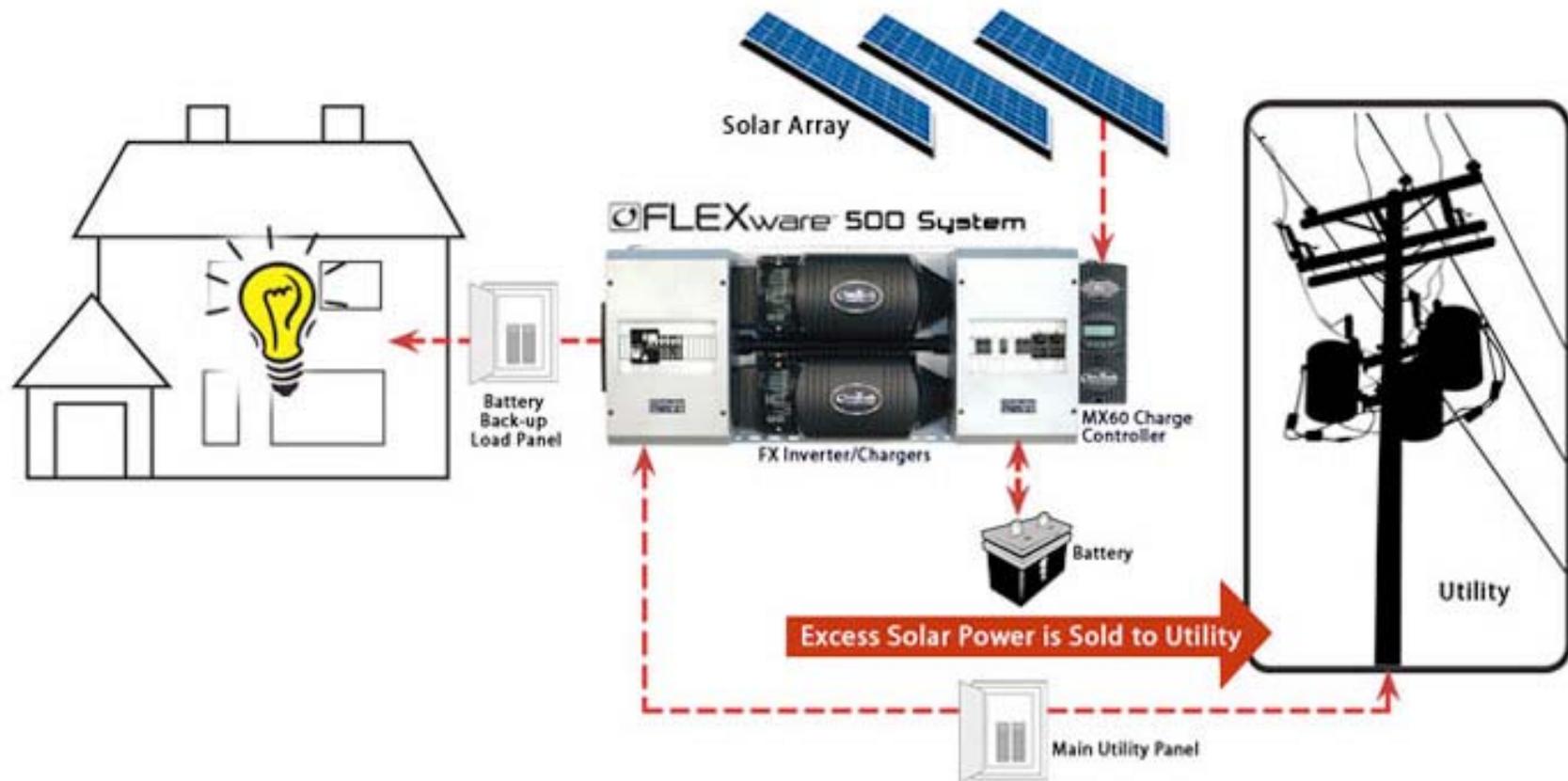


Grid-Tie



- \$7-10/watt typical installed cost for residential
- \$6-8/watt typical installed cost for commercial
- Typical residential system size in CA is 3-5 kW
- Grid-tie represents 90% of solar PV market.
- Simple system: modules, mounting rack, & inverter
- Will *not* produce power when grid is down.
 - Due to system safety considerations
 - Also not practical to have grid-tie running when grid is down due to frequent brownouts when clouds pass by.

Grid-Tie with Battery Backup

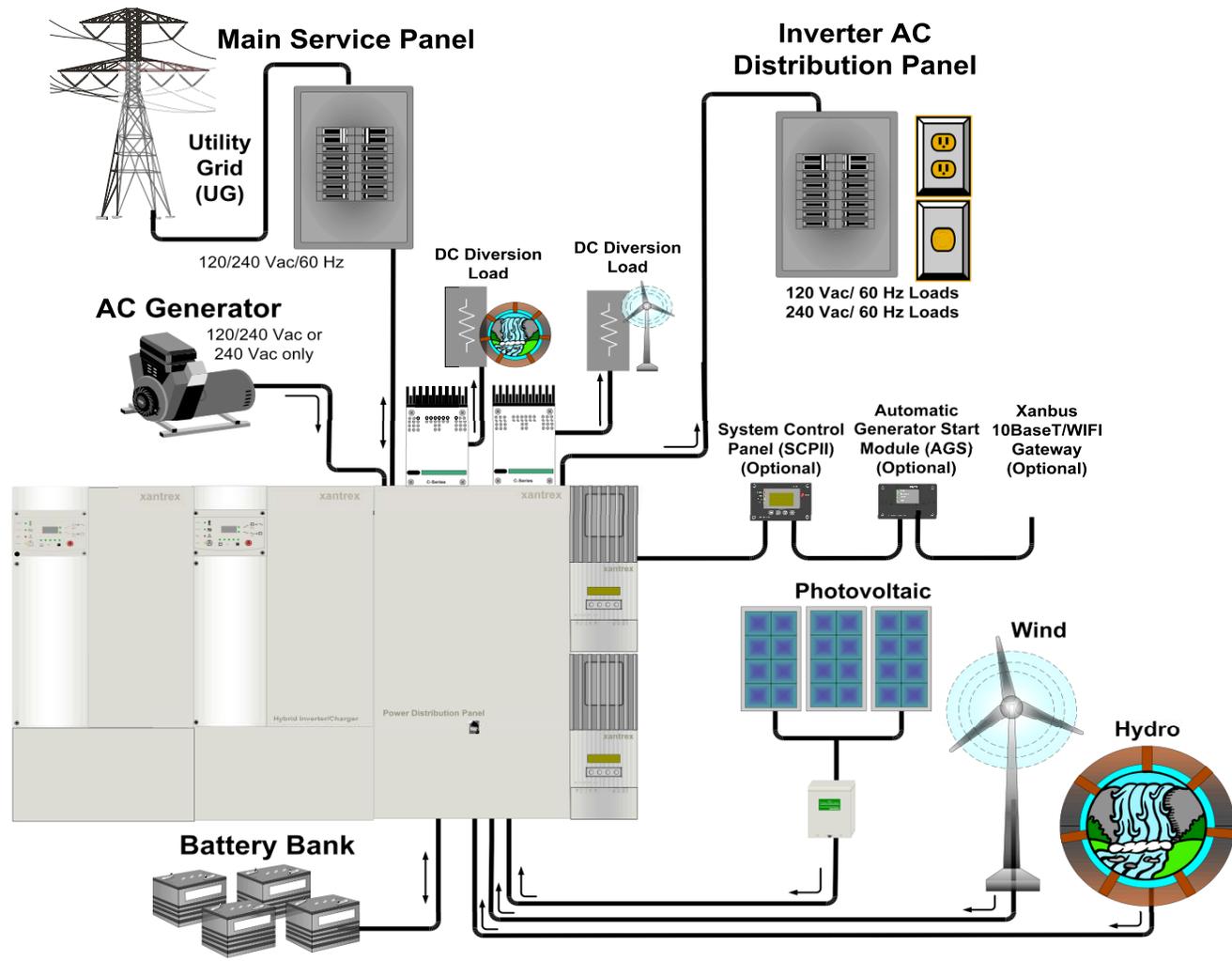


Grid-Tie with Battery Backup



- \$11-\$12/watt typical installed cost
- Provides power when grid is down
- Gas or propane generator less expensive for brief power outages
- Well suited for longer power outages – e.g., hurricane zones
- Excellent solution for mission critical applications: medical, emergency services, computer systems, etc.
- Grid-tie battery backup systems normally use sealed lead acid batteries - maintenance free

Grid Tie With Battery Backup



Off-Grid



- \$14/watt typical installed cost
- Best cost solution in remote areas with no access to utility power grid or where you are more than ¼ mile from power lines
- Much more complex to design and install than grid tie
- Load analysis is critical for proper off grid design
 - Offgrid owners typically tailor power usage to available renewable energy
 - Do not run dishwasher, laundry machine, vacuum during extended periods of cloudy weather
 - Most offgrid systems have multiple energy inputs – Solar array, wind generator, micro hydro generator, gas/propane generator
- It is best to live with an off grid system to do a good job designing an off-grid system

Off Grid Battery Basics



- Off-grid systems use flooded cell lead acid batteries.
 - Battery banks require regular maintenance for proper life.
 - Batteries should be fully charged every few days.
- Most new off-grid system owners ruin their first batteries quickly.
 - Best to sell cheapest batteries for first timers.
 - They can upgrade to better batteries after they ruin the first set.
- Dealers need to train customers carefully.
 - Monthly maintenance should be emphasized.
 - Offer hands-on training session in battery maintenance following new system commissioning.

Installation Cost Summary



- Grid-tie
 - \$7-10/watt typical installed cost - residential
 - \$6-8/watt typical installed cost - commercial

- Grid-tie with battery backup
 - \$11-12/watt typical installed cost

- Off-grid
 - \$14/watt typical installed cost

Question and Answer Time



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Solar PV Product Groups

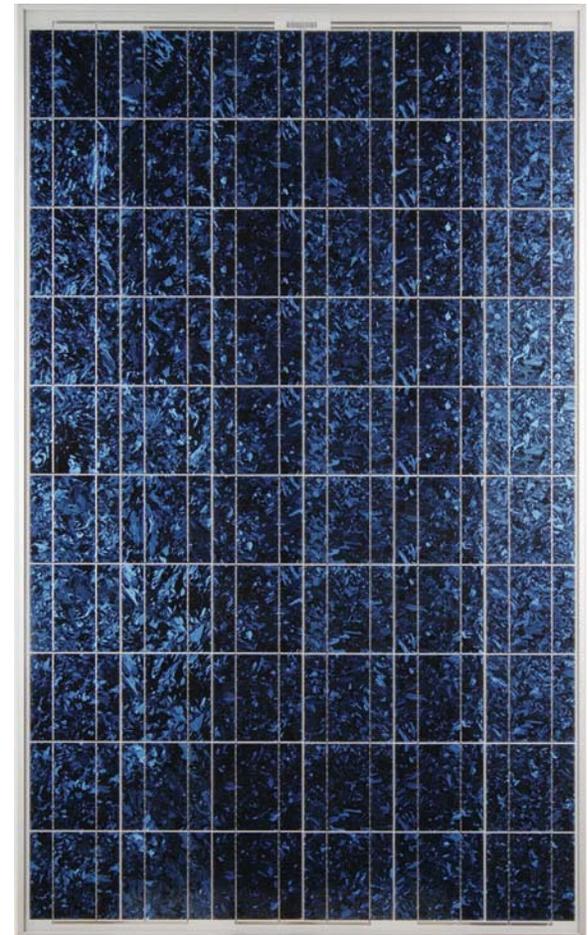


- Modules
- Mounting racks and hardware
- Electrical connections
- Combiner boxes and disconnect switches
- Inverters
- Charge controllers
- Batteries
- Balance of system components

Solar Modules



- AEE stocks broad selection
 - REC (Norway)
 - Evergreen
 - SolarWorld
 - Mitsubishi
 - Kyocera
 - Schott
 - AEE Solar off-grid modules
- Multiple lines of modules prevent sourcing problems during times of silicon production shortfalls.



Mounting Racks

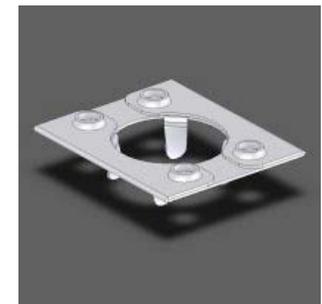
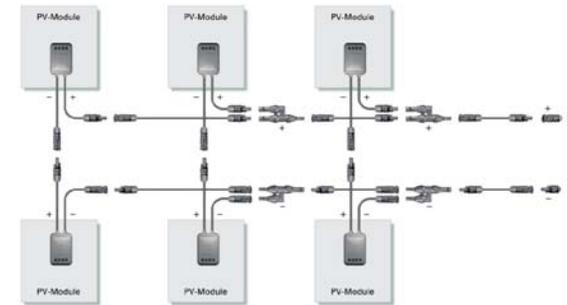
- Roof racking
 - AEE now stocking racking!
- Pole mounts
 - Static mount
 - Tracking systems
- Ground mounts



Photos courtesy of Solar Energy International

Electrical Connections

- **MC or Tyco connectors provide secure waterproof connections between modules**
- **Rennsteig crimping tool offers interchangeable dies for MC3, MC4, and Tyco connectors**
- **Grounding**
 - Tin-plated copper grounding lugs are industry standard method to ground aluminum frame and mounting rack
 - WEEB grounding clips simplify grounding and reduce installation time and cost
 - Documentation available at <http://www.we-llc.com/index.html>
 - Check with local inspector to make sure they will be approved.



Combiner Boxes & Disconnects

- **Combiner box**
 - Enables wiring of multiple strings of modules into single inverter.
- **Disconnect = Switch**
 - Disconnect DC power between array and inverter.
 - Disconnect AC power between grid and inverter.
 - Newer inverters offer integrated disconnect switches.
 - Check with local utility or inspector to determine if integrated disconnects are allowable.



Inverters

- **An inverter converts DC power from solar panels to AC power for home use or selling power back to public utility.**
- **Most inverters offer integrated combiner box disconnect.**
- **Internet monitoring services**
 - Available on most inverters
 - View system productivity via web
 - Excellent sales feature
 - Convenient troubleshooting tool
 - Monitoring services can send email alert if system productivity declines



Charge Controllers

- Prevents overcharging of batteries
- Additional options available:
 - MPPT – Maximum Power Point Tracking optimizes power from solar array power
 - Low voltage disconnect – prevents battery damage when batteries discharged
 - Automatic equalizing renews lead acid plate life
 - Temperature compensated charging



☉ FLEXmax™ 60

Batteries



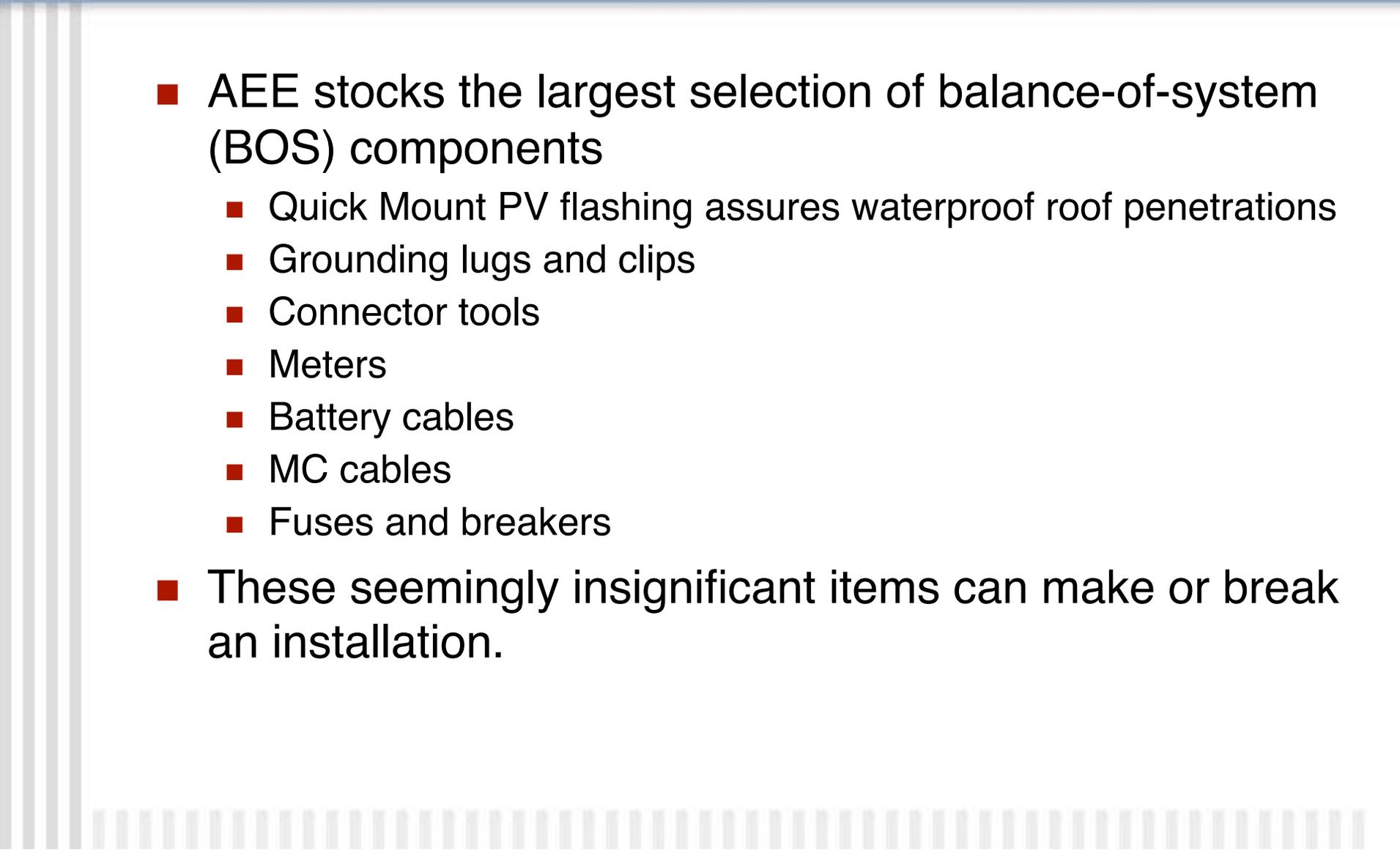
- Off-grid systems
 - Flooded cell lead acid batteries
 - Best cost over battery life
 - Can last 10-15 years with proper care
 - 6-8 years life is common
 - Should be fully charged every 3-4 days

- Grid-tie battery backup systems
 - Sealed lead acid batteries common
 - Maintenance-free
 - Can last 5-7 years if regularly returned to full state of charge
 - Typical life expectancy is 3-4 years
 - Approximately 2 times the price of flooded cell over battery life



Balance-Of-System Components



- AEE stocks the largest selection of balance-of-system (BOS) components
 - Quick Mount PV flashing assures waterproof roof penetrations
 - Grounding lugs and clips
 - Connector tools
 - Meters
 - Battery cables
 - MC cables
 - Fuses and breakers
 - These seemingly insignificant items can make or break an installation.
- 

Key Factors to Launching a Successful Solar Business



- **Training and Certification**
 - Beginning **AND** Advanced PV training strongly advised.
 - NABCEP certification
- **Site analysis and system design**
 - Power production estimates
- **Partners**
 1. Distributor – AEE Solar
 2. Electrical contractor
 3. Roofing contractor
 4. Local inspectors
- **Incentives & financing**
- **Effective sales and marketing**
- **Sound business management**

Question and Answer Time



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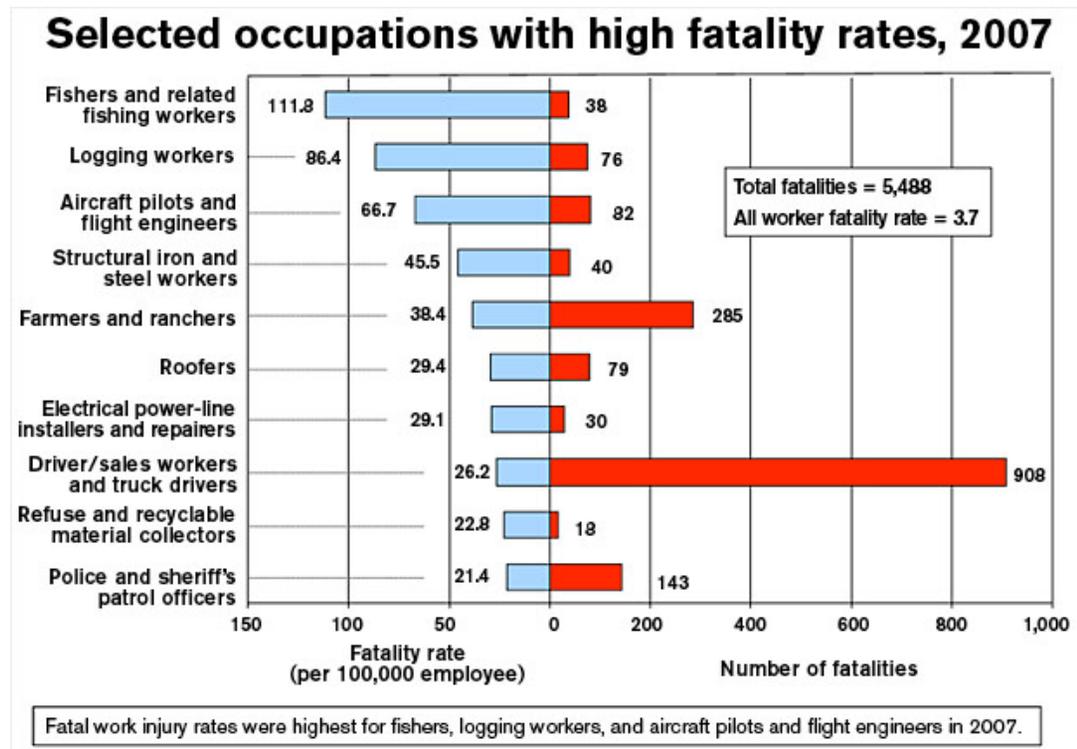
Why take PV training?



- Successful PV companies take training seriously.
 - Solar PV design/installation is a contractor business and requires technical competency to succeed
 - Those that forgo training have high failure rate.
- Technical knowledge - one of the keys to success
 - PV system design, Installation techniques, roofing considerations, electrical code considerations
- PV system designs vary from job to job
 - Pre engineered kits may help ease the solar design process for newcomers to the industry, but this strategy is not a viable business model over the long term.
 - PV installation business is overwhelmingly is retrofit oriented. It is very uncommon to find 2 identical installations. Systems must be designed after careful site evaluation.
- Quality PV training saves money
 - Those that forgo training pay more within the first 1-2 jobs due to cost overruns, system redesign due to failed inspections, shortened system life, and poor system productivity.
- Incentive knowledge
 - Critical to solar dealer profitability
- Ongoing training
 - Ongoing training required due to constant stream of new products, electrical and building code updates, and evolving incentive programs.
- Safety Training MANDATORY

Safety Considerations

- Roofing is the 6th most dangerous job in the US
- Electrical power line installers and repairers is 7th most dangerous job in the US.



SOURCE: U.S. BUREAU OF LABOR STATISTICS, U.S. DEPARTMENT OF LABOR, 2008

Training Matrix



NABCEP Entry Level
"Certificate of
Knowledge" Training

	Intro Training	Business Training	IREC ISPQ Beginner PV	Incentive training	IREC ISPQ Advanced PV	Manufacturer product training	NEC code training	Safety training	Installation training
System Designers	x	x	x	x	x	x	x	x	x
Installers	x		x		optional	x	x	x	x
Electricians	x		x		optional	x	x	x	x
Business Managers	x	x	x	x				x	
Sales Reps	x	x	x	x		optional			
Admin staff	x	optional		x					
Solar Brokers	x	x	x	x	optional	x	x	optional	x
Site Assessors	x	x	x	optional	optional	optional	x	optional	optional

PV Training



- Intro to Solar PV
 - Webinar: Launch & Grow Your Solar Business
 - 1, 2, & 3 day training workshops
 - Solar conferences
 - NABCEP “Entry Level Certificate of Knowledge” training courses
 - <http://www.nabcep.org/wp-content/uploads/2009/01/approved-providers05122009.pdf>
- Formal PV design and installation training
 - Strongly advise IREC ISPQ certified accredited training
 - Preferably from SEI, SLI, FSEC, or MREA
 - Complete list of certified organizations: <http://irecusa.org/index.php?id=91>
 - **Beginner PV training** - tuition \$750 - \$1300++
 - Classroom training (5-6 day course) or Online training (6 weeks @ 15 hrs/week)
 - **Advanced PV training** - tuition \$750 - \$1200
 - Classroom training (5 day course) or Online training (6 weeks @ 15 hrs/week)
 - Some training organizations split Beginner and Advanced training into 3-4 classes.
 - ALL students must complete the Beginner PV training before taking the Advanced PV training.
- Product specific training – Inverter, racking, grounding, etc...
 - Offered at workshops, trade shows, and dealer conferences
 - Best when taken AFTER formal PV training

PV Training continued



- **Hands-on system installation training**
 - 2 - 5 days training with SEI, SLI, FSEC, or MREA
 - Install system on your house.
- **NEC code training (Bill Brooks or John Wiles)**
 - Annual code refresher course advised for all dealers
- **Safety training – OSHA certified safety course**
 - Contact your workman's comp insurance carrier for recommended training courses.
- **Business Training**
 - 1 - 3 day training workshops available from many solar training orgs.
 - Ongrid training with Andy Black is great way to learn PV economics.
- **Incentive training**
 - 40 - 50% of PV staff is dedicated to managing incentive programs and administration aspects of business.
 - ASES and SEIA chapter meetings are the best place to get this training.
 - Local utilities and state energy offices often have useful training resources.
 - www.dsireusa.org is best online resource.

NABCEP entry level “Certificate of Knowledge” training



Information below was Downloaded from the NABCEP website

- NABCEP offers an entry level Certificate of Knowledge is **aimed at students wanting to get a job** the solar photovoltaic field.
- After taking a course from an approved provider and passing a national exam, this Certificate shows that the recipient has achieved basic knowledge, comprehension and application of key terms and concepts of photovoltaic (solar electric) systems operations.
- **The NABCEP Entry Level Certificate of Knowledge by itself does not qualify an individual to install PV systems but it does prepare them for employment in the field.**
- The “NABCEP entry level Certificate of Knowledge” program can be offered by any accredited university, college, community college, vocational-technical institute, NJATC, US Dept of Labor approved apprenticeship program, or an Institute for Sustainable Power accredited class.
- NABCEP entry level Certificate of Knowledge courses are required to have an interactive teacher-learner structure.
 - This implies a connection between a learner and a learning source and normally is structured in a conventional classroom and/or lab yard environment, but computer-assisted instruction, interactive video/CD/DVD and/or web site learning is also an accepted form of education.
- Providers are required to provide students with the necessary information covering the NABCEP-issued learning objectives.
 - This material shall be presented in a well developed way.
 - Courses can include more than the learning objectives but must include a comprehensive review of them.

Accredited Solar PV Training organizations



- AEE Solar advises that solar dealers take their training from an IREC ISPQ certified & accredited training organization.
- The Interstate Renewable Energy Council (IREC) certifies PV training programs through the Institute for Sustainable Power Quality (ISPQ) program
 - ISPQ Accredited & Certified Training Organization List <http://irecusa.org/index.php?id=91>
- **We strongly recommend the following ISPQ certified training organizations** because they have the longest track records, best industry reputations, the best curriculums, the best instructors, and the most extensive course offerings.
 - **Solar Energy International (SEI)** - Carbondale, CO www.solarenergy.org
 - **Solar Living Institute (SLI)** - Hopland, CA www.solarliving.org
 - **Midwest Renewable Energy Association (MREA)** - Custer, WI www.the-mrea.org
 - **Florida Solar Energy Center (FSEC)** - Cocoa, FL www.fsec.ucf.edu
- These top quality non-profit solar PV training organizations employ experienced PV instructors that educate students at a higher level than newer solar training organizations.
- Their instructors possess the wisdom developed through years of working in this dynamic and challenging field. They are able to effectively communicate their knowledge to the students because they all possess that special blend of photovoltaic system knowledge, experience, high level communication skills, and they are entertaining enough to hold your attention even during the dry discussions on code compliance, wire sizing, and the finer points of inspector debating tactics.

Solar Energy International

Solar PV Training



- AEE Solar's training partner is **Solar Energy International (SEI)**
- SEI www.solarenergy.org is “**THE**” premier training institute for solar & renewable energy
- Non-profit organization headquartered in Carbondale, CO with Courses in Grid-Tie PV, Off-Grid PV, Solar Thermal, Wind, Micro-Hydro, Water Pumping, Sustainable Building, etc...
- Industry leading PV hands on system installation training facility Paonia, CO
- Hands-on classroom trainings conducted regionally
- Online trainings available 8 times per year (Beginner & Advanced)
- AEE offers discount on SEI **online** PV courses for AEE Dealers

SEI Instructors



- SEI Instructors are the BEST in the business
 - 5 of the 7 ISPQ certified master trainers are from SEI
 - They have a **Minimum** of 3 years full time experience designing/installing PV
 - Most NABCEP certified PV installers have passed thru SEI courses
 - have operated their own or worked for successful solar businesses.
- SEI Instructors are experienced with:
 - a wide variety of solar products and applications
 - both residential and commercial installations
 - grid-tie and battery based systems
 - retrofitting PV systems to a variety of roof surfaces.
 - drilling thousands of holes in roofs that should never leak.
 - permitting and dealing with inspectors in a wide range of work environments.
- **SEI Instructors are entertaining!**

Qualifying a Solar Training Organization



- There are good quality training programs not yet listed on the IREC ISPQ list, however, there are many new solar training programs with **unqualified** instructors, so **BUYER BEWARE.**
- Get referrals from previous students or experienced solar pros before booking training.
- If you plan on designing or installing PV systems and the training organization is not ISPQ certified you should find out the following information before making your decision:
 - Who developed the training curriculum and what are their qualifications?
 - Who is the instructor, and what is his/her qualifications?
 - How many years did the instructor work as a system designer/installer
 - 3-4 years minimum experience as **full time** designer/installer is desirable
 - How many systems they have designed & installed?
 - What size were these systems?
 - Does the instructor have experience in battery based systems?
 - Is the instructor is NABCEP certified?
 - NABCEP-certified PV installers are among the best instructors in the industry.
 - Quality experienced PV instructors have worn the tool belt on the job for years, navigated the slippery roofs in cold months, crawled thru the insulation in the hot attics in the summer, and lived with the legacy (good and bad) of the systems they have designed and installed.

AEE Training Options

- **AEE Solar Training Webpage**
 - www.aeesolar.com/solar-training.html
- **AEE Solar Training Calendar**
 - <http://www.aeesolar.com/calendar/event-calendar.html>
- **AEE Solar Training Blog**
 - <http://www.aeesolar.com/blog/>
- **Webinars**
 - Launch & Grow Your Solar Business
 - AEE Solar Presents – Supplier Training Webinars
- **One and two day training programs throughout the country**
- **5 day hands-on Solar Energy International grid-tie PV courses**
 - July 6-10, Redway, CA
 - Aug 3-7, Flagstaff, AZ
 - Sep 21-25 Philadelphia, PA
 - Nov 2-6 Mesa, AZ
 - Nov 9-13 Mesa, AZ
- **AEE Solar Dealer Conference**

AEE Solar Training & Events Calendar - 2009

Legend:

- Launch & Grow Your Solar Business Webinar
- AEE Solar Presents - Supplier Webinar
- Regional Training Workshop
- AEE 3 Day Workshop
- Webinar
- AEE Solar Annual Dealer Conference

Month	Day	Event																													
May	26	27	28	29	30	31																									
June	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31



AEE Solar Dealer Conference

- **A Major Success!**
- Largest supplier-based solar training event in North America
 - <http://www.aeesolar.com/events/dealer-conference-09.html>
- Feb 2009, Mesa, AZ
- 40 exhibitors
- 450 attendees
- 3 days of training workshops
- 60 training classes
- 7 classrooms running for 3 full days
- Expo area
- Fantastic Networking Meal Events
- 3rd Annual AEE Solar Dealer Conference Feb 2010 Mesa, AZ.



The screenshot shows the AEE Solar website with a navigation bar at the top containing links for HOME, ABOUT AEE, BECOME A DEALER, FIND A DEALER, SOLAR TRAINING, SOLAR MARKETS SERVED, SOLAR CATALOG, and CONTACT. The main header features the AEE Solar logo and the tagline "The Only Wholesale Distributor You'll Ever Need". Below the logo are links for "BROWSE PRODUCTS", "BECOME A DEALER", and "LAUNCHING A SOLAR BUSINESS", along with a "DEALER LOGIN" button and the phone number "To Order: 800-777-6609".

The main content area is titled "2nd Annual AEE Solar Dealer Conference" and includes the dates "February 18-21, 2009, Mesa, Arizona". A banner image shows solar panels and a sunflower. A text box states: "Conference is selling out! Only 48 spaces available as of February 13. REGISTER NOW to insure your attendance!". Below this is a list of links: Sponsorships, Conference fee and registration, Conference site, Conference features, NABCEP test, Fun activities (golf, APS STAR tour, hiking), Conference schedule, Supplier exhibits & classes, and Hotel info. At the bottom, there are links for "Detailed Class & Event Schedule", "Conference Site Floor Plan", and "Extra Dinner Attendee Registration", followed by a "REGISTER ONLINE" button.

On the left side of the page, there is a section titled "COMMENTS FROM 2008 CONFERENCE ATTENDEES:" with several testimonials, and a section titled "PHOTOS FROM 2008" with a small image of a conference room.

Solar Certification from NABCEP



- **NABCEP** – North American Board of Certified Energy Practitioners
 - NABCEP is “the” Solar PV certification agency in North America
- NABCEP administers **2 different tests**
- **NABCEP Entry Level Certificate of Knowledge test**
 - **Passing this test provides no certification**, but does allow solar job seekers to demonstrate entry level knowledge to prospective employer.
 - AEE Solar offered this test during annual AEE Solar Dealer Conference
- **NABCEP Certified PV Installer test**
 - NABCEP certified PV installers have earned a mark of distinction as the test is very challenging and passing it demonstrates strong knowledge of PV system design and installation techniques and
 - Applicants must complete both education and job experience prerequisites to qualify to take the NABCEP Certified PV Installer test.
 - There are several paths you can follow to qualify to take Certified PV Installer test.
 - Refer to www.nabcep.org for details
 - Simplest path to qualify to take test for newcomers to the solar industry is completing the SEI Beginning AND Advanced PV classes and perform 2 system installs as the project lead.

The majority of NABCEP certified PV installers have passed through SEI training courses.

Site Analysis & System Design



- Site analysis and system design should be conducted by properly trained PV designer
 - AEE Solar offers design assistance, but design is ultimately the responsibility of the dealer
 - Beginning **and** Advanced PV training are very important
- Solar Site Analysis
 - Proper site analysis required for power production estimates.
 - **Shade is the enemy of PV** - small area of shading on only one module can cut production of an entire string by 90%!
 - Best to have no shade anywhere on array from 9 AM to 3 PM
 - Enphase & National Semiconductor have products to mitigate the effects of shade
- System sizing criteria
 - Budget
 - Available mounting area
 - Usage - Offset entire annual usage.
 - Usage - Offset highest bracket for fast ROI on tiered rate users

System Design – page 2



- Array orientation
 - South facing arrays best, southeast & southwest facing arrays are good, and east and west facing arrays may be acceptable if using “time of use” metering.
- Tilt angle
 - Roof mounts - in urban/suburban areas, solar arrays are normally mounted at the same pitch as the roof with a 4-inch minimum airspace under array for convective cooling.
 - Ground or pole mounts - Determine optimum tilt angle from design books or web tools for best year-round production.
 - Adjustable racking allows varying tilt to maximize summer vs. winter production – common in off grid systems, rare in grid tie applications.
 - Trackers are common in pole mount systems in rural areas, or with direct PV water pumping systems. Trackers are generally not advisable in grid tie or urban areas.
- Use **Google Earth** to determine if suitable unshaded mounting area is available (high-resolution images not yet available for all areas).
- Have prospective customer email digital photos of south, east, and western exposures of home to help assess solar viability.

Question and Answer Time



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Presentation Outline



Part One

1. History of Residential Solar
2. How to become a Solar Dealer
3. Renewable energy options
PV, wind, micro-hydro, solar thermal, solar lighting
4. Industry players
5. Solar markets
6. PV configurations
7. PV product groups
8. Key factors to launching a successful solar business
9. Training
10. NABCEP certification

Part Two

11. Site analysis & system design
12. The 4 key partners
distributor, electrical contractor, roofer, inspector
13. Incentives & financing
14. Dealer cost & profitability
15. Effective sales & marketing
16. Publications & textbooks
17. Code resources
18. Organizations
19. Helpful websites
20. Industry events

Power Production Estimates, Incentive Review, and Proposals



- Power production estimates and incentive review are basis for proposals to customer
 - Allows customer to understand Return On Investment (ROI)
- Several web tools help with power production estimates and incentive review process
 - Go Solar California
 - California Solar Initiative Calculator
 - FindSolar.com
 - PV Watts
- Proposal Generation Tool
 - www.ongrid.net
 - www.cleanpowerfinance.com

Go Solar California

- www.gosolarcalifornia.ca.gov/
- Go Solar California maintains lists of CEC approved modules and inverters.
- These “CEC approved” module and inverter lists are used by many other state incentive programs.
- CA dealers must apply with CEC to offer incentives to their customers.

Existing Homes New Homes Nonresidential Builders Installers News Room Search This Site

Celebrate the Sun
August is
Solar Energy Awareness month

Most Popular Links

- CSI Handbook
- Eligible Equipment
- Find Your Utility
- NSHP Communities
- NSHP Guidebook
- Registered Solar Retailers & Installers
- Solar for Existing Homes - CSI
- Solar 101 (All About Solar Energy)

Residential Solar Info

- Solar for **EXISTING** Homes
- Solar for **NEW** Homes
- Info for Builders & Developers

Nonresidential Solar Info

- Agriculture
- Commercial Buildings
- Industrial Buildings
- Local Government
- Nonprofit Organizations
- Solar Schools

Solar Retailers & Installers

- Solar Installers Page
- Database of Registered Retailers & Installers

Welcome to the Go Solar California website brought to you by California's Public Utilities Commission and Energy Commission. This site provides consumers a "one-stop shop" for information on rebates, tax credits, and incentives for solar energy systems in California.

Solar for Your Home

You can use the power of the sun, along with energy efficiency in your home, to help reduce your electricity bills by up to 60 percent or more! Find out about incentives for installing solar on your existing home or about buying a new home in one of California's solar communities. [MORE...](#)

Builders, Developers, and Installers

If you're a builder or developer, are building your own home, or are a solar installer, find the information that's right for you on our [Solar Industry Page](#).

California Solar Initiative Incentive Calculator



- www.csi-epbb.com
- Lists appropriate incentive for CA installs



Site Specifications:

ZIP Code:

Utility:

Customer Type:

Incentive Type:

PV System Specifications:

PV Module:

Number of Modules:

Mounting Method:

Inverter:

Number of Inverters:

Shading: Minimal Shading

Array Tilt (degrees):

Array Azimuth (degrees):

Documentation

User Guide
Get Adobe Reader
EPBB Source Code

Links & Resources

PG&E
SCE
CCSE
Go Solar California

True North 0°

	Proposed	Reference	Documentation
Site Specifications:			
ZIP Code	91384	92867	User Guide Get Adobe Reader EPBB Source Code
City	Castaic	Orange	
Utility	SCE		
Customer Type	Residential		
Incentive Type	EPBB		
PV System Specifications:			Links & Resources
PV Module	SolarWorld California, Inc.:SW175 mono 175.0W STC, 156.6W PTC, 157.3W PTC _{adj} ¹		PG&E SCE CCSE Go Solar California
Number of Modules	15		
Mounting Method	>3" to 6" average standoff		
DC Rating (kW STC)	2.6250		
DC Rating (kW PTC)	2.3490		
Inverter	PV Powered Inc:PVP3500		
Number of Inverters	1		
Inverter Efficiency (%)	95.50 %		
Shading	Minimal Shading	Minimal Shading	
Array Tilt (degrees)	20		
Array Azimuth (degrees)	180 True North 0°		
			
Optimal Tilt (proposed azimuth)	19		
Optimal Tilt (facing South)	19	17	
Results			
Annual kWh	4,060 (a)		
at optimal tilt	4,048 (b)		
facing south at optimal tilt	4,048 (c)	3,961 (d)	
Summer Months	May-October	May-October	
Summer kWh	2,343 (e)		
at optimal tilt	2,343 (f)		
facing south at optimal tilt	2,343 (g)	2,290 (h)	
CEC-AC Rating	2.243 kW		
Design Correction ²	100.000%		
Geographic Correction ³	100.000%		
Installation Correction ⁴	100.000%		
Design Factor⁵	100.000%		
CSI Rating⁶	2.243 kW		
Incentive Rate	\$2.20/Watt		

FindSolar.com

- FindSolar.com allows prospective customers to locate installing dealers for their zip code area.
- My Solar Estimator
 - <http://www.find-solar.org>
 - Provides power production estimates

FIND SOLAR Connecting You to Renewable Energy Professionals

About Us Terms & Conditions

Your Solar Electric Estimate

If you agree **solar is a smart investment**, [choose from a list of solar professionals](#) to help you install your very own system.

Click on the [More](#) buttons to learn about our assumptions and other important information used to generate your estimate. You may want to change some of the information to better match your situation. Also, please review the [notes](#) below. This information will help you work smarter with a [Solar Pro](#), and learn about ways to make a solar system work its best for you!

This estimate is to provide % of your electricity, on average, over the course of a year. Enter another value above to [recalculate costs](#) for a different percentage of energy supplied by solar power. =

Help us improve. We rely on feedback from our users to help keep our service accurate and useful: [Send us your Feedback](#)

SOLAR How It Pencils Out...

Print

Building Type:	Residential
State and County:	AZ - Maricopa
Utility:	SALT RIVER PROJECT
Utility Type:	Municipal Utility
Assumed Average Electric Rate: Please check against your bill To recalculate, enter a value and press "enter" on your keyboard - More	<input type="text" value="\$ 0.0968"/> /kWh More
Assumed Average Monthly Electricity Usage: Please check against your bill To recalculate, enter a value and press "enter" on your keyboard - More	<input type="text" value="2,000"/> kWh/Month More
Your Average Monthly Electricity Bill: (Assumed rate x average monthly usage)	\$ 194 / Month
Tiered Rates Apply:	Yes - See Notes , below!
Time-of-Use Metering Offered:	Yes - See Notes , below!
Net-Metering Available:	Yes - See Notes , below! More

ESTIMATED SYSTEM SIZE

The system size best for your situation will vary based upon product, building, geographic and other variables. We encourage you to work with a [Solar Pro](#) who can better estimate the system

Done

start Quicken 2008 D... Drafts - Micros...

PV Watts

- Estimate kWh production from system
- <http://www.nrel.gov/rredc/pvwatts/>



Click on **Calculate** if default values are acceptable, or after selecting your system specifications. Click on **Help** for information about system specifications. To use a DC to AC derate factor other than the default, click on **Derate Factor Help** for information.

Station Identification:

WBAN Number: 23183
 City: Phoenix
 State: AZ

PV System Specifications:

DC Rating (kW):
 DC to AC Derate Factor: **DERATE FACTOR HELP**
 Array Type:
 Fixed Tilt or 1-Axis Tracking System:
 Array Tilt (degrees): (Default = Latitude)
 Array Azimuth (degrees): (Default = South)

Energy Data:

Cost of Electricity (cents/kWh):



AC Energy & Cost Savings



Station Identification	
City:	Phoenix
State:	AZ
Latitude:	33.43° N
Longitude:	112.02° W
Elevation:	339 m
PV System Specifications	
DC Rating:	4.0 kW
DC to AC Derate Factor:	0.770
AC Rating:	3.1 kW
Array Type:	Fixed Tilt
Array Tilt:	33.4°
Array Azimuth:	180.0°
Energy Specifications	
Cost of Electricity:	8.5 ¢/kWh

Results			
Month	Solar Radiation (kWh/m ² /day)	AC Energy (kWh)	Energy Value (\$)
1	5.09	451	38.34
2	6.05	486	41.31
3	6.61	566	48.11
4	7.54	613	52.11
5	7.54	619	52.62
6	7.28	559	47.52
7	7.14	569	48.37
8	7.17	576	48.96
9	7.15	557	47.34
10	6.75	565	48.02
11	5.59	469	39.87
12	4.88	438	37.23
Year	6.57	6468	549.78

[About the Hourly Performance Data](#)

[Saving Text from a Browser](#)

Run PVWATTS v.1 for another US location or an International location
 Run PVWATTS v.2 (US only)

Key Partners

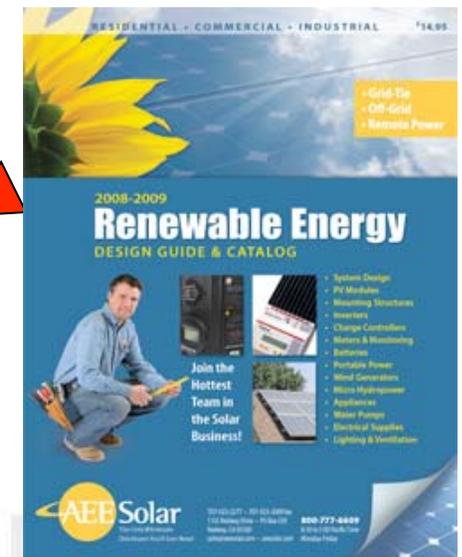
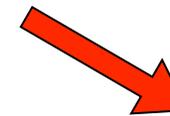


4 partners must come together to complete a successful PV system install:

- 1. Distributor - AEE Solar**
- 2. Electrical contractor**
- 3. Roofing contractor**
- 4. Local building inspector**

Partner #1 – Distributor

- **AEE Solar is your one-stop distributor.**
 - We stock all components needed for a wide variety of installations – grid tie, off grid, remote power, etc...
 - AEE has it all: Modules, inverters, racking, batteries, wind turbines, monitoring, and much more.
- **Eliminate complex web of vendor relationships and multiple purchase orders and invoices for every job.**
- **2008-2009 AEE Solar catalog now available!**
 - Download for FREE from aeesolar.com
 - Most sought-after resource in the industry.
 - Many competitors use it as a resource.
 - Unbranded catalog available for AEE Dealer
- **Purchase volume earns you better pricing**
- **Tech support**
 - important for new **and** experienced dealers



The AEE Solar Advantage



- **Proven Products at Competitive Prices**
 - In our three decades of solar experience we have seen and tested virtually every PV module, inverter, controller, mounting system, battery and system component out there. We sell only the best-performing, top brands – *and at highly competitive prices you can't beat anywhere. If AEE carries it, you know you can count on it!*
- **The Widest Selection in the Business**
 - AEE Solar carries the widest selection in the industry, including those essential parts nobody else carries – everything you need to perform NEC-compliant installations. We also offer preconfigured systems and parts-and-components kits to make your job easier and more profitable. *We stock it all so you don't have to!*
- **Unsurpassed Tech Support and Customer Service**
 - AEE Solar has the in-house expertise to help you do it right – off-grid or grid-tie; solar, wind or hydro; residential, commercial or industrial. Our sales engineers will even help you custom-design solutions for your customers! And our personal, friendly, responsive customer service is second to none. *Our three decades of solar experience support you at every step!*
- **Ongoing, Comprehensive Dealer Training**
 - AEE Solar provides national, regional and local solar training classes – from beginner to advanced – to help you sell and perform successful, NEC-compliant solar installations. Our online, classroom, and hands-on trainings help you stay up to date on the latest technologies, products, federal and state regulations, and more. *We help you master the skills you need to succeed!*
- **The Best Catalog in the Industry**
 - Our annual *Renewable Energy Design Guide & Catalog* is the industry's most sought-after resource, featuring thousands of products plus invaluable advice and tips. And we make a special version with a blank space on the cover for your company name and branding. *Use our renowned catalog as your own powerful sales tool!*
- **Fast, Accurate Shipping to Your Job Site**
 - With just-in-time delivery and blind drop shipping, we can ship directly to your customer. *Get what you need, when and where you need it!*

We help you succeed!



Partner #2 – Electrical Contractor



- **Electrical contractors have the best credentials for becoming solar installers.**
- **National Electric Code (NEC) Article 690**
 - Defines electrical code for PV
 - NEC Codebook updated every 3 years - 2008 edition now available
- **States/municipalities almost always require licensed electrician to do wiring.**
 - Some states require licensed electrical contractor for AC only
 - CA requires licensed electrical contractor for AC & DC
- **Electrical contractors should receive PV training**
 - High-voltage DC power requires special training
 - PV power requires specialized training
 - Small patch of shade can knock out over 90% of system power

Partner #3 - Roofing Contractor

- **Roofing errors (leaks) leading cause of service calls.**
 - Waterproof roof penetrations critically important.
 - Quick Mount PV flashing mounts ideal for roof penetrations.
 - Quick Mounts are fast, easy, and won't void roof warranty.
- **Racking and mounts must be engineered to handle:**
 - Wind - uplift loads
 - Snow load
 - Unirac web software eases design process
- **Safety training important - steep pitch roofs require safety harness.**



Photos courtesy of Solar Energy International



Partner #4 - Local Inspector



- **Local inspectors may have unique interpretation of code**
- **Local inspectors may or may not follow NEC article 690**
- **Many inspectors not familiar with NEC Article 690**
 - Inspector may look to installer for interpretation of NEC Article 690
 - This is where code training pays off!
 - Every solar dealer should take annual code refresher course from John Wiles or Bill Brooks.
- **New code may not be adopted for several years by some inspectors**
- **Get to know local inspectors and local code requirements**
- **Local utilities can be good resource for more info.**

System Financing



■ Financing options

- Cash purchase
- Rolled into 1st mortgage
- 2nd mortgage
- Renewable energy financing
 - Often a simpler financing option compared to mortgage
 - Can function as a bridge loan

■ AEE Solar financing partners

- EGIA solar system financing
- DFS – Dealer Financial Services

Incentives



- **You need to become an incentives expert!**
- **You should to fully understand federal, state, local, and utility incentives.**
- **Factor rebates and incentives into customer bids to convey true cost of an installed system.**
- **California incentives:**
 - Up-front incentive
 - Performance-based incentive
 - Installer must be registered with California Energy Commission to get incentives
- **Oregon incentive:**
 - 50% business energy tax credit recently approved!
 - Installer must be registered with Oregon Energy Trust to offer incentives
- **Washington incentives:**
 - PBI – production-based incentive
 - \$.15/kWh ~ ROI as good as 5-10 years
 - Washington-made modules and inverters increase the incentive rate to \$.54/kWh

Incentive Resources



- DSIRE – Database of State Incentives for Renewables & Efficiency
 - Lists incentive programs state by state
 - www.dsireusa.org
- Local chapter of ASES (American Solar Energy Society)
 - http://www.ases.org/index.php?option=com_content&view=article&id=10&Itemid=14
- Local chapter of SEIA (Solar Energy Industry Assoc.)
 - http://www.seia.org/cs/about_seia/state_chapters
- State agencies for renewable energy
 - Solar Washington
 - Oregon Energy Trust
 - California Energy Commission
- Local utilities

Dealer Cost & Profitability



- **The average installed price (before incentives) is \$8.00/watt**
 - Based upon 2-6 KW system size in CA
 - Source: CEC website for 2007 & 2008 installations
- **AEE Solar Bronze dealer cost for 3800 watt system \$18,087 = \$4.66/Watt**
 - Includes PV modules, roof rack, and inverter
 - Doesn't include conduit, wire, incidentals, labor, permitting, admin fees, and profit
- **\$8.00 - \$4.66/watt = \$3.34/watt remaining for conduit, wire, incidentals, labor, permitting, admin fees, and profit**
- **Installation time for 3800 Watt system normally takes 1-2 days**
 - Budget 60 man hours for installation, site assessment, permitting, and admin
 - Installation, labor, and permitting costs average \$1/watt
- **Module costs range between \$2.50 - \$3.50 watt**
- **Inverter costs average \$.50/watt**

Marketing Your Solar Business



- **There are countless ways to promote your business at little or no cost.**
- **Solar makes news**
 - Contact local newspapers, radio or TV stations for free publicity.
 - Local media needs stories with local interest, and you are it.
 - Invite local media to a jobsite (with your customer's permission).
- **Speak at meetings**
 - Rotary, chamber of commerce, environmental groups, builders groups, libraries, church groups, real estate groups.
- **Website CRITICALLY important**
 - **Most** prospective customers will look at your website.
 - A professionally developed and managed website is the best ROI in solar marketing.
 - AEE Solar site is created/managed by The Strategic Word.
 - Presentation on building an effective solar website: www.strategicword.com/webreport
- **Email address should have your company name**
 - Good email address: jspies@aeesolar.com
 - Bad email address: or jeff123@aol.com, jeffy@gmail.com, poppabear@hotdiggitydog.com

Advertising



- Word of mouth important
 - Good word of mouth guarantees you customers.
 - Bad word of mouth puts you out of business.
 - Do not over-promise system performance.
- Advertise certification
 - NABCEP
 - General and/or electrical contractor licenses
- Service for new dealers to find customers
 - FindSolar.com (find-solar.org)
 - Home Power contractor guide
 - Solar Today contractor guide

Sales Strategies



**Very
Important!**

- **Energy consulting** is pre-requisite to PV quotation
 - Very good public relations, establishes your credibility
 - Conservation more cost-effective than watts from a PV array
 - Every \$1 spent in energy savings saves \$5 in the PV system
 - Allows smaller dealers to compete with large installers
- **Don't overpromise** PV system output
- Develop a **professional presentation**
 - Show a customer what a system will cost after rebates and incentives.
 - Show the return on investment (ROI)
 - Software for producing professional presentations
 - On-Grid financial analysis www.ongrid.net
 - Clean Power Finance www.cleanpowerfinance.com

Sales Strategies



- **Not all customers created equal**
 - Don't waste valuable time selling to poor quality prospects
- **Identify customer hot-buttons - motivating influences**
 - Financial
 - Environmental
 - Energy independence
 - Status symbol
- **Solar system basics DVD www.sustainablemedia.net**
 - Helpful for prescreening customers
- **Service after the sale – Budget for service in initial estimate**
 - Grid-tie rarely require repairs until inverter replacement ~ 15 years
 - Off-grid installers budget 3-4 service calls for new installations
- **Solar brokers**
 - Brokers perform site evaluation, design the PV system design, and manage the sale
 - Partner with local installation companies to complete the install
 - Installer and Brokers should complete SEI PV training (or equivalent)
- **Fastest ROI is achieved with a smaller sized array (1-3 KW) on a power hungry home or business if the utility has tiered electric rates (common in CA)**
 - Some systems able to achieve ROI in under 5 years

Important Industry Considerations



- Emerging technology
 - Constant stream of new products and technologies require continuous training and adaptability.
 - Large swings in cycle of supply & demand
 - Multiple lines of modules to allow sourcing flexibility.
 - New expanded warehouse in Sacramento offers broader selection in stocked products.
 - Racking now stocked in Sacramento warehouse.
- 

Publications



- **Home Power** - **must have!**
 - www.homepower.com
 - Excellent resource for residential & small scale commercial
 - Off-grid roots, but expanding grid-tie focus
- **SolarPro** - **must have!**
 - www.solarprofessional.com
 - Produced by publisher of Home Power
 - Targeted to Solar designers, installers, resellers, and industry insiders.
- **Solar Today** - **must have!**
 - www.solartoday.org
 - Industry focus
 - ASES publication
- **Solar Industry**
 - www.solarindustrymag.com
 - Newer publication, but a good read!
- **Photon International**
 - www.photon-magazine.com
 - Excellent industry journal; in-depth market and product news
 - European focus
 - \$350/yr subscription fee

Solar training textbooks



- **Photovoltaics Design and Installation Manual - must have!**
 - Published by Solar Energy International – 2007
 - Top solar PV training textbook in use today
 - Spanish language version available
- **NEC 2008: National Electrical Code NFPA 70 - must have!**
 - Published by NFPA - National Fire Protection Association
 - National Electric Codebook
- **Photovoltaic Systems**
 - Published by the National Joint Apprenticeship & Training Committee for the Electrical Industry - American Technical Publishers, 2007
 - Good companion text to PV D&I Manual referenced above.
- **Textbooks shown above can be ordered from SEI**
 - www.solarenergy.org/resources/store.html

Electrical Code Resources



- **SEI - Solar Energy International**
 - Top solar training organization in US
 - www.solarenergy.org
- **National Electric Code NEC**
 - The electrician' bible
 - Article 690 governs PV wiring and grounding
- **Bill Brooks or John Wiles training classes**
 - Google their names with “NEC training”
 - http://www.solarabcs.org/index.php?option=com_events&Itemid=71
- **NECA/IBEW**
 - NJATC offers training for electricians.
- **Local inspectors and Local utilities**
 - dsireusa.org has contact info.
- **NABCEP study guide – www.nabcep.org**

Organizations



■ Solar Educational Organizations

- Solar Energy International (SEI) www.solarenergy.org
- Solar Living Institute (SLI) www.solarliving.org
- Midwest Renewable Energy Association (MREA) www.the-mrea.org
- Florida Solar Energy Center (FSEC) www.fsec.ucf.edu

■ Solar Energy Industry Association (SEIA)

- www.seia.org
- Industry lobby to congress
 - promotes federal and state renewable energy incentives
- State chapters often hold monthly meetings
 - http://www.seia.org/cs/about_seia/state_chapters

■ American Solar Energy Society (ASES)

- www.ases.org
- State chapters often hold monthly meetings
 - http://www.ases.org/index.php?option=com_content&view=article&id=10&Itemid=14#arizona

Helpful Websites



- **AEE Solar**
 - www.aeesolar.com
 - Distribution of solar, wind, micro-hydro electrical systems
- **SEI**
 - www.solarenergy.org
 - The foremost solar training organization in North America
- **RE Wrenches Forum**
 - <http://lists.re-wrenches.org/pipermail/re-wrenches-re-wrenches.org>
 - Great tech info!
- **PV Fire Safety**
 - http://www.otherpower.com/firefighter_safety.shtml
- www.aer-online.com
- www.cleantech.com
- www.consumerenergycenter.org
- www.nrel.gov
- www.renewableenergyworld.com
- www.solarbuzz.com
- www.solarliving.org
- www.solarnews.com
- www.solarindustrymag.com
- www.sustainableindustries.com

2009 Major Industry Events



- **Electric West 2009** Mar 18-20
 - Las Vegas, NV
 - www.electricshow.com
- **Northwest Solar Expo 2009** May 1-3
 - Portland, OR
 - www.nwsolarexpo.com
- **Solar 2009** (ASES sponsored) May 12-15 Second biggest solar show in North America
 - Buffalo, NY
 - www.ases.org
- **Midwest Renewable Energy Fair 2009** June 19-21 Lotsa Fun!
 - Custer, WI
 - www.the-mrea.org
 - SEI training class immediately following MREF!
- **Intersolar 2009** July 14-16
 - San Francisco, CA
 - www.intersolar.us
- **NECA 2009** Sep 13-15
 - Seattle, WA
 - www.necaconvention.org
- **Solar Power International 2009** Oct 27-29 Biggest solar show in North America
 - Anaheim, CA
 - www.solarpowerconference.com

International Sales Considerations



- We do not sell grid tie modules outside the US with exceptions in the Carribean. The only exception is REC group modules which we can sell to Mexico and Canada.
- It is advisable to allow us to arrange shipping through Haas
- If you must use your own freight forwarder (Haas does not ship everywhere), you can ask us for a recommendation
- If you choose the least expensive forwarder, you may get a company that has no experience with batteries, modules and other PV items that require specific handling
- If you use your own freight forwarder, we will provide a commercial invoice and SED as needed. We will not prepare any other documents
- We will try to get them other info as needed but this adds time and cost.
- It is necessary to finalize your bill of materials (BOM) before requesting shipping information. Changing orders results in significant delays
- Getting a correct freight quote can take between 48 hours and 2+ weeks depending on location and the level of freight service at their destination
- We normally do not sell GT inverters for 50 Hz 220 European systems
- We do not drop ship to foreign locations. If they are ordering batteries, wind machines, non-Unirac mounting systems etc, they will have to pay shipping from the manufacturer to our warehouse in Sacramento, CA plus shipping from Sacramento to destination

Question and Answer Time

almost done!



Sponsored by



HooRay Solar!

The AEE Solar Advantage



- **Unsurpassed technical know-how**
- **Proven products at highly competitive prices**
- **Widest selection of balance-of-system items**
- **Renewable Energy Design Guide & Catalog**
- **Solar training and education**
- **Complete-system packages**
- **Responsive customer service**
- **Financing packages**
- **Blind drop shipping**
- **Just-in-time delivery**
- **Custom-engineered solutions**

We help you succeed!



A big thanks to our sponsor of
“Launch & Grow Your Solar Business”



*High-Performance Solar Energy
Solutions for Long-Term Value*